The Rufford Foundation
Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Dao Thi Hoa Hong
Project title	Diversity and conservation of valuable timber, non-timber forest product and rare tree species in a montane nature reserve, north-western Vietnam
RSG reference	19217-2
Reporting period	June 2016 – December 2016
Amount of grant	£4998
Your email address	daothihoahong82@gmail.com
Date of this report	23 January 2017

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
To assess the difference in the diversity of valuable timber species, non-timber forest product tree species and local rarity tree species between a strictly protected core zone and a traditionally used buffer zone.				We found that the forests in the core zone and the buffer zone are rich in tree species (249 observed). Many of these tree species provide non-timber forest products (NTFPs) (48%) or valuable timber (22%). 79 tree species (32%) were rare in at least one of the zones and 18 species are red-listed. Overall tree density was not different in the two zones, but tree diameter and species richness were lower in the buffer zone.
To investigate the key reasons which affect the diversity of valuable timber species, non-timber forest product tree species and rare tree species in the core zone and the buffer zone.				We applied the logistic regression analysis to identify the impact of important variables, such as timber use, NTFP use, tree diameter, tree rarity, and red-list status, on differences of tree community between the core zone and buffer zone. We found that at the tree level, red-listed status, tree diameter, density of species and NTFP use (in order of reducing importance) were significantly associated with the probability of tree absence from the buffer zone. At the species level, the density of species was the most important variable, and low density (species rarity) strongly increased the probability of species absence
To suggest sustainable forest management strategies which meet				We established logistic regression models for predicting probabilities of tree and species

both the purpose of biodiversity conservation and the needs of local people				presence/absence. Therefore, the use of these models allows evaluation of the conservation effectiveness in a given nature reserve over time and among other nature reserves and national parks, and also facilitates the development of conservation strategies by quantifying the effects of different forest management measures on the presence or absence of trees and species

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

Some local women who came to community meetings but they are too shy and they cannot speak popular Vietnamese language (they only can speak H'Mong's language). It is difficult to get information from them. We tried to close and encouraged them a lot. The ranger in our team was a translator in these cases. It took more time than we estimated.

3. Briefly describe the three most important outcomes of your project.

3.1 A scientific paper with the title "Patterns of tree community differences in the core and buffer zones of a nature reserve in north-western Vietnam" has been published in the open access journal of Global Ecology and Conservation 8 (2016) 220–229, doi:10.1016/j.gecco.2016.09.011.
Available online at: http://www.sciencedirect.com/science/article/pii/S2351989416300907

3.2 The differences of tree community structure between the core zone and the buffer zone related to tree uses, dimensions, and rarity were analysed.

3.2.1 Tree species classification

A list of species name, number of trees, use category and specific use in traditional way of 120 NTFP tree species in the Ta Xua Nature Reserve were documented. The utilisation of NTFP species were classified in six different categories in accordance with local knowledge. The diversity of tree parts used varied from only one part to the whole of tree. Some species e.g. *Archidendron clypearia, Castanopsis indica,* and *Garcinia xanthochymus* are

used with only one component, while other NTFP species such as *Acronychia pedunculata, Canarium pimela,* and *Heliciopsis lobata* are often used some parts or a whole of tree. The medicinal species accounted for the highest proportion of NTFP tree species in Ta Xua Nature Reserve. They are used to treat various human diseases. For example, fruits and leaves of *Goniothalamus macrocalyx* are used as tea for preventing cancer, leaves of *Endospermum chinense* are used to treat bone diseases, and leaves of *Euodia lepta* and bark of *Melia azedarach* treated skin diseases (see in Appendix 1).

In addition, the lists of name and status of valuable timber tree species, local rare tree species and red-listed tree species in the core zone and the buffer zone were also reported. 54 tree species (accounting for 22% of all observed species in the core and buffer zones) were valuable timber species, 35 tree species were multiple-use species (providing both NTFPs and valuable timber). 79 tree species (32%) were rare in at least one of the zones, and 18 tree species (7%) were red-listed tree species (see in Appendices 2, 3, 4).

3.2.2 Differences in tree communities between the core zone and the buffer zone

Overall tree density was not different in the two zones, but tree diameter and species richness were lower in the buffer zone. However the density of large diameter trees (DBH ≥ 30 cm) significantly reduced and the density of small diameter trees (DBH < 30 cm) increased in the buffer zone. Trees providing NTFPs were significantly more numerous in the buffer zone, whereas trees providing valuable timber were more numerous in the core zone. Rare and red-listed trees had lower densities in the buffer zone.

Comparison of tree species in the two zones indicated that the buffer zone had the estimated species richness 28% lower. The buffer zone also had 53% fewer tree species with DBH ≥ 30 cm, 7% fewer valuable timber species, 10% fewer NTFP species, and 35% fewer multiple-use species. Rare and red-listed tree species also reduced by 56% and 38%, respectively, in the buffer zone.

3.2.3 Logistic regression models for predicting probabilities of tree and species absence

A multiple logistic regression analysis was used to predict the probability of tree absence in the buffer zone. The results indicate that red-listed status (OR = 2.94, 95% CIs = 1.81- 4.78) and *large DBH* (OR = 1.01, 95% CIs = 1.00 - 1.02) increased the probability of tree absence in the buffer zone. In contrast, high density (OR

= 0.99, 95% CIs = 0.98 -1.00) and NTFP use (OR = 0.62, 95% CIs = 0.49 - 0.76) reduced the probability of tree absence in the buffer zone.

Logistic regression analysis was used to predict the probability of species absence in the buffer zone. The results indicate that the probability of species absence was predicted by density of species per hectare, but not by other analyzed factors (DBH, NTFP use, valuable timber, red-listed status). In particular, low density was strongly associated with increased probability of species absence. Comparison of different logistic models for density of species indicated that the (1/density of species per ha) and (1/density of species per ha)$^{0.25}$ models had lower AIC values than the (density of species /ha) model, and that the (1/density of species per ha)$^{0.25}$ model had the lowest AIC value indicating the highest level of prediction accuracy.

3.2.4 DCA for analysing tree densities of NTFP species

Correlations of densities of NTFP tree species with forest structure and human interference variables were analysed using detrended correspondence analysis (DCA). The first DCA axis correlated negatively with species richness (r = -0.4) and positively with the number of footpaths (r = 0.3), and the second DCA axis correlated negatively with the number of stumps (r = -0.4) and positively with tree DBH (r = 0.7), ($p \leq 0.05$). The different directions of the vectors of these four variables suggest contrasting influences of forest structure variables and human disturbance variables on the abundance of NTFP species.

NTFP tree species that had high densities in the buffer zone positively correlated with two human interference variables: number of footpaths and number of stumps. It indicated that densities of these species are likely to increase with increasing numbers of footpaths and stumps. On the other hand, NTFP tree species that had low densities in the buffer zone negatively correlated with these human interference variables. It means that densities of these species tend to decrease with increasing human interference. In other words, these results indicated that human interference had divergent effects on the abundance of NTFP tree species. It is likely that NTFP use by local people changed the density of tree species, but it did not lead to species extirpation.

3.3 Indigenous knowledge of local H'Mong people in collecting and using NTFPs was documented.

Indigenous knowledge of local H'Mong people in collecting and using NTFPs was firstly documented, therefore, there is an opportunity to conserve and share their knowledge about forest protection and use.

4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).

Firstly, two local people were members of our team. They participated all different phases of the fieldwork. Secondly, H'Mong elders, traditional doctors and local women were invited to participate in the ethnobotanical survey. Therefore, they can enhance their awareness about forest science, forest ecology and forest conservation from forester, ranger, scientist and botanist. They also have chances to share their knowledge and also ask some relevant questions. Local people also got benefit from being paid while participating in this project. After that, local people also were informed about the diversity status of high valuable timber species, NTFP tree species, rare and red-listed tree species from the findings of this project.

5. Are there any plans to continue this work?

Yes, I would like to continue this project to propose concrete conservation measures to preserve some specific rare and red-listed species that are iconic tree species and facing the endangerment of extinction. For example, studies of the spatial patterns of regeneration trees in relation of adult trees, breeding and nursery techniques and transplant experiments of some threatened tree species should be conducted.

I would like to apply our models in other nature reserves and national parks to assess the diversity status of rare, red-listed and useful tree species, thus to evaluate the effectiveness of forest protection and conservation measures.

I also would like to conduct some other studies on ecosystem services to assess the benefits local people obtain from ecosystems as well as the social and economic values of forest ecosystems that facilitate the managers and policy-makers release suitable legal regulations to balance conservation and socio-economic objectives.

6. How do you plan to share the results of your work with others?

6.1 The results of this project had been published as an original research article in an international open access journal of Global Ecology and Conservation on 18

October 2016. Audiences can free download it from http://www.sciencedirect.com/science/article/pii/S2351989416300907

6.2 I also presented the results of this project to (1) the reserve's committee and staff members of the Ta Xua Nature Reserve, (2) local H'Mong people, and (3) international PhD students in Tropical Silviculture and Forest Ecology Department, Forest Science and Forest Ecology Faculty, Göttingen University, Germany.

6.3 The results of this project will be published as one part of my PhD dissertation to submit to Faculty of Forest Science and Forest Ecology, Göttingen University, Germany.

6.4 I also will use data and results of this project in my lectures for bachelor and master students in Vietnam National University of Forestry when I come back to Vietnam.

7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?

The Rufford Foundation grant was used successively in the whole time of the project. The money was spent according to the anticipation in this project. In the first time of this project, the Rufford Foundation grant was partly used for purchasing some necessary things such as protecting clothes, sleeping bags and first aid kit for team members. In the middle phase of this project, the main expenses were used for paying the field assistants in the fieldwork. Besides, the RSG was also used for food buying and lodging for team members when working in forest. At the end of this project, the RSG was used for ethnobotanical survey including renting community meeting places; preparing water and tea for participants and paying to meeting participants.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used. 1£ = 27961VND

Item	Budgeted Amount	Actual Amount	Difference	Comments
First aid kit (1 set)	63.29	63.29	0	
Personal protecting clothing and sleeping bags (5 sets)	268.74	268.74	0	
Field supplies for partners (5 people)	3914.24	3914.24	0	
Food, lodging and other	604.3	604.3		

miscellaneous things for fieldwork (lump sum)				
Ethnobotanical survey	147.58	147.58	0	
Total	**4998**	**4998**	0	

9. Looking ahead, what do you feel are the important next steps?

Our results also indicate that rare and red-listed trees were depleted in the buffer zone. In consideration of conservation goals, specific conservation efforts to preserve threatened tree species in the Ta Xua Nature Reserve are needed.

Other nature reserves and national parks should evaluate the effectiveness of current conservation measures through using our models to whether or not conservation goals are met or need to be improved.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

I used the logo of the RSG in all my presentations when I presented the results of this study in the Ta Xua Nature Reserve and in Tropical Silviculture and Forest Ecology Department, Faculty of Forest Science and Forest Ecology, Göttingen University.

11. Any other comments?

I submit the PDF file of article published in an international open access journal of Global Ecology and Conservation.

I also submit the appendices of (1) traditional uses of non-timber forest products; (2) diversity status of valuable timber species; (3) a list of rare tree species and (4) a list of red-listed tree species in the core and buffer zone of the Ta Xua Nature Reserve.

I will submit my PhD dissertation after I defend.

I am grateful to the Rufford Foundation for financial support to carry out this research project and I acknowledged the Rufford Foundation in my publication.

Appendix 1. Traditional uses of non-timber forest products (NTFPs). Tree species names, number of trees with DBH of at least 6 cm in the core zone (C.z) and buffer zone (B.z), utilization categories, and specific use of 120 NTFP species in the Ta Xua Nature Reserve (40 sample plots per zone). Utilization categories: 1, medicine; 2, food; 3, fiber; 4, fodder; 5, fish paralysis (coma); 6, incense. Detailed utilization is based on indigenous knowledge. Species correlated significantly with DCA axes (Fig. 5) are indicated in bold in the species code column

Scientific name	Species code	Vietnamese name	No. of trees		Utilization						Detailed utilization
			C.z	B.z	1	2	3	4	5	6	
Acer campbellii subsp. wilsonii (Rehder) P.C.DeJong	Ace.w	Thích 3 thùy	5	0		x					Fruits are edible.
Acronychia pedunculata (L.) Miq.	Acr.	Bưởi bung	8	0	x	x					Decoction of roots and leaves is used to treat colds, cough, indigestion, and rheumatism. Crushed leaves are used to treat swelling pain. The water of boiled leaves is used to treat flu and pimples. Fruits are edible and used to treat anorexia and flatulence.
Actinodaphne cochinchinensis Meisn	Act.c	Mò vối thuốc	1	2	x						Decoction of leaves is used to treat measles, dysentery, abdominal pain, and rheumatism. Crushed bark and leaves are used to treat scabies, injuries, and swelling pain.
Aglaia odorata Lour.	Agla.	Gội ngâu	7	0	x	x					Roots are used to induce vomiting. Leaves are used to treat scabies. Scented flowers are used to preserve tea.
Aidia pycnantha (Drake) Tirveng	**Aid.**	Mãi táp lông	6	2	x						Medicine
Alangium chinense (Lour.) Harms	Ala.c	Thôi ba	2	1	x			x			Roots are used to treat rheumatism. The liquid of chewed leaves and the paste residue is used to treat snakebite. Root bark is used to treat bone pain, joint pain, and swelling pain. Fruits are combined with other species to treat kidney disease. Leaves are used as food for animals.

Allospondias lakonensis (Pierre) Stapf	**Allo.**	Dâu da xoan	4	4	x	x					Bark is used to treat cough. Crushed leaves are used to treat pain and swollen knees. Seeds are used to treat indigestion. Fruits are edible and have a sour and sweet taste.
Altingia siamensis Craib	**Alt.**	Tô hạp điện biên	17	91						x	Resin is used to make incense.
Antidesma ghaesembilla Gaertn.	Ant.g	Chòi mòi	1	0	x	x					Flowers are used to treat rheumatism. Bark is used to treat diarrhea. Crushed leaves are used to treat headaches and pimples. A decoction of branches is used to treat irregular menstruation. Fruits are edible, have a sour taste, and are used to treat cough and pneumonia.
Aphanamixis polystachya (Wall.) R.Parker	**Aph.**	Gội trắng	1	9	x						Decoction of bark is used to treat the spleen, liver disease, tumors, and abdominal pain. Seed oil is used as an ointment during massage for rheumatism.
Archidendron clypearia (Jack) I.C.Nielsen	Arc.c	Mán đỉa	0	2	x						Water of boiled leaves is used to treat scabies.
Archidendron lucidum (Benth.) I.C.Nielsen	Arc.l	Mán đỉa trâu	1	5	x						Branches and leaves are used to treat emphysema and rheumatism.
Artocarpus tonkinensis A.Chev. ex Gagnep.	Art.	Chay rừng	0	1	x	x					Fruits are used to treat lung disease, bleeding cough, nose-bleeding, sore throat, stomach ache, and anorexia. Roots are used to treat arthritis, back pain, menorrhagia, and to strengthen teeth. Root bark and the sour and sweet fruits are edible.
Betula alnoides Buch.-Ham. ex D.Don	**Betu.a**	Cáng lò	1	4	x						Bark and leaves are used to treat venomous snake bites. Bark is used to treat common colds, stomach ache, dysentery, and rheumatism.

Bischofia javanica Blume	Bis.	Nhội	1	0	x	x					Shoots and young leaves are used to treat diarrhea, pimples, itches, and vaginitis. The water of boiled shoots and young leaves is used to treat toothache, gingivitis, and sore throat. Fruits, shoots, and young leaves are edible.
Camellia chrysantha (Hu) Tuyama	Came.ch	Chè hoa vàng	2	0	x	x					Leaves are used to make tea and treat dysentery.
Camellia sinensis (L.) Kuntze	**Came.si**	Chè rừng	4	15	x	x					Leaves are used to make tea and treat indigestion.
Canarium pimela K.D.Koenig	Canar.	Trám đen	0	1	x	x					Fruits are edible, have a fleshy and buttery taste, and are used to treat for detoxification alcohol, eating toxic fishes and larynx disease. Fruits and seeds are used to treat dental caries. Roots are used to treat rheumatism and backache. Leaves are used to treat flu, upper respiratory infection, pneumonia, and scabies.
Carallia brachiata (Lour.) Merr.	**Cara.b**	Trúc tiết	11	8	x	x					Bark is used to treat scabies, spreading ulcers, mouth ulcers, and sore throat. Fruits are edible.
Castanopsis chinensis (Spreng.) Hance	Cast.c	Dẻ gai trung quốc	1	1		x					Nuts are rich in starch and edible.
Castanopsis indica (Roxb. ex Lindl.) A.DC.	**Cast.i**	Dẻ gai ấn độ	18	20		x					Nuts are rich in starch and edible.
Castanopsis lecomtei Hickel & A.Camus	Ca.lec	Cà ổi sapa	3	0		x					Nuts are rich in starch and edible.
Castanopsis purpurella (Miq.) N.P.Balakr.	Ca.pur	Dẻ gai đỏ	3	0		x					Nuts are rich in starch, edible, and used to make distilled alcohol.
Castanopsis sp2.	**Cast.sp2**	Dẻ gai	0	15		x					Nuts are edible.
Castanopsis sp3.	Cast.sp3	Dẻ gai lá nhỏ	1	0		x					Nuts are edible.
Castanopsis tonkinensis Seemen	**Cast.to**	Dẻ gai bắc bộ	35	17		x					Nuts are edible.

Castanopsis tribuloides (Sm.) A.DC.	**Cast.tr**	Dẻ sp	1	10		x					Nuts are edible.
Choerospondias axillaris (Roxb.) B.L.Burtt & A.W.Hill	Choe.	Xoan nhừ	8	9	x	x	x				Fruits are used to treat weak/damaged spleen, indigestion, and hemorrhagic injuries. Bark and root bark are used to treat burns and pimples. Roots and leaves are used to treat indigestion. Fruits are edible, havea sour and sweet taste, and are used to make wine. Fiber from bark is used to braidropes.
Cinnamomum balansae Lecomte	Cinnamo.	Vù hương	0	1	x						Oil from leaves, bark, trunk, and roots are used to treat flu, indigestion, cough, and rheumatism.
Cinnamomum bejolghota (Buch.-Ham.) Sweet	**Cin.b**	Re bầu	3	14	x						Bark, branches, leaves, and roots contain aromatic oils. Bark is used to treat flatulence and liver damage. Bark and leaves are used to treat hemorrhagic injuries, bone fractures, and snake bites.
Cinnamomum curvifolium (Lam.) Nees	**Cin.c**	Re lá cong	4	0	x						Bark is used to treat palpitation.
Cinnamomum iners Reinw. ex Blume	Cin.i	Re hương	16	12	x						Oil from bark and leaves is used for massages in treating rheumatism.
Cinnamomum tonkinense (Lecomte) A.Chev.	**Cin.t**	Re xanh	0	3	x						Shoots are used to treat kidney disease, back pain, flu, and bone pain.
Cipadessa baccifera (Roth) Miq.	**Cip.**	Cà muối	0	4	x						Decoction of leaves is used to treat rheumatism and in baths for treating scabies
Cleistanthusmonoicus (Lour.) Müll.Arg	Clei.	Đỏm trơn	1	2	x	x					Root bark and leaves are used to treat bone pain and rheumatism. Fruit is edible and cleans the tongue.
Commersonia bartramia (L.) Merr.	Com.	Hu đen	0	2			x				Bark provides fiber for knitting mats.
Croton poilanei Gagnep	**Crot.**	Bã đậu lá dài	100	107	x		x				Bark is used to treat eye diseases and orally for treating abdominal pain. Leaves are used to treat allergies. Fiber from the bark is used for weaving and making braided ropes.

Eberhardtia tonkinensis Lecomte	**Eber.**	Mắc niễng	72	22		x					Seeds are edible.
Elaeocarpus grandiflorus Sm.	Ela.g	Côm đắng	1	0		x					Fruits are edible.
Endospermum chinense Benth.	Endo.	Vạng trứng	2	0	x						Leaves are used to treat bone fractures, injuries, arthritis, joint pain, back pain, and paralysis of arms and legs.
Ficus fistulosa Reinw. ex Blume	Fi.fi	Sung rừng	6	7		x					Fruits are edible.
Ficus glandulifera (Wall. ex Miq.) King	**Fi.gla**	Vỏ mản	4	63			x				Bark provides fiber.
Ficus heterophylla L.f.	**Fi.he**	Vú bò	0	11		x		x			Fruits are edible. Leaves are used as a food for cattle.
Ficus hirta Vahl	Fi.hi	Ngõa lông	0	8	x						Resin is used to treat flatulence and constipation. Leaves and fruits are used to treat bruises.
Fokienia hodginsii (Dunn) A.Henry & H H.Thomas	Fokie.	Pơ mu	11	4						x	Oil is used for making incense
Garcinia cowa Roxb. ex Choisy	Gar.c	Tai chua	1	0	x	x					Seeds are used as an anti-emetic. Resin and leaves are used as an antiseptic. Fruits are edible, have a sour taste, and are used to treat fever.
Garcinia multiflora Champ. ex Benth.	Gar.m	Dọc	2	0	x	x					Seed oil is used to treat pimples. Bark and fruits are used to treat emphysema and are astringent and analgesic. Young leaves and fruits are edible.
Garcinia oblongifolia Champ. ex Benth.	Gar.ob	Bứa lá thuôn	2	1	x	x					Decoction of bark is used to treat stomach ache, indigestion, gastroenteritis, gingivitis, and cough-bleeding. Crushed bark is used to treat burns, pimples, eczema, allergy, and removal of bullets from the body. Resin is used to treat burns. Young leaves and fruits are edible.
Garcinia oliveri Pierre	Gar.o	Bứa lá dày	1	0	x	x					Combination of fruits with other species *(Garcinia villersiana)* is used to treat sprains. Fruit

											is edible and has a sour taste.
Garcinia xanthochymus Hook.f. ex T.Anderson	**Gar.t**	Nụ	2	5	x						Leaves are used to treat edema, flatulence, and abdominal pain.
Gmelina arborea Roxb.	Gme.	Lõi thọ	3	0	x						Juice of leaves is used to treat gonorrhea, cough, and ulcers. Branches are used to treat snake bites and scorpion stings. A decoction of roots is used to treat indigestion, fever, and edema.
Goniothalamus macrocalyx Bân	Gon.	Màu cau trắng	1	0	x						Bark, fruits, and leaves are used to make a tea for anti-cancer treatment.
Helicia robusta (Roxb.) R.Br. ex Blume	Hel.r	Mạ sưa răng cưa	2	0	x						Leaves, bark, branches, roots, and fruits are used as a poultice.
Heliciopsis lobata (Merr.) Sleumer	Heli.l	Răng cưa	0	3	x						Leaves, branches, and bark are used to treat rheumatism and in preparing a water bath for women after childbirth to provide refreshment and analgesia.
Heteropanax fragrans (Roxb.) Seem.	Hete.	Đại khải	0	2	x						Root bark and roots are used for detoxification, to treat emphysema, and to provide analgesia and hemostatic effects. Branches are used to treat burns, sunstroke, headache, rheumatism, arthritis, hemorrhages, and snake bites.
Hydnocarpus anthelminthica Pierre ex Gagnep.	Hyd.a	Đại phong tử	3	5	x						In combination with other species is used to treat ulcers due to leprosy and some skin diseases.
Ilex cymosa Blume	**Ilex.c**	Nhựa ruồi	7	10	x						Roots are used to prevent fever. Leaves are used to treat sprains.
Ilex rotunda Thunb.	**Ilex.**	Vỏ rụt	4		x						Leaves and bark are used to treat flu, tonsillitis, sore throat, gastroenteritis, rheumatism, and dengue fever. Crushed leaves and bark are used to treat bruises, burns, pimples, and

											hemorrhagic injuries.
Juglans regia L.	**Jug.**	Óc chó	0	4	x	x					Seeds are edible and used to treat kidney disease, back pain, wounds, and asthma. Leaves are used to treat tuberculosis and skin diseases.
Kibatalia laurifolia (Ridl.) Woodson	Kib.	Ớt sừng	0	3	x						Root, trunk, and leaves are used as diuretics and to provide hemostasis.
Knema conferta (King) Warb.	**Kne.c**	Máu chó lá bé	1	2	x						Seeds are used to treat scabies and skin diseases.
Lithocarpus vestitus (Hickel & A.Camus) A.Camus	**Lit.v**	Sồi lông nhung	3	0		x					Fruits are edible.
Litsea balansae Lecomte	**Lits.ba**	Mò roi	4	18	x						Oil is used to treat common colds.
Litsea cubeba (Lour.) Pers.	**Lits.c**	Màng tang	2	81	x	x					Roots are used to treat headache, stomach ache, rheumatism, bruises, irregular menses, and flatulence. Fruits are used to treat indigestion and stomach ache. Leaves are used to treat pimples, mastitis, and snake bites. Young leaves are edible.
Litsea rotundifolia Hemsl.	Lits.r	Bời lời lá tròn	2	0	x						Oil, leaves, and roots are used to treat arthritis, injuries, back pain, dysmenorrhea, digestive problems, flatulence, headache, and colds
Litsea sp1.	**Lits.s**	Bời lời xanh	4	4	x						Crushed bark and leaves are used as a poultice to treat swelling, burns, and wounds. A decoction of bark is used to treat diarrhea and dysentery.
Litsea umbellata (Lour.) Merr.	Lits.u	Mò lông	1	1	x						Boiled leaves are used to treat bruises and pimples.
Macaranga denticulata (Blume) Müll.Arg.	**Maca.**	Lá nến	3	34	x		x				Boiled leaves are given to women after childbirth to provide refreshment. Leaves are used to treat pimples. Bark has fiber.

Machilus bonii Lecomte	**Mac.b**	Kháo vàng	10	0	x						Bark is used to treat burns and toothaches.
Machilus thunbergii Siebold & Zucc.	**Mac.t**	Re vòng	9	0	x						Bark is used to treat stretched ligaments' and emphysema.
Machilus velutina Champ. ex Benth.	Mac.v	Kháo lông	5	4	x						Bark and oil are used to treat common colds.
Macropanax undulatus (Wall. ex G.Don) Seem.	**Mac.u**	Đại đinh dúng	14	14	x						Bark is used to treat diabetes, edema, rheumatism, and indigestion.
Madhuca pasquieri (Dubard) H.J.Lam	**Mad.**	Sến mật	35	2	x	x					Seeds are edible and used to treat rheumatism and cardiac diseases.
Magnolia baillonii Pierre	Ma.bai	Giổi găng	1	0	x						Bitter bark is used as an antipyretic.
Magnolia balansae A.DC.	**Ma.bala**	Giổi lông	1	2		x					Seeds are used as spices.
Magnolia braianensis (Gagnep.) Figlar	Ma.bra	Giổi nhung	1	0	x						Seeds and bark are used to treat colic and fever.
Magnolia coco (Lour.) DC.	Mag.c	Hoa trứng gà	1	0	x	x					Scented flowers are used to preserve teas. Other parts of the tree are used to treat rheumatism. Women are given boiled leaves to promote recovery after childbirth.
Magnolia mediocris (Dandy) Figlar	**Mag.m**	Giổi xanh	3	0	x	x					Seeds are used as spices. Seeds and bark are used to treat colic and fever.
Mallotus metcalfianus Croizat	Mal.	Ba bét đỏ	0	1			x				Bark has fiber.
Mallotus paniculatus (Lam.) Müll.Arg.	**Mal.pa**	Ba soi	5	45	x		x				Roots and fruits are used to treat swelling and bruises. Fiber from the bark is used for braiding ropes.
Mallotus philippensis (Lam.) Müll.Arg.	**Mal.ph**	Cánh kiến	3	1	x						Roots are used to treat dysentery and sore throat. Bark is used to treat epilepsy and diarrhea. Hairs from the fruit are used to kill tapeworms, treat edema, syphilis, skin diseases, and as a contraceptive.
Mangifera minutifolia Evrard	**Mang.m**	Xoan rừng	4	5		x					Young leaves and fruits are edible.

Manglietia fordiana (Oliv.) Hu	**Mang.f**	Vàng tâm	25	9	x						Fruits, bark, and root bark are used to treat constipation and dry cough.
Melia azedarach L.	Meli.	Xoan quả to	1	0	x						Fruits are used to treat stomach ache, abdominal pain due to flatulence and tapeworms, hepatitis, dysmenorrhea, cardiac diseases, and fever. Bark is used to treat scabies and itches.
Neocinnamomum lecomtei H. Liu	**Neo.l**	Re mới	4	0	x						Bark is used to treat stomach ache.
Neolitsea zeylanica (Nees & T. Nees) Merr.	**Neo.z**	Kháo lá dài	16	7	x					x	Roots are used to treat pimples on the fingers. Crushed mature leaves and bark are used to make incense.
Nephelium cuspidatum Blume	**Nep.c**	Vải thiều rừng	17	7		x					Fruits are edible and have a sour and sweet taste.
Nephelium lappaceum L.	**Nep.l**	Vải rừng	10	5	x	x					Young fruit and fruit rind are used to treat diarrhea, dysentery, fever, malaria, and kill tapeworms. Fruits are edible.
Paulownia fortunei (Seem.) Hemsl.	**Pau.**	Hông	0	2	x						Roots are used to treat rheumatism.Root bark is used to treat sore muscles. Bark is used to treat bruises. Flowers and leaves are used to treat poisoning, boils, burns, and swelling. Fruits are used to treat bronchitis.
Persea odoratissima (Nees) Kosterm.	**Perse.**	Rè vàng	7	3						x	Bark is used to make incense.
Podocarpus neriifolius D.Don	Pod.	Thông tre lá dài	1	0	x	x					Bark and a decoction of leaves are used to treat arthritis and joint pain. Seeds are edible and have a fragrant flavor.
Polyalthia cerasoides (Roxb.) Bedd.	Poly.c	Nhọc lá nhỏ	1	0	x						Consumption of the water of boiled roots is used to treat hives.
Prunus arborea (Blume) Kalkman	**Prun.a**	Xoan đào	4	25	x						Bathing in the water of boiled leaves is used to treatscabies.
Pterospermum heterophyllum Hance	**Pte.h**	Lòng	0	3	x						Roots are used to treat rheumatism, back pain,

		mang									hemiplegia, swollen wounds, and fatigue after childbirth.
Pterygota alata (Roxb.) R.Br.	**Pter.a**	Sảng cánh	1	2	x		x				The mucus of seeds is soaked and used as an anesthetic, and to promote sleep. Bark has fiber.
Quercus platycalyx Hickel & A.Camus	Que.p	Dẻ cau	7	7		x					Fruits are edible.
Rhamnoneuron balansae (Drake) Gilg	Rham.	Gió dấy	1	0	x		x				Leaves, bark, and branches are used to treat malaria and cough. Bark has fiber.
Rhus chinensis Mill.	**Rhus.c**	Muối	1	2	x	x					Roots, leaves and fruits are used to treat flu, bee stings, skin rashes, itches, snake bites, and pimples. Fruits are edible.
Schefflera heptaphylla (L.) Frodin	**Schef.h**	Chân chim tám lá	3	20	x	x					Bark, roots, and leaves are used to treat back pain, tendonitis, and swelling. Young leaves are used as a vegetable.
Schima superba Gardner & Champ.	Schima.	Vối thuốc lông	10	0					X		Crushed bark is used for fish paralyzed (coma), and sometimes combined with *Derris elliptica* to increase efficacy.
Sterculia lanceolata Cav.	Ster.l	Sảng nhung	2	0	x	x					Bark is used to treat swelling and pimples. Leaves are used to treat bruises. Seeds are edible.
Streblus asper Lour.	Streb.	Ruối rừng	0	1	x	x	x	x			Leaves are used to treat hemorrhage and dysentery. Crushed young leaves are used to treat bleeding wounds. Resin is used to treat headache. Bark is used to treat tooth decay, colic, fever, diarrhea, cough, bone fractures, and dog bites. A decoction of branches and roots is used to treat diabetes and urinary retention. Fruits are edible and have a fragrant and sweet taste. Fiber from bark is used to weave bags. Leaves are used as a food for cattle.

Styrax tonkinensis Craib ex Hartwich	**Styr.t**	Bồ đề	2	63	x						The stem is incised to harvest resin that is used to treat cough, colic, and provide sedation.
Symplocos cochinchinensis (Lour.) S. Moore	Sym.c	Dung nam bộ	4	1	x						Shoots are used to treat burns. Bark is used to treat fever, dysentery, diarrhea, and common colds.
Syzygium chloranthum (Duthie) Merr. & L.M.Perry	Syz.c	Roi rừng	3	0		x					Fruits are edible.
Syzygium hancei Merr. & L.M.Perry	Syz.h	Trâm vỏ dày	1	0	x						Bark is used as an antiseptic to treat dysentery and diarrhea, and to eliminate helminthes.
Syzygium polyanthum (Wight) Walp.	Syz.p	Sắn thuyền	1	0	x	x					Crushed leaves are used to treat suppurating wounds, burns, infectious wounds, bone fractures, and skin necrosis. Bark is used to treat dysentery. Young leaves are edible.
Syzygium zeylanicum (L.) DC.	**Syz.z**	Trâm tía	14	4	x	x					Bark, leaves, and roots are used to treat rheumatism and syphilis. Fruits are edible and have a good flavor.
Tarenna attenuata (Voigt) Hutch.	**Tare.**	Cà phê rừng	0	30	x						Crushed roots are used to treat wounds in children. Other parts of the tree are used to treat arthritis, bruises, and bone fractures.
Tetradium glabrifolium (Champ. ex Benth.) T.G. Hartley	Tetra.	Thôi chanh tía	3	7	x						Root bark is used to treat rheumatism. Leaves are used to treat snake bites.
Trema orientalis (L.) Blume	**Trema.**	Hu đay	0	16	x	x	x	x			Roots and leaves are used to treat hemorrhagic injuries. Shoots and young leaves are consumed as vegetables. Bark provides fiber. Leaves are use as food for cattle.
Triadica cochinchinensis Lour.	Tria.c	Sồi tía	3	2	x						Roots and leaves are used to treat snake bites, constipation, and abscesses.
Trivalvaria costata (Hook.f. & Thomson) I.M.Turner	**Triv.c**	Nhọc lá bóng	38	10	x						Roots are used to treat gastritis, spleen diseases, and indigestion.
Vernicia montana Lour.	**Ver.m**	Trẩu	3	2	x	x					Bark is used to treat toothache and tooth decay. Seeds are used to treat pimples and

											impetigo. Oil seed is edible.
Wendlandia glabrata DC.	Wen.g	Hoắc quang trắng	2	0	x						Bark is used to treat arthritis, fatigue after childbirth, indigestion, and diabetes.
Wrightia pubescens R.Br.	Wrig.p	Thừng mực lông	1	0	x						Roots, bark, and leaves are used to treat tuberculosis, rheumatism, back pain, itches, pimples, and bronchitis.
Xanthophyllum hainanense Hu	Xan.h	Chanh rừng	2	2		x					Leaves are edible. Branches are used to make energy drinks.
Xylopia vielana Pierre	**Xil.v**	Dền	2	4	x	x					Bark is used as a blood tonic for women after childbirth, and to treat depression, asthenia, malaria, and irregular menstruation. Leaves are used to treat indigestion and rheumatism. Fruits are edible.
Zanthoxylum armatum DC.	**Zan.**	Hồi gai	0	2	x						Roots, branches, fruits, seeds, bark, and leaves are used to treat toothache, stomach ache, digestive disorders, helminth infections, flu, headache, cough, asthma, rheumatism, snake bites, and skin diseases.
Zanthoxylum myriacanthum Wall. ex Hook. f.	**Zan.m**	Mắc khén	1	5	x	x					Roots and leaves are used to treat rheumatism, bleeding injuries, bone fractures, pimples, itches, and burns. Fruits are used as a spice.

Appendix 2. Valuable timber species. Tree species names, number of trees with DBH of at least 6 cm in the core zone (C.z) and buffer zone (B.z), and wood characteristics of the 54 valuable timber species in the Ta Xua Nature Reserve (40 plots per zone)

Scientific name	Vietnamese name	No. of trees		Tree size and wood characteristics[a]
		C.z	B.z	
Acer laurinum Hassk.	Thích 10 nhị	6	14	A large tree. Wood is hard, straight, fine-textured and easy to work.
Acer oblongum Wall. ex DC.	Thích lá nguyên	10	9	A large tree. Wood is of good qualityand used in construction.
Aglaia spectabilis (Miq.) S.S.Jain & S.Bennet	Gội nếp	12	1	A large tree. Wood is hard, durable and easy to work.
**Aphanamixis polystachya* (Wall.) R.Parker	Gội trắng	1	9	A large tree. Wood is fine-textured and durable.
**Betula alnoides* Buch.-Ham. ex D.Don	Cáng lò	1	4	A large tree. Wood is hard.
**Bischofia javanica* Blume	Nhội	1	0	A large tree. Wood is heavy, durable and easy to work.
**Canarium pimela* K.D.Koenig	Trám đen	0	1	A medium to large sized tree. Wood is soft, light and quite good quality.
Castanopsis cerebrina (Hickel &A.Camus) Barnett	Sồi phảng	4	13	A large tree. Wood is hard and of good quality.
Castanopsis echinocarpa Miq.	Dẻ gai thô	14	6	A large tree. Wood is hard, smooth-textured, easy to work, and resistant to rot.
**Castanopsis hystrix* Hook. f. & Thomson ex A. DC.	Dẻ gai đỏ	3	0	A large tree. Wood is coarse-textured, easy to work and resistant to rot.
**Castanopsis indica* (Roxb. ex Lindl.) A.DC.	Dẻ gai ấn độ	18	20	A large tree. Wood is hard, good quality and resistant to termites and insects.
**Castanopsis lecomtei* Hickel & A.Camus	Cà ổi sapa	3	0	A medium sized tree. Wood is used for many purposes.
Castanopsis tessellata Hickel & A. Camus	Cà ổi lá đa	2	0	A large tree. Wood is hard, fine-textured, straight and durable.
**Castanopsis tonkinensis* Seemen	Dẻ gai bắc bộ	35	17	A medium to large sized tree. Wood is white. The sapwood is used for construction.
Chaetocarpus castanocarpus (Roxb.) Thwaites	Da nâu	0	2	A large tree. Wood is fine, white and hard.
**Choerospondias axillaris* (Roxb.) B.L.Burtt &	Xoan nhừ	8	9	A medium sized tree. Wood is fine-textured, easy to work.

A.W.Hill				
Cinnadenia paniculata (Hook. f.) Kosterm	Kháo xanh	12	0	A medium to large sized tree. Wood is hard, heavy, durable and easy to work.
**Cinnamomum balansae* Lecomte	Vù hương	0	1	A large tree. Wood is heavy, durable and easy to work.
**Cinnamomum curvifolium* (Lam.) Nees	Re lá cong	4	0	A medium sized tree. Wood is straight and fine structure.
**Cinnamomum iners* Reinw. ex Blume	Re hương	16	12	A medium sized tree. Wood is of good quality, straight and has a good smell.
Dacrycarpus imbricatus (Blume) de Laub.	Thông nàng	2	2	A large tree. Wood is light, straight, fine, and easy to work.
**Fokienia hodginsii* (Dunn) A.Henry & H H.Thomas	Pơ mu	11	4	A large tree. Wood is light, fine, durable and aromatic
**Gmelina arborea* Roxb.	Lõi thọ	3	0	A large tree. Wood rarely splits or warps, easy to work and resistant to termites.
**Ilex rotunda* Thunb.	Vỏ rụt	4	0	A medium to large sized tree. Wood is slightly soft, heavy and easy to work.
**Juglans regia* L.	Óc chó	0	4	A large tree. Wood is straight, rarely splits.
Lithocarpus ducampii (Hickel & A.Camus) A.Camus	Dẻ đỏ	3	11	A large tree. Wood is pinkish, hard, fine veins and valuable.
**Lithocarpus vestitus* (Hickel & A.Camus) A.Camus	Sồi lông nhung	3	0	A medium to large sized tree. Wood is hard, heavy, rough-textured and rot resistant.
**Machilus bonii* Lecomte	Kháo vàng	10		A medium to large sized tree. Wood is soft and straight.
**Madhuca pasquieri* (Dubard) H.J.Lam	Sến mật	35	2	A large tree. Wood is hard, heavy, durable and very good quality.
**Magnolia baillonii* Pierre	Giổi găng	1	0	A large tree. Wood is hard, fine-textured, durable and valuable.
**Magnolia balansae* A.DC.	Giổi lông	1	2	A medium sized tree. Wood is fine-textured, rarely splits or warps, resistant to termites and insects.
**Magnolia braianensis* (Gagnep.) Figlar	Giổi nhung	1	0	A large tree. Wood is straight, fine-textured, durable, resistant to termites
**Magnolia mediocris* (Dandy) Figlar	Giổi xanh	3	0	A large tree. Wood is hard, fine-textured, easy to work, and resistant to termites.
Magnolia sumatrana var. glauca (Blume) Figlar &Noot.	Mỡ	0	7	A large tree. Wood is soft, straight, durable and easy to work.
Magnolia foveolata (Merr. ex Dandy) Figlar	Giổi lá bạc	11	1	A large tree. Wood is hard, fine and durable.

Manglietia fordiana (Oliv.) Hu	Vàng tâm	25	9	A medium to large sized tree. Wood is fine-textured, aromatic and resistant to termites and insects.
Melia azedarach L.	Xoan quả to	1	0	A medium to large sized tree. Wood is soft, easy to work and resistant to termites.
Mischocarpus pentapetalus (Roxb.) Radlk.	Trường kẹn	4	4	A large tree. Wood is straight, heavy, fine and durable.
Nephelium cuspidatum Blume	Vải thiều rừng	17	7	A medium sized tree. Wood is hard, fine-textured and durable.
Paulownia fortunei (Seem.) Hemsl.	Hông	0	2	A medium to large sized tree. Wood is fine-textured, light, soft, does not split and is a good insulator.
Pavieasia anamensis (Pierre) Pierre	Trường mật	0	2	A large tree. Wood is heavy, straight, fine-textured and durable.
Persea odoratissima (Nees) Kosterm.	Rè vàng	7	3	A medium to large sized tree. Wood is hard, durable, easy to work and resistant to termites
Phoebe macrocarpa C.Y.Wu	Kháo lá to	9	1	A medium sized tree. Wood is white, hard and fine.
Podocarpus neriifolius D.Don	Thông tre lá dài	1	0	A medium to large sized tree. Wood is straight, fine-textured, and easy to work.
Pterygota alata (Roxb.) R.Br.	Sảng cánh	1	2	A large tree. Wood is smooth-textured, easy to work, and durable.
Quercus acutissima Carruth.	Sồi nhọn	1	0	A medium sized tree. Wood is of good quality and moderately valuable.
Quercus platycalyx Hickel & A.Camus	Dẻ cau	7	7	A medium sized tree. Wood is hard and straight, used in construction.
Quercus chevalieri Hickel & A.Camus	Sồi Sapa		10	A large tree. Wood is of quite good quality and used for many purposes.
Schima superba Gardner & Champ.	Vối thuốc lông	10	0	A large tree. Wood is fine-textured, easy to work, and resistant to termites.
Syzygium hancei Merr. & L.M.Perry	Trâm vỏ dày	1	0	A medium sized tree. Wood is hard, heavy and resistant to termites.
Syzygium levinei (Merr.) Merr.	Trâm	3	0	A medium sized tree. Wood is smooth, hard and durable.
Syzygium zeylanicum (L.) DC.	Trâm tía	14	4	A medium sized tree. Wood is hard, fine-textured and durable.
Tapiscia sinensis Oliv	Trương hôi	1	0	A large tree. Wood is of good qualityand used in construction.
Tetradium glabrifolium (Champ. ex Benth.) T.G. Hartley	Thôi chanh tía	3	7	A medium sized tree. Wood is light and resistant to termites and insects.

[a] Based on standard textbooks (Tran and Nguyen 1993; Nguyen et al. 1996)

*Species are multiple-use

Appendix 3. Rare tree species. Tree species names, number of trees with DBH of at least 6 cm in the core zone and/or buffer zone of 79 rare species in the Ta Xua Nature Reserve (40 plots per zone)

Scientific name	Vietnamese name	No. of trees	
		Core zone	Buffer zone
Species are rare in the core zone and buffer zone			
Castanopsis chinensis (Spreng.) Hance	Dẻ gai trung quốc	1	1
Glochidion zeylanicum (Gaertn.) A.Juss.	Áng nước	1	1
Litsea umbellata (Lour.) Merr.	Mò lông	1	1
Species are rare and only found in the core zone			
Acer tonkinense Lecomte	Thích lá to	1	0
Antidesma ghaesembilla Gaertn.	Chòi mòi	1	0
Antidesma velutinum Tul.	Chòi mòi lông	1	0
Ardisia sp.	Trọng đũa lá nhỏ	1	0
Bischofia javanica Blume	Nhội	1	0
Camellia crassiphylla Ninh & Hakoda	Chè lá dày	1	0
Camellia forrestii (Diels) Cohen-Stuart	Chè	1	0
Camellia sp	Chè sp	1	0
Carallia brachiata (Lour.) Merr.	Răng cá	1	0
Castanopsis sp3.	Dẻ gai lá nhỏ	1	0
Cinnamomum glaucescens (Nees) Hand.-Mazz.	Re chum	1	0
Elaeocarpus grandiflorus Sm.	Côm đắng	1	0
Flacourtia indica (Burm.f.) Merr.	Mùng quân	1	0
Garcinia cowa Roxb. ex Choisy	Tai chua	1	0
Garcinia oliveri Pierre	Bứa lá dày	1	0
Goniothalamus macrocalyx Bân	Màu cau trắng	1	0
Knema furfuracea (Hook. f. & Thomson) Warb	Máu chó lá lớn	1	0
Litsea baviensis Lecomte	Bời lời Ba vì	1	0
Machilus parviflora Meisn.	Kháo hoa thưa	1	0
Machilus sp	Kháo lá bạc	1	0
Magnolia coco (Lour.) DC.	Hoa trứng gà	1	0
Melia azedarach L.	Xoan quả to	1	0
Magnolia baillonii Pierre	Giổi găng	1	0
Magnolia braianensis (Gagnep.) Figlar	Giổi nhung	1	0
Podocarpus neriifolius D.Don	Thông tre lá dài	1	0
Polyalthia cerasoides (Roxb.) Bedd.	Nhọc lá nhỏ	1	0
Prunus zippeliana Miq.	Da bò	1	0
Pterospermum acerifolium (L.) Willd.	Lòng mang thường	1	0
Rhamnoneuron balansae (Drake) Gilg	Gió dấy	1	0
Sp1	Dâu núi	1	0
Syzygium balsameum (Wight) Wall. ex Walp.	Trâm hôi	1	0

Syzygium glaucum (King) Chantaran. & J.Parn.	Trâm đỏ	1	0
Syzygium hancei Merr. & L.M.Perry	Trâm vỏ dày	1	0
Syzygium polyanthum (Wight) Walp.	Sắn thuyền	1	0
Syzygium sterrophyllum Merr. & L.M.Perry	Trâm sẳng	1	0
Tapiscia sinensis Oliv.	Trường hôi	1	0
Wrightia pubescens R.Br.	Thừng mực lông	1	0
Species are rare and only found in the buffer zone			
Artocarpus tonkinensis A.Chev. ex Gagnep.	Chay rừng	0	1
Canarium pimela K.D.Koenig	Trám đen	0	1
Cinnamomum balansae Lecomte	Vù hương	0	1
Cleistanthus oblongifolius (Roxb.) Müll.Arg.	Cọc rào	0	1
Mallotus metcalfianus Croizat	Ba bét đỏ	0	1
Pavetta graciliflora Wall. ex Ridl.	Xương gà	0	1
Phyllanthus elegans Wall. ex Müll.Arg.	Ngót rừng	0	1
Sterculia sp.	Chôm sp	0	1
Streblus asper Lour.	Ruối rừng	0	1
Wendlandia sp1.	Hoắc quang tía	0	1
Wrightia laevis Hook.f.	Thừng mực mỡ	0	1
Species are rare in the core zone but not rare in the buffer zone			
Actinodaphne cochinchinensis Meisn.	Mò vối thuốc	1	2
Aphanamixis polystachya (Wall.) R.Parker	Gội trắng	1	9
Archidendron lucidum (Benth.) I.C.Nielsen	Mán đỉa trâu	1	5
Sp2	Bạc tán xanh	1	2
Betula alnoides Buch.-Ham. ex D.Don	Cáng lò	1	4
Cleistanthus monoicus (Lour.) Müll.Arg	Đỏm trơn	1	2
Castanopsis tribuloides (Sm.) A.DC.	Dẻ sp	1	9
Cryptocarya concinna Hance	Nanh chuột	1	12
Eurya ciliata Merr.	Chè lông	1	4
Heritiera augustata Pierre	Vôi cui	1	2
Knema conferta (King) Warb.	Máu chó lá bé	1	2
Lithocarpus sp1.	Sồi	1	6
Machilus salicina Hance	Kháo lá bé	1	4
Magnolia balansae A.DC.	Giổi lông	1	2
Rhus chinensis Mill.	Muối	1	2
Pterygota alata (Roxb.) R.Br.	Sảng cánh	1	2
Zanthoxylum myriacanthum Wall. ex Hook. f.	Mắc khén	1	5
Species are rare in the buffer zone but not rare in the core zone			
Aglaia spectabilis (Miq.) S.S.Jain & S.Bennet	Gội nếp	12	1
Alangium chinense (Lour.) Harms	Thôi ba	2	1
Cryptocarya impressa Miq.	Mò quả tròn	8	1
Elaeocarpus hainanensis Oliv.	Côm lá đào	3	1

Elaeocarpus japonicus Siebold	Côm nhật	4	1
Garcinia oblongifolia Champ. ex Benth.	Bứa lá thuôn	2	1
Mallotus philippensis (Lam.) Müll.Arg.	Cánh kiến	3	1
Magnolia foveolata (Merr. ex Dandy) Figlar	Giổi lá bạc	11	1
Phoebe macrocarpa C.Y. Wu	Kháo lá to	9	1
Quercus myrsinifolia Blume	Dẻ lá tre	5	1
Symplocos cochinchinensis (Lour.) S. Moore	Dung nam bộ	4	1

Rare tree species when density of a species was 1 or fewer individual/ ha (Pitman et al. 1999)

Appendix 4. Red-listed tree species. Tree species names, number of trees with DBH of at least 6 cm in the core zone (C.z) and/or buffer zone (B.z), and conservation status in the Vietnam and IUCN Red Lists of 18 red-listed tree species in the Ta Xua Nature Reserve (40 plots per zone)

Scientific name	Vietnamese name	No. of trees		Conservation status[a]	
		C.z.	B.z	Vietnam	IUCN
Aglaia spectabilis (Miq.) S.S. Jain & S.S.R. Bennet	Gội nếp	12	1	VU	LC
Canarium pimela K.D:Koenig	Trám đen	0	1	VU	nl
Castanopsis cerebrina (Hickel & A.Camus) Barnett	Sồi phảng	4	13	EN	nl
Castanopsis lecomtei Hickel & A.Camus	Cà ổi Sapa	3	10	VU	nl
Castanopsis purpurella subsp. Purpurella	Dẻ gai đỏ	3	0	VU	nl
Castanopsis tessellata Hickel & A.Camus	Cà ổi lá đa	2	0	VU	nl
Cinnadenia paniculata (Hooker f.) Kostermans	Kháo xanh	12	0	VU	nl
Cinnamomum balansae Lecomte	Vù hương	0	1	VU	EN
Dacrycarpus imbricatus (Blume) de Laub.	Thông nàng	2	2	nl	LC
Fokienia hodginsii (Dunn) A. Henry & H. H. Thomas	Pơ mu	11	4	EN	VU
Goniothalamus macrocalyx Bân	Màu cau trắng	1	0	VU	VU
Lithocarpus vestitus (Hickel & A.Camus) A.Camus	Sồi lông nhung	3	0	EN	nl
Madhuca pasquieri (Dubard) H.J.Lam	Sến mật	35	2	EN	VU
Magnolia baillonii Pierre	Giổi găng	1	0	VU	LC
Magnolia balansae A.DC.	Giổi lông	1	2	VU	DD
Magnolia braianensis (Gagnep.) Figlar	Giổi nhung	1	0	EN	DD
Podocarpus neriifolius D.Don	Thông tre lá dài	1	0	nl	LC
Quercus platycalyx Hickel & A.Camus	Dẻ cau	7	7	VU	nl

[a] Based on the Vietnam and the IUCN Red Lists (Nguyen et al. 2007; IUCN 2014). VU = vulnerable; EN = endangered; LC= least concern; DD = data deficient; nl = not listed