Community-Based Natural Resource Management: Data Collection in Nam Sabi and Training in Htamanthi, Sagaing Region, Myanmar

Report of Research

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Acknowledgments

Warm thanks to everyone for another productive and successful session of community forestry research and training in northern Myanmar. In addition to fieldwork, the trip also involved rewarding interactions with the Forest Department, useful planning meetings at Mandalay University to discuss future collaborations, and a one-day training workshop on community forestry and field botany at the Htamanthi Wildlife Sanctuary Headquarters. There are many people and institutions to thank for this.

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Charles M. Peters

Executive Summary

From May 4 to May 21 of 2014, fieldwork was conducted in the village of Nam Sabi (N25.36182°, E95.34253°; 143 masl) in Hkamti District, Sagaing Region and community forestry, management planning, and botanical collection training was offered at the Htamanthi WS headquarters (N25.33649°, E95.26741°; 157 masl) in Htamanthi, Homalin Township, Sagaing Region in collaboration with Dr. Kate Armstrong from The New York Botanical Garden (NYBG). The basic objective of the fieldwork at Namsabi was to provide a preliminary assessment of the supply and demand of important forest resources for the village; the training at Htamanthi was designed to outline the theoretical and methodological details of community-based natural resource management (CBNRM)and to highlight the importance of plant specimens in understanding local floristics.

The results from the household surveys revealed that at least 40 plant species, including palm thatch, timber, poles, bamboo, rattan, and medicinal plants, are harvested each year from the forest for subsistence use. In terms of quantity of material harvested, palm thatch, bamboo, and rattan are the most important forest resources for the community.

Because of the rugged topography, access to many of the forest areas sampled during the inventory work at Nam Sabi was provided by walking in streams. Image above shows Team 1 returning to base camp along Nam Sabi stream after competing Transect 3.

Four transects totaling 1.92 hectares were sampled in the forest area south of the village. Ka nyin and thin bone were the most abundant timber species, wa net and wa ni par were the most abundant bamboos, yamata kyein and kyein ni were the most abundant rattans, and yone was the most abundant thatch palm. . Over half of the useful species recorded in the household surveys were tallied in the transects, and most of these species appeared to be regenerating in the forest.

The one-day training workshop at Htamanthi was attended by 25 rangers. The first session covered the mechanics of resource depletion and the importance of forest management. The second session focused on field methodologies, i.e. forest inventories and growth studies, and included hands-on exercises using compasses, clinometers (for measuring tree height) and diameter tapes; the construction of stainless-steel dendrometer bands was also demonstrated. A third session discussed how inventory and growth data can be combined to estimate a sustainable yield. In the afternoon, Dr. Kate Armstrong gave a presentation about herbaria and the importance of collecting plant specimens for species identification, and then demonstrated different collecting techniques and let participants prepare and press a n herbarium specimen.

The work in Sagaing generated several conclusions of relevance to community-based natural resource management. First, **Namsabi, given its proximity to the Htamanthi WS, would provide a very useful example of the conservation benefits of community forestry as a way to stabilize the buffer zones of protected areas**. . More detailed work in this community is warranted. Second, systematic botany and plant collecting significantly enhance community forestry analyses. **The move from local name to scientific binomial is a critical first step to sustainable resource use, and the conscientious collection of herbarium specimens should be promoted and encouraged whenever possible**.

Heading out from the Thim-soe basecamp at Namsabi to start the inventory transects.

Introduction

Collaborative work with WCS and the Myanmar Forest Department on community forestry in northern Myanmar has been underway since 2005. Initial efforts were based on documenting the rattan resource in the Hukaung Valley Wildlife Sanctuary (*Hukaung Valley Rattan Survey Trip Report,* April 2005), followed by preliminary resource surveys in three villages (*Community-Based Natural Resource Management in the Hukaung Valley Wildlife Sanctuary*, June 2009), and the establishment of a 100 hectare management area outside of the village of Shinlonga (*Community-Based Natural Resource Management in the Hukaung Valley Wildlife Sanctuary: Phase 2*, December 2009). Unfortunately, the political situation in this part of Kachin State started to deteriorate and the community forestry work was put on hold.

After a four-year hiatus, collaborative community-forestry work was re-initated in 2013 in a small mixed Chin-Naga village in Leshi Township of the Naga Self-Administered Zone (formerly Sagaing Division). The selection of this village, which has a long history of using and managing forests outside of the jurisdiction of the Forest Department, was based on the premise that it would provide a useful comparison to previous work conducted exclusively in villages situated within a protected area. The results from the fieldwork (*Community-Based Natural Resource Management: Training and Data Collection in Ti gun, Naga Self-Administered Zone, Myanmar*; December 2013) clearly revealed the utility of this type of comparative analysis.

A final community / forest context which we have yet to examine is the case of communities that are located adjacent to or in the buffer zones of protected areas. These cases are especially interesting given that the development of successful programs of community-based natural resource management in these communities could greatly help to secure the buffer zone habitats. In addition to the economic and social benefits, the implementation of community-based natural resource management within or adjacent to buffer zones could provide distinct advantages for conservation. With these ideas in mind, the village of Nam Sabi, located adjacent to the Htamanthi Wildlife Sanctuary in Sagaing Region, was selected for study. In addition to providing a new community forestry context, the work at Nam Sabi was unique in that a field botanist, Dr. Kate Armstrong from NYBG, was an advisor on the project and initiated the systematic collection of plant specimens from local forests.

The current report is divided into four sections. The first section focuses on the work at Nam Sabi, presents the survey team, provides a brief description of the study village, and outlines the different methodologies used in the survey protocol. An annotated list of the important forest resources recorded in the household surveys is provided, and data from the inventories are used to discuss the existing resource base of selected species

The second section focuses on the collection of plant specimens by Dr. Armstrong and provides a detailed list of all of the specimens that were collected as part of the fieldwork.

The third section describes the training workshop that was given at the Htamathi Wildlife Sanctuary Headquarters for the rangers and staff. An overview of the topics covered in the classroom sessions is provided, and the field exercises and training activities offered are discussed.

The final section evaluates the potential of community-based natural resource management at Namsabi, highlights the importance of a detailed assessment of the local flora, and outlines the recommended next steps to build on the results from the recent fieldwork.

Survey Team

The survey team at Namsabi was an inter-disciplinary group from several institutions, i.e. the WCS Myanmar Program, the Forest Department, and The New York Botanical Garden (NYBG), together with two field crews of villagers and local cooks As is shown in the photo above, the team included (front row, l-r): Naing Win Aung (cook), Toe Lwin, Aung Myint Sein, Than Tun Oo, Naing Oo, Aung San Oo, Aye Myint Ko, Dr. Charles Peters; (back row, l-r): Moe Thu Aung (cook), Myint Thein (Htamanthi WS), Soe Hlaing, Kyaw Zin Aung (Htamanthi WS), Kyaw Zay Ya (WCS),Yinhtan Syan Bay (WCS), Aung Htel Oo (WCS), Sein Myint Maung, Ohn Hlaing, Lin Zaw, Dr. Kate Armstrong (NYBG), U Saw Htun (WCS).

U Saw Htun is the Deputy Country Program Director of the WCS Myanmar Program. He organized the logistics for the fieldwork, made sure that everything ran smoothly, and was the lead speaker during the village presentations. U Saw Htun functioned as leader of the survey team and also counted and measured trees as part of Team 2

Dr. Charles Peters is the Kate E. Tode Curator of Botany at The New York Botanical Garden. Dr. Peters is a plant ecologist and a forester specializing in the ecology, use, and management of tropical forest resources. He has written extensively on various aspects of community forestry.

Dr. Kate Armstrong is a botanist and a post-doctoral research at The New York Botanical Garden. An accomplished field taxonomist, she is a specialist in the systematics and biogeography of the Sapotaceae and Cordiaceae families. Dr Armstrong made numerous plant collections during the fieldwork, trained field staff in collection, pressing, and recording label information, and co-taught the training workshop at the Htamanthi Wildlife Sanctuary headquarters.

Daw Myint Myint Oo (not pictured), Technical Coordinator (Community and Natural Resources) in the WCS Myanmar Program, made all of the initial village arrangements in Nam Sabi, selected the field crews and support staff, and organized the household surveys.

U Kyaw Zay Ya, Deputy Technician (GIS and Remote Sensing) in the WCS Myanmar Program, produced all of the maps and led one of the inventory teams. He ran compass, recorded the data, and conducted preliminary analyses on all of the survey results. He also assisted with initial village introductions and helped select and set up the basecamp for the inventories and botanical collections.

U **Kyaw Zin Aung** and **U Myint Thein** are Rangers at the Htamanthi Wildlife Sanctuary; both assisted in the community forestry work at Ti gun. U Kyaw Zin Aung assisted with all of the plant collecting and specimen preparation activities. U Myint Thein acted as leader of Team 2 and assisted with the community presentations.

Daw Myint Myint Oo (in WCS cap) organizing field crews and directing community activities in Namsabi.

Study Village

Nam Sabi (N25.36182º; E95.34253º; 143 masl), a Shan Village with a few Bamar families comprised of 43 households, is located about five miles up the Chindwin River from the town of Htamanthi in Homalin Township, Sagaing Region (see map at upper left). The village was established in 1910; a local primary school was opened in 1973. The traditional boundary area of the village (shown as a white line in the map) is estimated at about 44 square kilometers.

Based on the results of the VCP survey conducted in Nam Sabi in January, 2013, the village maintains about 70 acres of agricultural fields with rice, ground nut, mustard, and variety of bean species being the dominant crops. The collection of bamboo and rattan from the forest provide additional income sources. Construction materials and thatch are harvested from the forests surrounding the village, as are a large assortment of medicinal plants , cordage, fencing materials,and forest fruits.

The forests at Namsabi are a combination of evergreen and semi-evergreen formations with scattered patches of bamboo and rattan in places that appear to have been subjected to endogenous disturbance, e.g. landslides, erosion, or fire. These forest communities are located on steep terrain dissected by numerous stream channels. and exhibit a multi-strata, albeit relatively open, canopy structure with abundant poles, a few large canopy trees, and abundant understory palms. Given the steep topography, treefalls and blowdowns are a frequent occurrence. Forest structure becomes more closed and better developed with increasing distance from the village; riparian forests located along the larger streams are especially well-preserved.

Location of Nam Sabi village adjacent to the Htamanthi Wildlife Sanctuary in Homalin Township. Orange lines show transect locations; yellow points are plant collections. Basecamp is shown as orange triangle.

It is worth noting that the scattered distribution of large, canopy trees appears to be more related to edaphic factors than human activity, i.e. logging. Soils are sandy, and extremely droughty in places, and the sequential deposition of course sediments by the Chindwin River as it has slowly moved across the landscape is clearly visible on satellite images of the region. Sandy, well-drained soils simply support less forest biomass than more fertile, fine textured substrates. Yet, in spite of these ecological constraints, the forests outside of Namsabi appear to be in very good shape. Especially considering that they been exploited continually by local communities for more than a hundred years

Village meeting led by U Saw Htun to present results from field surveys and to discuss next steps All of the community meetings were extremely well attended. Photo by Kyaw Zi Ya.

Field Surveys

The data collection activities at Namsabi generated two distinct types of information. Household surveys were conducted to generate a list of the most important local forests resources and to estimate the approximate quantity of each resource that is harvested each year. These surveys essentially quantify the annual community *demand* for forest resources, i.e. how much timber, palm thatch, bamboo, and rattan does the village need to maintain itself.. Systematic forest inventories were then conducted in areas that are actively being harvested to estimate the existing *supply* of different resources, i.e. how much timber, palm thatch, bamboo, and rattan is the forest producing. Given an understanding of the overall resource supply and demand dynamics at the village level, management interventions can be developed to keep these two quantities in balance. Or, in some cases, to actually increase the supply of important forest species.

Each type of survey conducted at Nam Sabi is examined in greater detail below. The basic methodologies used in the household surveys and forest inventories are briefly described, and then the results from these data collection activities are summarized and discussed. [NOTE: To permit comparisons between sites, the field methods used in Nam Sabi were essentially identical to those employed in the Hukaung Valley and the Tigun village surveys].

Household Interviews

The current demand for different resources was estimated through Resource Needs Assessment (RNA) interviews conducted in seventeen households. These interviews were conducted by the WCS advance team under the direction of Myint Myint Oo prior to the arrival of the NYBG researchers and the rest of the survey team.

The main focus of the interview, at least initially, was on the different materials used to construct the house. Actually being in the house and pointing to the wall panel, rafter, or floor joist being discussed greatly simplified this task. Although the interviews were conducted in such a way as to move progressively from roof, to walls, to floors, to medicinal plants, to cordage, and then farming implements, they were decidedly non-structured interactions and the participants could move the conversation in any direction they wanted. The interviews, on average, took about an hour to conduct.

In addition to collecting data about the amount of timber, bamboo, thatch, and rattan that the household used in a given period of time, information was also elicited about the productivity and yield of specific resources, e.g. how many leaves can be harvested for thatch, or how many culms can be removed out of a clump of bamboo and how fast do new stems grow back. These types of data are veryuseful for assessing the sustainability of resource harvest.

U Myint Thein conducts a Resource Needs Assessment (RNA) interview in Namsabi.

Inventory Transects

Data on the actual supply of different forest resources were obtained through quantitative inventory transects that sampled the density and size-class distribution of the taxa recorded in the household surveys. As is shown on the map at the top of page 4, four inventory transects of varying length were sampled in the forests south of Nam Sabi; Taken together, the four transects represent a total sample area of 19,200 m^2, or 1.92 hectares.

Each transect were comprised of a series of contiguous 10 x 20 m plots. The total number of plots in each transect varied according to topography and the actual conditions in the forest. Transect 3, for example, ran up to the edge of a steep, unsurpassable cliff after 26 plots.

After first clearing the line along a specified bearing, a nylon rope containing knots to correct for slope was used to measure out 20 m. A plot stake was set and the transect rope laid on the ground to provide a centerline for the plot. Two teams then slowly scanned 5 m to the left and 5 m to the right of the centerline and called out the identity and size of every useful species that was encountered. All trees greater than 5 cm in diameter (DBH) were counted and measured with a diameter tape; all rattan stems, bamboo culms, and medicinal plants were counted and recorded regardless of size. Rattan canes were assigned to 1.0 m size classes based on the height of the tallest cane in a clump. The merchantable height of at least one tree was measured in each plot using a clinometer or a Spiegel relascope and the elevation and geographic location of each transect were recorded using a GPS device.

Growth Bands

A small sample of trees were fitted with growth bands, both as a training opportunity and to emphasize that the growth and yield of a forest resource is what ultimately determines the sustainability of harvesting and that this, therefore, is a very important parameter to measure.

The growth bands are spring-tightened, stainless-steel belts that are custom fitted around the tree. A zero line is marked on the belt, and, over time as the tree grows, the zero line is displaced and the difference between the upper and lower of the line represents diameter growth during the measurement period. The gap between the two lines is measured with a vernier caliper to quantify the growth increment.

After finishing the inventory work, field staff selected different timber species of varying size and then fit them with growth bands. The diameter (DBH), commercial height, and canopy position, i.e. dominant, co-dominant, or suppressed, of each sample tree was recorded. A GPS reading was also taken to facilitate the re-location of the tree.

Making a growth band to fit around a Thin bone (*Alstonia rostata*) tree.

Results

The results from the Resource Needs Assessment interviews are shown in the table on the following page (p. 7). Annual harvest estimates have been expanded to represent all 43 households in the village. Taken together, the village harvests at least 40 types of trees, palms, shrubs, and herbaceous plants from the forest. Although all taxonomic determinations should be viewed as questionable until voucher specimens can be examined, the forest resources that can be tentatively identified represent 23 species from 16 different plant families.

Several points of interest should be noted in the table. In spite of the diversity of different species used, only a few of the resource groups, e.g. palm thatch, bamboo, and rattan, appear to be harvested each year in large quantities. Only 10 - 20 poles/year are harvested from most of the timber species, with the exception ma lein htwa and shaw which appear to be preferred species for house construction. Interviewers were unable to solicit information about the quantities of medicinal plants that were harvested each year, which suggests that the collection of these plants is low intensity, opportunistic, and essentially need based.

It is very telling that scientific names could be assigned, even tentatively assigned, to only a little over half of the species recorded in the interviews. The names that are shown in the table are based on field observations or on published nomenclature based on the local name of the local name of the plant, i.e. Kress, *et al.* 2003. A Checklist of the Trees, Shrubs, Herbs, and Climbers of Myanmar. *Contr. U.S. National Herbarium* Vol. 45:1-590. Using a local name to determine the taxonomic identity of a plant is fraught with problems, especially in a flora as poorly known as that of Myanmar. And yet, even taking into account these problems, the local names for about half of the plant recorded in Namsabi are not contained in any of the existing checklists. The take-home message here is that there is a dire need to collected herbarium specimens of the useful flora of Myanmar, especially inside or adjacent to protected areas or in sites where community forest interventions are being investigated.

The density/hectare of selected resources as recorded in the inventory transects is also shown in a table below (p. 8). The data are counts of all the bamboos, rattans, medicinal plants and thatch palms encountered; only timber trees ≥ 10 cm DBH were included in the inventory. In spite of over 100 years of continual exploitation, the densities of many important forest resources are still quite high. Thousands of bamboo canes may be harvested each year for house construction, but there are still a thousand more/hectare continuing to grow in the forest. Similarly, the total annual demand for Ka Nyin and Ka Laung poles can be satisfied by only a few hectares of forest. These findings are encouraging because they suggest that existing rates of resource exploitation have not exceeded the productive capacity of the forest.

Although the overall density of a resource is clearly useful in assessing the impact and potential sustainability of forest utilization, of

Packing up the Thim-soe basecamp after finishing fieldwork at Nam Sabi. Plant presses with specimens are shown in the foreground

Nomenclature, use, and quantity of subsistence plant resources harvested annually by the village of Nam Sabi. Species records and harvest estimates based on unstructured household interviews (n=17); all taxonomic determinations should be viewed as tentative.

Resource Group	Local Name	Species	Family	Annual Harvest
Thatch	Tawhtan	*Livistonia jenkinsiana* Griff.	Arecaceae	16,179 leaves
	Yone	*Salacca secunda* Griff.	Arecaceae	2,259 leaves
Timber	Ka Laung	*Dysoxylum binecatariferum* Hook f.	Meliaceae	17 poles
	Ma Lein Htwa			449 poles
	Ye mein			14 poles
	Mal Hau			3 pole
	Ka Nyin	*Dipterocarpus sp.*	Dipterocarpaceae	14 poles
	Kyauk Tamar			8 poles
	Taw Saga			11 poles
	Ngu	*Cassia fistula* L.	Caesalpiniaceae	31 poles
	Yemane	*Gmelina arborea* Roxb.		11 poles
	Ma Khone Twa			3 poles
	Tapyay			6 poles
	Myauk La Khauk	*Artocarpus chaplasha* Spreng.		6 poles
	Ma U	*Neolamarckia cadamba* (Roxb.)	Rubiaceae	17 poles
	Ta Thi	*Diospyros kaki* L. f.	Ebenaceae	8 poles
	Thin Bone	*Alstonia rostata* Fisch.	Apocynaceae	8 trees
	Shaw	*Sterculia angustifolia* Jack	Sterculiaceae	88 poles
Bamboo	Tinkha Wa	*Cephalostachyum pallidum* Munro	Poaceae	5,723 culms
	Wa Net	*Gigantochloa wanet* E.G. Camus	Poaceae	5,853 culms
	Wa Nipar	*Pseudostachyum polymorphum* Munro	Poaceae	1,002 culms
Rattan	Kyein Ni	*Calamus guruba* Buch.-Ham.	Arecaceae	6,198 canes
	Thin	*Calamus sp.*	Arecaceae	1,1412 canes
Medicinal Plants	Win U	*Milletia eriocalyx* Dunn	Fabaceae	
	Kyaung Sha	*Oroxylum indicum* (L.) Kurz	Bignoniaceae	
	Sin Tone Ma	*Tinospora cordifolia* Miers	Menispermaceae	
	Ak Kyaw Paung Ta Htaung			
	Sa Nwin	*Curcuma sp.*	Zingiberaceae	

Table (con't)

Resource Group	Local Name	Species	Family	Annual Harvest
Medicinal Plants	Taw Say Palae			
	Say Than Dai			
	Bonma-yazar	*Rauvolvia serpentina* (L.) Benth.	Apocynaceae	
	Kabaung Gyi	*Strychnos sp.*	Loganiaceae	
	Kabaung Ye Kyi	*Strychnos potatorum*	Loganiaceae	
	Than Dahel			
	Upa tha ka	*Hemidesmus indicus* (L.) W.T. Aiton	Ascelpiadeaceae	
	Theegyi Laephone			
	Kway U			
	Nalin Kyaw	*Neolitsea lanuginosa (Nees) Gamble*	Lauraceae	
	Yar The Set			
	Kyawe Law Mai			

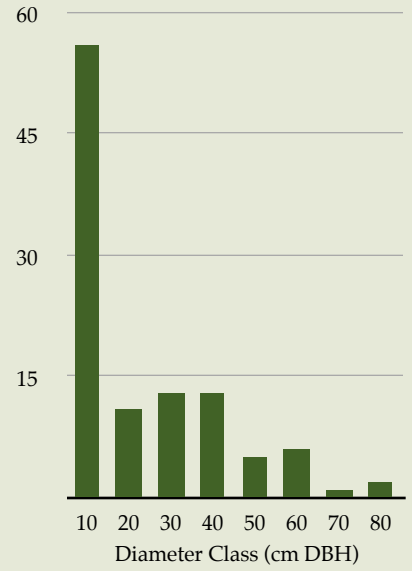
perhaps greater importance is the size-class distribution of the stems that comprise the density estimate. Of interest here are indications of whether the species appears to be actively regenerating in the forest, or conversely, of whether a gap or anomaly in the size distribution might indicate a possible harvest impact on species recruitment. As individuals were recorded into size classes, as well as counted,during the inventories, the size-class structures of several of the tree populations at Nam Sabi can be usefully examined.

Size-class histograms for two important timber species, Ka Nyin and Thin Bone are shown on the following page (p. 9); values represent total counts from all four transects. The size distribution for Ka Nyin, shown in the top histogram, reflects a tree populations with abundant regeneration that appears to be maintaining itself well in the forest. There are some slight dips in the distribution in the 20, 50, and 70 cm diameter classes, but overall the population conforms quite well to the classic negative exponential or "j-shaped"distribution that is frequently associated with stable, self-maintaining aggregations. It is very likely that the annual harvest of poles from this species will be replaced by the growth of individuals from the smaller size classes.

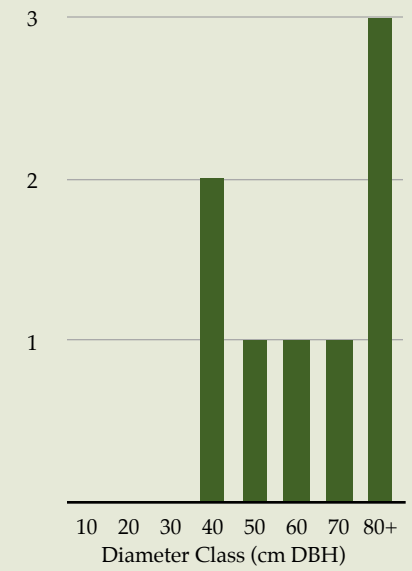
The histogram for Thin Bone, on the other hand, reflects an entirely different story. There are only a few large diameter individuals/hectare and the

Density/hectare of selected plant resources recorded in the forests surrounding Nam Sabi. Results based on transect inventories of 1.92 hectares of forest.

Resource Group	Species	Density (Stems/hectare)
Timber	Ka Nyin	56
	Thin Bone	4
	Ka Laung	2
Bamboo	Wa Net	1226
	Wa Ni Par	51
Thatch	Taw Htan	25
	Yone	416
Rattan	Kyein Ni	79
	Yamata Kyein	190
Medicinal Plant	Bonma-yazar	101
	Nalin Kyaw	44
	Say Than Dai	46
	Taw Say Palae	2



Size-class histogram for Ka Nyin (Dipterocarpus sp.).; values are the number of individuals recorded in 1.92 hectares of transects.



Size-class histogram for Thin Bone (Alstonia rostata).; values are number of individuals recorded in 1.92 hectares of transects.

smaller size classes are completely empty. There are several things that may have caused this pattern. First, the species may be experiencing severe problems in regenerating on the site, and the lack of individuals in the 10, 20, and 30 cm diameter classes may also extend down to the seedling and sapling stages. What this would imply is that once the larger individuals have been harvested, the species would slowly disappear from the forest. Alternatively, the gap in the 10, 20, and 30 cm diameter classes could reflect the intensive exploitation of pole-sized stems in this forest. There may still be abundant seedlings and saplings of this species in the understory that will eventually replenish local stocks. Although additional transects would be needed to fully understand the demographic situation of the population of Thin Bone trees at Namsabi, both scenarios suggest that a concerted management effort is warranted to avoid over-exploitation of this species.

The size-class distribution of Thin Bone raises the important issue of what a sustainable level of harvest for this species would be. What is needed to define a sustainable harvest for this species, as well as for other important forest resources at Nam Sabi is growth data. Given that only the annual growth of a timber species can be removed sustainably in one year, how fast do these trees actually grow? As is shown in the table below, stainless-steel dendrometer bands were placed around nine trees representing eight different species to start collecting these data for local timber trees. These trees will need to re-measured in May, 2015 to collect the first data on annual tree growth, and many more trees will need to be banded to augment the dataset. .

Comparing the information on the community *demand* for certain resources from RNA surveys with the *supply* data for these species from the inventory transects, several basic observations about the sustainability of resources use at Nam Sabi are suggested. In spite of the impact of annual subsistence harvesting on the size-class distributions of some species, none of the important forest resources appear to be over-exploited. That said, the abundance of thatch, and rattan and timber is clearly reduced in forests located closer to the village. There are, however, large tracts of forest near the border with the Htamanthi Wildlife Sanctuary that remain to be sampled. These forests will undoubtedly exhibit a higher resource richness, a more well-developed canopy, and a greater density of large trees, i.e. they would be ideal habitats for community-based natural resource management.

Field crews plot their transect on the Namsabi basemap .

Species, diameter (DBH), height, GPS coordinates, and crown class of trees fitted with stainless-steel dendrometer bands on May 14, 2014.

Species	Diameter (cm)	Height (m)	Latitude	Longitude	Crown Class
Thin Bone	37.6	13	N25°19′49.1″	E95°20′43.2″	co-dominant
Ka Nyin	53.4	16	N25°19′48.4″	E95°20′47.5″	co-dominant
Kyauk Tamar	52.5	8.5	N25°19′48.5″	E95°20′47.7″	co-dominant
Ka Laung	17.2	5	N25°19′50.2″	E95°20′50.9″	suppressed
Ngu	44.1	3	N25°19′50.6″	E95°20′41.7″	co-dominant
Ma U	72	11	N25°19′53.5″	E95°20′40.8″	co-dominant
Ma U	36.4	10	N25°19′53.9″	E95°20′40.7″	co-dominant
Myauk La Khauk	63.2	11	N25°20′04.7″	E95°20′38.6″	co-dominant
Tapyay	39.1		N25°20′46.8″	E95°20′37.0″	dominant

Plant Collections

The undeniable first step in sustainable resource management is knowing the correct name of the plant that you are managing. Previous work on community forestry in northern Myanmar, however, had somewhat sidestepped this directive by first separating the resources out by local name and then, *a posteriori*, attempting to assign scientific names based on local nomenclature. This protocol allowed us to sample larger areas, to conduct more surveys in shorter periods of time, and to collect diagnostic information from a larger number of villages - but it wasn't the optimal, or most useful way to assess the relationship between people and plants.

Catalyzed by the collaboration of Dr. Armstrong during the fieldwork at Nam Sabi and recent botanical initiatives of the NYBG, all of this is starting to change. **We now want to put correct Latin binomials on all of the useful species important to local communities, to adequately document the floristic composition of the forests within which these communities live, to train local botanists, and to promote the collection of voucher specimens wherever possible**.

Dr. Armstrong formed a team including WCS staff, Forest Department rangers, and local villagers and trained everyone how to collect plant specimens, how to properly press them, and how to record the necessary descriptive data in a field book. .While the two inventory teams were running transects, the botanical team was working through the same tract of forest collecting duplicate herbarium specimens of all species encountered with flowers or fruits. The collections were transported in large plastic bags back to the basecamp, spread out on the large bamboo table, and then, in the evening, painstakingly pressed and recorded the field data for each collection.

A total of 51 collections were made, each collection represented by a varying number of duplicates. An annotated list of these collections including field determination of Family and genus, collection locality, and local nomenclature is presented in the table on the following pages. The plant collections contain trees, treelets, shrubs, woody climbers, herbs, and epiphytic parasites, and, based on the field determinations presented, pertain to 27 plant families.

Using an expandable collecting pole to cut a small piece of a fruiting branch.

Field determination of Family and genus, life form, geographical coordinates, and Myanmar and Shan name of plant specimens collected in the forests and fields outside of Nam Sabi.

No.	Family	Genus	Life From	Latitude	Longitude	Myanmar Name	Shan Name
513	Zingiberaceae	*Alpina*	herb	N25°19′47.1″	E95°21′46.8″		taung kote
514	Clusiaceae	*Garcina*	tree	N25°19′46.5″	E95°21′48.3″	Mat lin	Ma nan
515	Euphorbiaceae	*Baccaurea*	tree	N25°19′45.5″	E95°21′53.0″	Ka na zo	Ma phai
516	Euphorbiaceae		shrub	N25°19′42.6″	E95°21′48.5″	Boma Ya Zar	
517	Olacaceae	*cf. Olax*	tree	N25°19′41.3″	E95°21′48.1″	Hinnpoak	Mabashimyo
518	Arecaceae		palm	N25°19′51.6″	E95°21′44.8″	Thinpaung	Markmapai
519	Simaroubaceae	*cf. Eurycoma*	treelet	N25°20′04.6″	E95°21′16.8″		Ma ohn nut
520	Sapindaceae		tree	N25°20′05.0″	E95°21′15.9″		Padaung chine
521	Euphorbiaceae		tree	N25°20′06.1″	E95°21′14.7″		
522	Myristicaceae	*Knema*	tree	N25°18′45.7″	E95°21′03.3″		Ma ya naing
523	Myrsinaceae		tree	N25°18′46.3″	E95°21′03.8″	Taw Jemau	Panukaing
524	Euphorbiaceae		tree	N25°18′45.6″	E95°21′04.9″		Zumpaung
525	Rubiaceae		tree	N25°18′45.3″	E95°21′04.9″		
526	Arecaceae		rattan	N25°18′44.7″	E95°21′05.2″		
527	Malvaceae(?)		tree	N25°18′55.4″	E95°20′57.5″		Makya
528	Urticaceae	*Elatostema*	herb	N25°18′56.8″	E95°20′57.2″		
529	Celastraceae		vine	N25°18′57.4″	E95°20′56.1″		
530	indet.		shrub	N25°18′58.1″	E95°20′56.4″		Jwaye law mai
531	Rutaceae		tree	N25°19′00.3″	E95°20′52.5″	Kyat tha lin	
532	Rubiaceae	*Ixora*	treelet	N25°19′00.0″	E95°20′46.3″		
533	Lamiaceae	*Vitex*	tree	N25°19′00.4″	E95°20′45.2″	Kyetyoo	Baluledwa
534	Rubiaceae		treelet	N25°19′01.1″	E95°20′44.8″		
535	Oleaeceae (?)	*Jasminum*	vine	N25°19′00.4″	E95°20′45.2″		Sindonemanwe
536	Olacaceae	*cf. Olax*	tree	N25°19′00.4″	E95°20′45.2″	Hinnpoak	Mabashimyo
537	Dioscoraceae	*Dioscorea*	vine	N25°19′00.4″	E95°20′45.2″		Gangha
538	Rosaceae	*Pyrus*	tree	N25°19′03.1″	E95°20′45.1″		Taw thit daw
539	Rutaceae		tree	N25°19′03.1″	E95°20′45.1″		
540	Dilleniaceae	*Dillenia*	tree	N25°19′04.4″	E95°20′45.9″	Simpyom	Ma sun

Table (con't)

No.	Family	Genus	Life From	Latitude	Longitude	Myanmar Name	Shan Name
541	Myrtaceae	*Syzygium*	tree	N25°19′05.9″	E95°20′46.1″	Thepi	Thepi
542	Myrtaceae	*Syzygium*	tree	N25°19′28.1″	E95°20′49.1″	Kaban	Kaban
543	Euphorbiaceae	*Macaranga/Mallotus*	tree	N25°19′31.4″	E95°20′48.8″	Phetwai	Phetwai
544	Moraceae	*Ficus*	tree	N25°19′31.4″	E95°20′48.8″	Yehthepan	Yehthepan
545	Rubiaceae	*cf. Haldina cordifolia*	tree	N25°19′33.9″	E95°20′46.8″	Ma eu	Ma lom
546	Myrsinaceae	*Ardisia*	tree	N25°20′17.5″	E95°20′41.7″	Kyat ma aoke	Pa nu kai
547	Moraceae	*Streblus asper*	climber	N25°20′17.5″	E95°20′41.7″	Ohn nhe	Kan ya
548	Sapindaceae	*cf. Serjania*	vine	N25°21′22.0″	E95°20′34.4″	Kaler myed	Padaung chine
549	Polygalacaeae	*Xanthophyllum*	tree	N25°20′31.2″	E95°20′37.5″	Ga zin	Mei mwa
550	Marantaceae		herb	N25°20′31.2″	E95°20′37.5″	Thin	Paung
551	Dipterocarpaceae		tree	N25°20′42.1″	E95°20′38.0″		Sam kha
552	Fabaceae	*cf. Dalbergia*	climber	N25°20′42.1″	E95°20′38.0″		Makant mu
553	Fabaceae	*cf. Millettia*	climber	N25°20′42.1″	E95°20′38.0″	Yan wun oo	Yan wun oo
554	Loranthaceae		epiphyte	N25°21′02.1″	E95°20′42.7″		Kyi paung
555	Loranthaceae		epiphyte	N25°21′11.8″	E95°20′37.0″		Kyi paung
556	Myrtaceae	*Syzygium*	tree	N25°21′11.8″	E95°20′37.0″	Yae Ta phay	
557	Celastraceae	*cf. Salacia*	climber	N25°21′12.3″	E95°20′36.5″		
558	Lauraceae		treelet	N25°21′19.0″	E95°20′34.1″		Phi nam kha
559	Dilleniaceae	*Dillenia indica*	tree	N25°21′19.0″	E95°20′34.1″	Lin yaw	Masan gyi
560	Elaeocarpaceae	*Elaeocarpaceae cf. lanceifolius*	tree	N25°21′28.1″	E95°20′36.4″		Sam kha
561	Moraceae	*Artocarpus chaplasha*	tree	N25°21′28.1″	E95°20′36.4″	Myauk la khauk	Mai ma hak
562	Boraginaceae		herb	N25°21′28.1″	E95°20′36.4″	Sin na mong	
563	Apocynaceae	*cf. Holarrhena pubescens*	tree	N25°20′05.8″	E95°17′16.2″	let htok	

All specimens were pressed in the field and the presses were carried back to the Htamanth Wildlife Sanctuary headquarters. A plant drier was constructed using charcoal stoves as a heat source and the specimens were put inside to dry. .As the material was still quite wet by the time that the science team has to return to Yangon, staff at Htamanthi was trained to check the specimens, to change the newspaper as necessary, and to remove the dry collections from the press periodically.

Having to leaving the plant specimens at Htamanthi was unfortunate, because there is always the danger that the material will go moldy or be eaten by insects. Of greater importance, however, these valuable collections have yet to be deposited in local herbaria, e.g. Forest Herbarium at Yesin (RAF), University of Mandalay, or Yangon University (RANG), and Dr. Armstrong was unable to carry duplicates back to NYBG to study them and do the final identifications.

Training

A training workshop was held for the ranger staff at the Htamanthi Wildlife Sanctuary headquarters on May 15, 2014. The one-day workshop covered the theory and methods underlying community forestry work, and an overview was also provided about the collection and preparation of plant specimens. The workshop involved both Powerpoint presentations in the new meeting room, and field exercises; it was attended by about 25 rangers.

The morning session summarized the collaborative community forestry work done in northern Myanmar by MOECAF, WCS, and NYBG (C. Peters), and outlined the research protocols involved, e.g. Resource Needs Assessment surveys and forest inventories. Participants were then shown how to lay out an inventory transect, how to control the transect bearing with a compass, and how to measure tree heights using a clinometer (shown above).. A second presentation (K. Armstrong) was then offered on the importance of assigning the correct name to plants and the need to collect voucher specimens. The rangers were shown how to use a collecting pole, and everyone got a chance to collect, prepare, and press a plant specimen.

The afternoon session was focused on .how to integrate the supply and demand information obtained from the household surveys and transects to produce a diagnostic of community resource use. Data from the Hukaung Valley and the Naga Hills were used as case studies. Detailed information about the growth and yield of forest resources was shown to be the key parameter in designing sustainable systems for community-based natural resource management. The construction of growth bands was then demonstrated, and the rangers broke into teams and put growth bands around all of the teak trees planted in the headquarters compound. A final session answered questions and included a discussion about next steps in the development of applied botanical science in Myanmar.

U Kyaw Zin Aung demonstrates the correct way to press a plant specimen.

Next Steps

Based on the results presented, the village of Nam sabi seems to be an appropriate venue for developing a pilot program of community-based natural resource management. Villagers have expressed an interest in CBNRM as a way to maintain their forests, and the location of the community boundary next to the Htamanthi WS provides a unique opportunity to investigate the conservation benefits of community forestry as a way to stabilize the buffer zones around protected areas.

With this idea in mind, a return trip to Nam Sabi is planned for October 2014. The basic objectives of this trip are fourfold:

1. Working in close collaboration with the village, select a representative tract of forest to be used as a Community Management Area (CMA). The area should comprise 100-200 hectares, contain sufficient densities of timber, bamboo, and rattan, and be located close enough to the village to facilitate resource harvest and transport, and sufficiently close to the Htamanthi WS to function as a buffer area. The Community Management Area would embody the concept of forest conservation through sustainable resource, and harvest allotments would be based on the actual density and yield of local resources

2. Initiate the inventory of timber, bamboo, and rattan resources within the CMA. .This sampling protocol will involve an array of parallel, 10 m-wide transects located systematically along a baseline. Sample intensities of 5 to 10% are recommended. to provide a sample intensity of 5 to 10%. Arranging the transects in a systematic fashion will allow resource mapping and the definition of harvest areas.The

3. Expand the preliminary study of tree growth at Nam Sabi by putting dendrometer bands on a sample of timber species of varying size and canopy position within the management area. . More growth trees will be banded as additional transects are established.

4. Continue the collection of voucher specimens in the area, with particular attention paid to the useful taxa and important forest resources growing within the management area. Provide training to a team of villagers who could act as "para-botanists" to collect, press, dry, and store plant specimens of species that flower and fruit when the science team or Forest Department staff are not there.

Given the importance of voucher specimens for documenting and understanding the local flora, it is very important that the appropriate permits and agreements are in place to insure that duplicate collections can be deposited in local herbaria and also sent back to NYBG for further study.

Finally, as the community forestry work develops at Nam Sabi it would be extremely useful to maintain a continuing dialogue with the Forestry Department to assess the relevance of this CBNRM experiment to Community Forestry Instruction (CFI) and the development of a more nuanced strategy for managing the buffer zones around protected areas.

Plot marker after all the flagging is gone (Transect 3).