CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Twenty-fifth meeting of the Plants Committee
Geneva (Switzerland), 17 and 20-23 July 2020

RESPONSE OF INDIA TO THE QUESTIONNAIRE ON BOSWELLIA TREES (*BOSWELLIA* SPP.)

1. This information document has been prepared by the Secretariat and is submitted in relation to document PC25 Doc. 25 on *Boswellia trees (*Boswellia *spp.)*. [1]

2. India submitted a response to Notification 2020/010 and its Annex on *Questionnaire on Boswellia trees (*Boswellia *spp.)* on June 27, 2020, and its content could not be considered in time for the publication of document PC25 Doc. 25 . The questionnaire submitted by India, in original language and format is attached in the Annex of the present information document.

3. The submitted information provides additional detail concerning the *B. serrata* and *B. ovalifoliolata* populations of India, to be considered by a potential working group at PC25, alongside the information contained in document PC25 Doc. 25 on *Boswellia trees (*Boswellia *spp.)*, and information document PC25 Inf. 3 on *Boswellia trees (*Boswellia *spp.).*

4. India reports that:

   a) *B. serrata* has a wide distribution in 17 out of the 28 federal states of which India is composed, and climatic suitability for the species prevails in ca. 22% of the overall Indian territory. In seven states exist detailed population assessments. The combined total species count in these seven states is estimated at 44 million individuals;

   b) *B. ovalifoliolata* is an endemic species restricted to specific locations in the state of Andhra Pradesh. There is no population assessment available;

   c) Slow growth and poor regeneration are principal threats, while population trends and habitat trends are stable;

   d) Total demand for *B. serrata* for national consumption and international trade is estimated at 745 tonnes per annum, with the majority used in Ayurvedic medicine, and annual exports approximating 90 tonnes;

   e) Unsustainable harvest led to declines of *B. serrata* populations in some Indian states, but several efforts for artificial propagation and plantations are underway, and Boswellia species and habitats are now well-protected; and that

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[1] *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

f) India considers the populations of *B. ovalifoliolata* may meet the criteria and may be considered for listing on Appendix II of CITES, while the populations of *B. serrata* do not meet the criteria for listing on Appendix-II of CITES.

5. The Secretariat recommends this information document to also be considered in the intersessional process that the Plants Committee will undertake, taking into consideration the recommendations contained in document PC25 Doc. 25 on *Boswellia trees (*Boswellia *spp.)*.

Questionnaire on Boswellia trees (*Boswellia* spp.)

Section 1: Contact information

1a.	Party: **India**	
1b.	Institution: **Ministry of Environment, Forest, Climate Change**	
1c.	Contact information of the representative who responded to the questionnaire:	Name: **Mr. Soumitra Dasgupta**
		Phone:+91-11-24695416
		Email: **adgwl-mef@nic.in**
		Other:

Section 2: Biological data on *Boswellia* (paragraphs a) and c) of Decision 18.205)

2a. **Please list the *Boswellia* species that are known to occur within the territory of your country:**

In India, the genus is represented by two species viz,. *Boswellia serrata* Roxb. Ex Colebr and *Boswellia ovalifoliolata* Balakr & A.N. Henry.*B. serrata* is widely distributed throughout the tropical parts of the country while *B. ovalifoliolata* is restricted in the tropical and subtropical parts of peninsular India.

2b. **For each species occurring in your country, please provide its population status. Add rows if needed.**

Species	No concern	Vulnerable	Endangered	Other, please specify	Unknown
• B.serrata	☒	☐	☐		☐
• B.ovalifoliolata	☐	☒	☐		☐
•	☐	☐	☐		☐

2c. **For each species occurring in your country, please provide information on the population trend. Add rows if needed.**

Species	Increasing	Stable	Decreasing	Other, please specify	Unknown
• B.serrata	☐	☒	☐		☐
• B.ovalifoliolata	☐	☐	☐		☐
•	☐	☐	☐		☐

2d. **For each species occurring in your country, please provide its habitat trends. Add rows if needed.**

Species	Increasing	Stable	Decreasing	Other, please specify	Unknown
• B.serrata	☐	☒	☐		☐
• B.ovalifoliolata	☐	☒	☐		☐
•	☐	☐	☐		☐

2e. **Please provide a short qualitative summary of each species' habitat and role in its ecosystem. Add space if needed.**

B. serrata's distribution across the country is quite wide. Out of 28 states in the county, it has presence in 17 states. Based on the available literature and survey, it is apparent that distribution and population size of *B. serrata* is fairly large.

The species mostly found in dry teak forest, southern dry mixed deciduous forests, dry peninsular sal forest, northern dry mixed deciduous forest and the edaphic climax types of the dry deciduous forests. The species prefers dry, hot climate and rocky mountain terrain with gravelly poor soils. The optimum rainfall of the species growing area appears to be 750 to 1500 mm with optimum temperature varying from 40°-47.5° C in summers and absolute minimum from 0° to 10°C in winters. In the Siwalik hills, it is found on dry sandstone ridges. In Rajasthan, it occupies drier ridges on gneiss, mica-schist, limestone and shales. In Madhya Pradesh, Chhattisgarh and Maharashtra, it finds favour in the hotter slopes and ridges of hills on trap and sometimes on gneiss and schist. The species has the ability to thrive in the poorest and shallowest soils where most of its associates remain stunted. In Tamil Nadu, it occurs on shales and quartzites of dry and stony hills. It is present either singly or in pure belts or patches up to 1,150 m. The species does not require frequent irrigation.

B. ovalifoliolata is an endemic species and is restricted in southern Andhra Pradesh state, in the tropical to subtropical dry deciduous forests of the peninsular part of India mainly in the foothills of the Seshachalam Hill ranges of the Eastern Ghats.

2f. **Please provide a short qualitative summary of each species' population status, size, and distribution. Add space if needed**.

B. serrata has presence in 17 states in India. Recently Rajpoot *et al*. (2020) predicted the distribution of future climatically suitable habitat areas for *B. serrata* in India. According to them, 21.95 % of the country area is climatically suitable for the *B. serrata* with substantial area distributed in the states of Madhya Pradesh , Uttar Pradesh, Karnataka, Rajasthan, Maharashtra, Haryana, Chhattisgarh and Jharkhand. A portion of the climatically suitable area also extended into the states of Uttarakhand, Gujrat, Tamil Nadu, Himachal Pradesh, Bihar, Punjab, Andhra Pradesh, Jammu & Kashmir and Kerala.

For *B. serrata*, the total population size across its entire range of distribution has not been assessed, but based on data in regional surveys, the population is still large. To assess present status of the *B. serrata*, data of living stock was sought from the different states. Where this information was available, it has been compiled and is as follows:

Maharashtra

The state of Maharashtra has wide distribution of *B. serrata* which is commonly known as Salai. The Maharashtra Forest Department is divided into 11 territorial circles and 51 territorial divisions. Based on standard sampling method, the population size has been estimated. A total population of 8.52m has been estimated in 10 circles. The highest number of trees was estimated for Chandrapur Circle (2.34m) followed by Gadchiroli (1.73m), Dhule (1.54m), Amaravati (1.0m), Nagpur (0.88m) etc. The species was not reported from Nashik Circle.

Madhya Pradesh

Extensive survey for population density (T ha^{-1}) estimation was carried out by the forest department using standard method. The species is distributed throughout the state. Mostly, the species is found in mixed forests, however, in some areas pure patches have been reported. Out of 16 forest circles, presence of *B. serrata* is found in 15 circles and most of the forest divisions. The species has been not reported from Rajgarh and Obedullaganj forest divisions. The highest density was reported for Umaria Forest Division. Under this division, Ghunghuti Range showed the highest density (73.25 T ha^{-1}) followed by Pali Range (41.87 T ha^{-1}), Norajabad (36.61 T ha^{-1}), Umariya Range (22.79 T ha^{-1}) and Chandiya Range (22.79 T ha^{-1}). On the basis of available range wise data, average tree density (T ha^{-1}) in Madhya Pradesh was estimated to be 3.53 (T ha^{-1}). For the total forest cover of 7.75m ha., the population of *B. serrata* in the state is estimated to be 27.35m.

Gujarat

B. serrata is also widely distributed in the state of Gujarat. The Forest department enumerated salai trees in all the divisions and same was mentioned in the working plans. As per the estimate of Gujarat Forest Department, total individual trees existing in the state of Gujarat are 1.932m. The highest number of trees are found in Banaskantha Forest Division (1.746m) followed by Sabarkantha (0.068m), Chotaudepur (0.055m), Vayara (0.022m) , Arvalli (0.019m) etc.

Telangana and Andhra Pradesh

Telangana and Andhara Pradesh have substantial number of *B. serrata* trees. A comprehensive exercise was carried out by the Institute of Forest Biodiversity, Hyderabad from the sampled plots for estimation of growing stock of Salai. Data reveals that in Telangana there are approximately 5.0m tree. The study was based 2080 sample points with 359 individuals spread in 14 forest divisions. A similar exercise was done in the state of Andhara Pradesh with 1080 sample points drawn from 7 forest divisions. The study reveals that the estimated population of *B. serrata* is 0.4m.

Karnataka

In Karnataka, *B. serrata* is found in 10 forest divisions namely Bellary, Chitradurga, Davanagere, Kalburgi, Yadgiri, Bidar, Chikmaglur, Koppa, Hassan and Tumkur. On the basis of beat wise surveys, a study report on "Population status and removal of Bio-resources in forests with special emphasis on medicinal plants in Karnataka", projected the population of *B. serrata* to be 3.21m and number of matured trees to be 0.565m. The report also reveals that among the 50 species of Bellary forest division, *B. serrata* is one of the dominant species in the area. However, present total living stock of *B. serrata* in the different divisions is 0.909 m trees. Highest number of trees are reported from chikmagalur forest division (0.470m) followed by Ballari (0.215m), Davanagere (0.065m), Chitradurga (0.052 m), and Kalburgi (0.043).

Haryana

In Haryana, the species is found in the Shiwalik hills of Panchkula and Yamuna Nagar hills covering Kalesar, Chhachhrauli, Panchkula and Pinjore forest ranges. Recently in the Arawali hills of Rewari district, existence of species has been noticed with about 200 individuals. The species is mainly found in a scattered manner except in Kalesar range near Chikan tower where it occurs in patches. As per the estimate of Haryana Forest Department there are about 2500 trees in Haryana.

B. ovalifoliolata is an endemic species and is restricted to Andhra Pradesh, in the tropical to subtropical dry deciduous forests of the peninsular part of India mainly in the foothills of the Seshachalam Hill ranges of the Eastern Ghats in the Chittoor, Tirupati, Nallamali, Cuddapah and Kurnool districts. It has very restricted distribution. No assessment of the living stock of *B. ovalifoliata* has been made till date.

2g. **Please list the main threats that are known to affect the conservation and sustainable use of *Boswellia* species and known drivers of these threats.**

Slow growth; relatively poor regeneration; Over exploitation for use may be a threat if not managed sustainably.

2h.	**Please provide citations of relevant literature and any supporting files to the questions above. Please add rows as needed.**	
	File/attachment	**Comments (if any)**
	List of References attached as **Annexure.**	

Section 3: Harvest and exploitation (paragraph b), c)and d) of Decision 18.205)

3a. **Which *Boswellia* species among those occurring in your country are harvested for subsistence or commercial use?**

B. serrata is a commercially important tree which exudes volatile oil, resin and gum.

3b. **For what uses are *Boswellia* species mainly harvested (e.g. timber, medicine, incense, other)?**

Uses of *B. serrata* in India

Plant Part or Plant Product	**Uses**
Bark	Used as cordage (Orwa *et al*.,2009).
Boswellic acids	Isolated boswellic acids used for pharmaceutical therapeutic applications (Du *et al*., 2015) Collected by local people as one source of income from NTFPs (Dular, 2015). Indian herbal extraction companies produce standardized and non-standardized *B. serrata* extracts for the export market, mainly Japan, Singapore, UAE and USA (Brender *et al*., 2018).
Exudate (oleogum resin)	After removal of the polysaccharide fraction, the only non-coniferous source of turpentine and resin in India (reportedly used as a substitute for imported 'Canada balsam' oleoresin from the bark of *Abies balsamea* (L.) Mill.) (Haryana State Medicinal Plants Board, 2013). Active ingredient of traditional Ayurvedic medicinal formulations for treatment of asthma and arthritis (Ayurvedic Pharmacopoeia Committee, 2004) and of traditional Unani medicinal formulations for the treatment of renal disorders (Ahmed *et al*., 2014).
Extracted gum	Used as a binding agent in pharmaceutical tablet formulations (Chaudhari *et al*., 2011).
Fodder	As a substitute fodder for buffaloes (Orwa *et al*., 2009).
Green leaf twigs	Utilized as fodder in the Sariska tiger Reserve situated in the Aravalli hill range (Dular, 2015)
Tree	Reported new use in West Bengal as a lac host (Orwa *et al*. 2009). Used for fuel; charcoal made from it is used for iron smelting (Orwa *et al*., 2009)
Wood	Wood fibre mixed with 25-40% long fibred bamboo pulp to make paper (Mahesh *et al*,. 2015)

	Used to produce local furniture , storage boxes, packing cases, cement barrels, matches, plywood and veneers (Orwa *et al*., 2009)

B. ovalifoliolata is used as a substitute for gum extracted from *Commiphora wightii*.

3c. **For each of the above uses, what is the volume of harvest for commercial purposes (approximate annual harvest)? Please include an estimate of the number of trees harvested and/or volume of harvested material. If available, provide conversion factors.**

India is the main supplier of frankincense derived from *B. serrata* (Brendler *et al.* 2018). In trade *B. serrata* is known by several names such as *B. serrata* Extract, *B. serrata* Gum, *B. serrata* Gum Extract, *B. serrata* Leaf Cell extract, Boswellia serrata Oil, *B. serrata* Resin Extract, *B. serrata* Water, Saccharomyces/ *B. serrata* Gum Ferment Extract. India is the only producer of *B. serrata* oleo-resin for the international market.

Most of frankincense is harvested in the Sheopur district in Madhya Pradesh. Bhattacharya & Hayat (2004) estimated that 530 tonnes of frankincense resin harvested annually from the Sheopur. From Gujarat and Andhra Pradesh annually 99.8 and 27.0 tonnes were harvested respectively during 2008-2013 (Yogi *et al.,*2014).

According to Coppen (1995), total trade of world olibanum in 1987 was 3200 tonnes, out of which India's share was 200 tonnes. From 1987-1993, India exported an average of 87.5 tonnes/year of frankincense resin. Brendler *et al.* (2018) reported export of 102.8 and 74.56 tonnes annually for the period of 2015-16 and 2016-17 respectively. Average annual export is estimated to be 89 tonnes for the year 2015-17. Goraya and Ved (2017) estimated annual consumption of *B. serrata* in Herbal Raw Drugs by Domestic Herbal Industry in India is 655.47 MT from wild source. It is reflected from the above data that total demand for *B. serrata* for national consumption and international trade is 745 tonnes per annum in India.

3d. **What volume is exported (approximate annual export)?**

From 1987-1993, India exported an average of 87.5 tonnes/year of frankincense resin. Brendler *et al.* (2018) reported export of 102.8 and 74.56 tonnes annually for the period of 2015-16 and 2016-17 respectively. Average annual export is estimated to be 89 tonnes for the year 2015-17.

3e. **Please specify to what extent (if any) harvest or export affects the sustainability of *Boswellia* populations.**

According to Shahabuddin and Prasad (2004), the level of exploitation of *B. serrata* can lead to extinction in the Sheopur forest division, Madhya Pradesh. However, current data reveals high number of individuals in the Sheopur forest.

According to Tewari (2014) unsustainable harvesting of frankincense led to decline in this species in the Indian state of Gujarat from an average of 400 tonnes/year in the 1970s to 150 tonnes in 1990s , and not exceeding an average of 20 tonnes/year in 2008-2013 (Brendler *et al.* 2018; Yogi *et al.* 2014)

3f. **Please specify if harvest or export reduce or otherwise affect the regeneration capacity of *Boswellia* populations.**

Please see the response in 3e above.

For sustainability of planting stock, a number of nurseries are being managed by the Forest Departments. Different states have adopted measures for the sustainable harvesting of produce. Under Biodiversity Conservation and sustainable harvesting (2005), officials are empowered in Madhya Pradesh to prohibit areas for *B.serrata* collection. On an average one mature *B.serrata* tree yields with 90cm girth yields about 2.0 to 2.5 kg of oleo-resin in a year. Large number of rural people residing in the forest fringe villages are engaged in the harvest of the oleo-resin. This is one of the important forest based livelihood generating options for these people. Similarly a number of processing units are involved in the process resulting in job opportunities for the large section rural population.

3g. **Please summarize any initiatives to artificially propagate/cultivate *Boswellia* species or to grow plantations or nurseries of them, and the scale and size of plantations/nurseries.**

In India, several State Governments are taking up initiatives for plantations of *B. serrata.* In Maharashtra, under Gosikurd project, nursery of 2000 plants was raised and maintained in Brahmapuri Division and 200 plants raised in Wansadi Range , Central Chanda Division.

In Gujarat, seedlings were raised in forest nurseries for planting in forest areas. Sabarkantha forest division raised 11300 plants in Poshina, Lambadiya, Raigadh and Khebrahma nurseries. In Gabbar Nursery, Ambaji North Range Banaskantha Forest Division, 1,11,100 plants were raised in the year 2018-19. Apart from seedlings of seed origin, vegetative method of propagation was also done in forest areas. *B.serrata* is also being propagated through root sucker by digging trenches around old mature trees

3h.	**What are the challenges to artificially propagate/cultivate *Boswellia* species in your country?** *B. serrata* has low viability and survival percentage.

3i.	**Please provide citations of relevant literature and any supporting files to the questions above. Please add rows as needed.**	
	File/attachment	Comments (if any)
	List of References attached as **Annexure.**	

Section 4: Supply chains and international trade (paragraph a), b)and f) of Decision 18.205)

4a. **Who are the predominant legal or customary owners / custodians of *Boswellia*?**

Government-owned ☒ Local communities ☐ Individual ownership ☒ Community-based or individual land tenure ☐

Please describe the land ownership structure where *Boswellia* spp.occur, including harvest rights.

In India, the species is harvested by several tribal communities. Large numbers of rural people residing in the forest fringe villages are engaged in the harvest of the oleo-resin. This is an important forest based livelihood generating option for these people.

4b. **If known, please specify who are the main harvesters of *Boswellia* specimens?**

Individual collectors ☒ Collector associations ☐ Private companies ☐ Other ☐

Please provide further details on the types of harvesters.

Large numbers of rural people residing in forest fringe villages are engaged in the harvest of the oleo-resin

4c. **Is there any in-country processing capacity for *Boswellia* specimens? Please describe.**

Although there are processing units within the country, a detailed assessment on their numbers, capacities, etc have not been done.

4d. **Approximately how many companies or institutions in your country are known to process and / or trade *Boswellia* specimens? Please list the main ones.**

This information is not available at present. Further time would be required to collect it.

4e. **What are the main *Boswellia* specimens known to be exported from your country (e.g. extract, woodchips, other)?**

A complete assessment of this not available at present. Please see our responses in 3b and 3c above.

4f.	**Which are the main known importing countries of *Boswellia* specimens sourced from your country?**

Oleo resin is in high demand in countries like Germany, Mexico, USA, Belgium, France, UK, etc.

4g.	**Please list the *Boswellia* species that are imported into your country (whether finished or unfinished specimens) and the countries from which they were imported.**

India imports *B. sacra* and *B. frereana* from the Gulf and North Africa.

4h.	**What are the main *Boswellia* specimens imported into your country (e.g. timber, medicine, incense, other)?**

This information is presently not available and would require time to collect.

4i.	**What is the approximate volume of *Boswellia* specimens being imported? Please specify for each type of specimen.**

This information is presently not available and would require time to collect.

4j.	**Is there any re-export of *Boswellia* specimens from your country? Please specify including approximate volumes of the specimen re-exported and to which countries.**

This information is presently not available and would require time to collect.

4k.	**If known, please provide common trade names and/or product names under which the *Boswellia* specimens are internationally traded.**

Boswellin®, Shallaki® , Niltan® , Rheumatic-X®

4l.	**If available, please provide information on any reference material, guidance, or tools to identify *Boswellia* specimens in trade.**

This information is presently not available.

4m. **If available, please provide contacts of any known stakeholder groups, specialists, or institutions that might aid the Secretariat in the implementation of Decision 18.206.**

Forest Research Institute, Dehradun (a designated CITES Scientific Authority of India)

4n. **Please provide citations of relevant literature and any supporting files to the questions above. Please add rows as needed.**

	File/attachment	Comments (if any)
	List of References attached as **Annexure.**	

Section 5: Regulatory framework and species management (paragraph e) of Decision 18.205)

5a. **Please describe any regulations or management measures in place or in preparation concerning**

i. The conservation of *Boswellia* populations and/or habitats?

Boswellia species and its habitats are protected as per the Indian Forest laws. Training and awareness programmes organized at village level for sustainable harvesting oleo-resin.

ii. The sustainable harvest of *Boswellia* specimens?

For sustainability of planting stock, a number of nurseries are being managed by the Forest Departments. Different states have adopted measures for sustainable harvesting of produce. Forest officials can regulate, on the basis of the area and season for collection and harvesting of *B.serrata* under the Madhya Pradesh Forest Produce (Biodiversity Conservation and Sustainable Harvesting) Rules, 2005

iii. The export of *Boswellia* specimens?

Frankincense or oilbanum is exported and imported under ITC HS code 13019032. As per the Directorate General of Foreign Trade (DGFT), Ministry of Commerce, Government of India, the item under this code is freely exportable under the current export policy. Import of the item is also 'free' under the current import policy".

iv. Ecological restoration efforts *in situ*, planned or underway, including the timeframe, source of propagation specimen, and outcomes.

State Governments are taking up plantations of Boswellia in their respective States. In Maharashtra, under Gosikurd project, nursery of 2000 plants was raised and maintained in Brahmapuri Division and 200 plants raised in Wansadi Range, Central Chanda Division.

In Gujarat, seedlings were raised in forest nurseries for planting in forest areas. Sabarkantha forest division raised 11300 plants in Poshina, Lambadiya, Raigadh and Khebrahma nurseries. In Gabbar Nursery, Ambaji North Range Banaskantha Forest Division, 1,11,100 plants were raised in the year 2018-19. Apart from seedlings of seed origin, vegetative method of propagation was also done in forest areas. *B.serrata* is also being propagated through root sucker by digging trenches around old mature trees.

5b.	**Please provide citations of relevant literature and any supporting files to the questions above. Please add rows as needed.**	
	File/attachment	Comments (if any)
	List of References attached as **Annexure.**	

Section 6. Additional remarks or information

6a. **Please provide any additional information or remarks relevant to the implementation of Decisions 18.205 to 18.208 on Boswellia trees (*Boswellia* spp.)**

Due to its restricted distribution and over exploitation, *B. ovalifoliolata* has been classified as "Vulnerable" by IUCN. We are of the view that this species may meet the criteria and may be considered for listing on Appendix II of CITES.

On the other hand, *B. Serrata***,** commonly known as salai, has wide distribution in India. Most of the salai is utilized in ayurvedic medicine (655 MT) and a much smaller amount of 89 MT is exported to other countries. It is being propagated by the vegetative means such as shoot and root cuttings. Tissue culture techniques are being developed for mass multiplication.

Population data for *B. serrata* collected from concerned states reveals that a large population exists in different forest divisions of states such as Maharashtra (8.52 m), Madhya Pradesh (27.3m), Gujarat (1.94m), Telangana (5.0m) and Andhra Pradesh (0.4 m). For sustainability of planting stock, a number of nurseries are being managed by the Forest Departments. Different states have adopted measures for the sustainable harvesting of produce. Large number of rural people residing in forest fringe villages are engaged in the harvest of the oleo-resin and it is an important forest based livelihood generating option. Considering the large living stock of *B. serrata* in the country, that the species does not meet the criteria for listing on Appendix-II of CITES.

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