

SECOND PROGRAM PERFORMANCE REPORT

Reporting Period: September, 2001 to August, 2002

for

Increasing Local/Global Connections through

PLANTS, PEOPLE, and BIODIVERSITY PROTECTION

A project funded by the
USAID Bureau for Humanitarian Response
Office of Private and Voluntary Cooperation (BHR/PVC)
Cooperative Agreement No. HRFP-A-00-01-00009-00

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August, 2002

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I. Executive Summary

During the September 2001 – August 2002 reporting period, all project objectives were achieved and/or exceeded, and all remaining project components are on track. Outputs included (a) the production and dissemination of six (6) thematic articles highlighting the global importance of plants (two more than the originally scheduled four), (b) the drafting and testing of a new and innovative project curriculum entitled Mountain Adventures: Exploring the Himalayas, Andes, and Appalachians, and (c) detailed planning of the online collaborative project between middle-school students in Nepal, Peru, and the U.S. (to be launched during the next reporting period). Additional outcomes of note included (a) an expressed interest by TMI to translate the Mountain Adventures curriculum into Spanish and Nepali, (b) requests from the United States Botanic Garden, Washington, D.C. to showcase the curriculum through the creation of an educational display on the Andes, Himalayas, and Appalachians, (c) prospective expansion of the project's pilot online collaborative project, and (d) production of a thematic poster in Quechua, Spanish, and English by TMI's Andean Program entitled "Protect the Native Plants of the Sierra of Ancash". Major tasks remaining for the project include (a) launch of the online student project, (b) distribution of the Mountain Adventures curricula to teacher/members throughout the NGA network, and (c) final workshop on Spruce Knob to assess overall project impact and plan for long-term project continuation.

II. Project Overview

Plants, People, and Biodiversity Protection is a two-year project (2001-2003) that is being implemented by The Mountain Institute (TMI) in partnership with the National Gardening Association (NGA) and College of Natural Resources, Virginia Tech, Blacksburg, Va.

The project's primary goal is to increase target audience understanding and awareness for the (a) importance of native plants in the U.S. and abroad, (b) their usefulness to millions of people worldwide as sources of food, medicine, and fiber,

(c) the local/global commonalities in the historical and day-to-day use of plants, and (d) the role of USAID in protecting native plants through international, community-based conservation projects. Underpinning each message is the role of women as traditional keepers of indigenous botanical knowledge throughout the world. The project is focusing on the species-rich and traditional plant use cultures of the Himalayas, Andes, and Appalachians in order to maximize the opportunities provided by TMI, NGA, and Virginia Tech's on-going initiatives within these regions.

Project outputs will include thematic articles on the importance of plants (hardcopy and online); mountain curricula developed with participant NGA teachers/members (hardcopy and online); an online collaborative student project involving U.S., Nepali, and Peruvian students; and hardcopy- and Web-based dissemination mechanisms that will reach secondary audiences for years to come. Project materials will reach more than 75,000 U.S. teachers, approximately 1.8 million middle school students, and 1.8 million annual gardener visitors to NGA's gardening Web site for an estimated 4 million individuals contacted during the life of the project.

II. Project Progress: Actual Accomplishments vs. Planned Goals and Objectives

A. First Reporting Period (June-September 2001)

The project's original Implementation Timeline is shown as Table 1, p. 36 of the proposal. As reported in the FIRST PROGRAM PERFORMANCE REPORT, project accomplishments during the first quarter (18 June to 18 September 2001) included:

1. April 2001: Announce DevEd award, program goals/objectives, and activities on NGA's website and the Mountain Forum network

Progress: The award was announced on the NGA website, Kidsgardening website, Kidsgardening listserv (15,000 subscribers), and Gardenwire listserv (20,000 subscribers) as scheduled. Announcement on the Mountain Forum website is scheduled for November, 2001.

2. April-May 2001: Begin NGA teacher/member and professional developer recruitment

Progress: Achieved as scheduled

3. April-May 2001: Thematic article planning/drafting

Progress: Achieved as scheduled

4. June 2001: *Pre-project awareness survey and background readings sent to selected teacher participants who will attend the first participatory workshop*

Progress: Achieved as scheduled

5. July 2001: *Participatory Workshop 1 held at the Spruce Knob Mountain Center to begin design and development of (a) articles, (b) curricula, and (c) the collaborative on-line student project (for Year 2)*

Progress: Achieved as scheduled

B. Second Reporting Period (September, 2001 and August, 2002)

As mentioned in the previous progress report, the finalization of the Cooperative Agreement in September, 2001 resulted in the need to re-schedule most of the originally planned activities. However, all objectives for the reporting period have been achieved or exceeded; all components are now back on schedule; and various unanticipated benefits of the program are beginning to manifest. The sections below describe the progress achieved in the production of the thematic articles; the new mountain studies curriculum; and planning for the online student collaborative project:

6. January-March 2002: *Draft thematic articles distributed to NGA, TMI, and participant teachers for final editing*

Progress: Six (6) thematic articles, as opposed to the originally scheduled four (4), were written between January-March 2002 by Alton Byers with assistance from graduate student Laura Shillington, College of Natural Resources, Non-Timber Forest Product Program. Topics included (1) Introduction, (2) Mountains and Plants, (3) Native Plants as Food, (4) Native Plants as Medicine, (5) Native Plants for Fiber, Dyes, and Other Uses, and (6) USAID and the Conservation of Mountain Biodiversity. The articles were professionally edited by an NGA editor in late March, revised by TMI, and again submitted to NGA in April 2002.

In May, 2002, a Pre-Project Awareness Survey regarding the thematic articles was posted by NGA (see attachments) that was completed by 2,962 NGA members. Each of these participants will be notified personally by email when the new articles are posted, and each will take the survey again in the fall of 2002. This level of response is considered to be excellent in NGA's experience and, to NGA Program Director Joan White, is indicative of a new and higher level of interest in global issues that transcends the traditional "how-to" gardening services of the organization's web page. NGA members seem to genuinely appreciate this new

addition of contemporary, global issues and advocacy that we will continue to monitor in the remaining project period.

Also indicative of participant interest are the various email comments received daily, a sample of which is provided below:

MI Survey wrote:

Hello again!

The second article in our series on mountains and mountain vegetation is posted at:

<http://www.nationalgardening.com/special/tmi/article2.asp>><http://www.nationalgardening.com/special/tmi/article2.asp>

Enjoy!

Responses:

***Greetings from Northwest Montana! I have read up on your "Plants, People, and Biodiversity Protection" project and wanted to extend my kudos, it sounds fantastic! Let me know what opportunities are built into the project for a botanist or GIS technician, I would be happy to get involved if the niche exists. I am attending the "Ecological and Earth Sciences in Mountain Areas" conference in Banff, Alberta Sept. 6th - 10th to do a little networking and see what research is currently going on. I would be happy to promote the PPBP project if you are able to send a press release package my way. Congrats on the DC office as well! TMI will surely benefit from such a strategic location. Give my regards to all!

** We really enjoyed the article on mountains. Also, tickled that you included the reference areas -- already used 2 of them! Thank You!

** Perfect! Thanks so much!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

** Please send me Article's 1 & 2. Thanks in advance. This is a wonderful idea!

Article I, Introduction, was visited by 6,570 NGA members which is considered to be an excellent level of response. The total numbers of NGA and other members visiting each of the thematic articles will be quantified and assessed in the project's final report.

7. June-November 2002: Thematic Articles published on www.Nationalgardening.com (one article each month)

Progress: One thematic article has been posted on the NGA website since June, 2002 (total of 4 out of 6 articles posted to date). The articles may be viewed at <http://www.nationalgardening.com/special/tmi/survey.asp> , with a link recently installed in the TMI webpage (<http://www.mountain.org/whatsnew.html>) Har rdcopies of the original articles are included in the attachments. Efforts are currently underway to include a printer-friendly component (pdf file) of the

articles that will facilitate ease of printing and therefore dissemination potential. At this time, the four available articles in pdf format may be viewed at:

Discussion Paper 1

<http://www.garden.org/special/tmi/pdf/PAPER1.PDF>
<http://www.garden.org/special/tmi/pdf/PAPER1-1.PDF>

Discussion Paper 2

<http://www.garden.org/special/tmi/pdf/PAPER2.PDF>
<http://www.garden.org/special/tmi/pdf/PAPER2-1.PDF>

Discussion Paper 3

<http://www.garden.org/special/tmi/pdf/PAPER3.PDF>
<http://www.garden.org/special/tmi/pdf/PAPER3-1.PDF>

Discussion Paper 4

<http://www.garden.org/special/tmi/pdf/PAPER4.PDF>
<http://www.garden.org/special/tmi/pdf/PAPER4-1.PDF>

8. August 2001-June 2002: Mountain Adventures: Exploring the Himalayas, Andes, and Appalachians curricula drafted and tested by participant teachers; second Participatory Workshop conducted at the Spruce Knob Mountain Center, WV

After the July 2001 participatory meeting, the NGA curriculum writer conducted extensive background research with the assistance of TMI, resulting in a draft version of the curriculum. The draft curriculum is composed of five modules, each containing teacher materials, student materials, activities, and black and white line masters (included in the attachments).

Module 1: *Why Mountains?* introduces students to the importance of mountains—globally and personally—with open-ended questions to provoke interest in topics addressed in later modules. *Why Mountains?* thematically introduces students to mountains around the world as sources of water, play areas, sacred sites, homelands, weather barriers, “islands” of biodiversity, and geographic divides. In this module, students also explore the definition of a mountain, how mountains are made, and graphical representations of mountains on maps. Expeditions to the top of Nevado Huascarán (Andes), Mount Makalu (Himalayas), and Blair Mountain (Appalachians) frame the four remaining modules as students work in teams to climb a mountain in the longest, tallest, or oldest mountain range in the world. Along the way they explore the biodiversity (Module 2: *Mountains as Biodiversity Hotspots*), cultural diversity (Module 3: *Mountain People*), ethnobotany (Module 4: *Plants and People*), and hydrology (Mountain 5: *Mountains as Water Sources*) of their mountain.

In February 2002, a copy of the draft curriculum was sent to each of the teacher-participants to pilot test in their classrooms during the spring semester. Each

teacher received an extensive evaluation form (see attachments: Evaluation Questions for Teacher Participants) to complete after the pilot-testing period. The completed evaluation forms were returned to the curriculum writer at the second participatory meeting in June 2002. During the first day of this meeting (please see attachments), a group discussion was held on the evaluation responses to determine specific recommendations for curriculum revisions. These recommendations (see attachments: Minutes from June 27-29, 2002 meeting), will be incorporated into the draft curriculum prior to field-testing. Additionally, selected units were tested by 40 West Virginia K-12 teachers during a July-August TMI course entitled "Celebrating the International Year of the Mountains 2002 in West Virginia". Their comments and suggestions were particularly useful to the Appalachian module and have been forwarded to the NGA curriculum specialist for incorporation.

As the next step, fifty teachers will be selected to field test the curriculum in their middle school classrooms during the fall semester, 2002. These field-testers have been selected from a pool of teachers who responded to a call from the National Gardening Association to participate in the curriculum field-testing. Ten teachers will field test each of the five modules and provide feedback to the curriculum writer by completing an evaluation form. The final curriculum, under the new name *Mountain Adventures: Exploring the Himalayas, Andes, and Appalachians*, will then be published in hard copy, posted on the World Wide Web, and disseminated by the National Gardening Association and The Mountain Institute.

9. ***June 2002: Develop on-line student collaborative project (U.S., Peru, Nepal middle schools) based on thematic articles and curricula***

During the final two days of the June, 2002 participatory workshop, the format of the online collaborative project was determined. The process that resulted in this format is outlined in Minutes from June 27-29, 2002 meeting (please see attachments).

The participant teachers in the June, 2002 workshop decided that the pilot online collaborative project should have three interactive components. After a verbally engaging and visually appealing introduction to mountains, students from the three locations (Andes, Himalayas, and Appalachians) will introduce themselves to one another by sharing information through an online discussion forum. Next, students will design questions and conduct interviews with parents, grandparents, and other community members to research the importance of native plants in their culture, past and present. This information will be compiled and shared with their international classmates. Finally, students from all three locations will work collaboratively to create a final online presentation that accurately portrays the importance of native plants in these three regions.

It is of note that several unanticipated outcomes associated with the Plants, People, and Biodiversity Protection project have developed. First, there is a strong interest from TMI's Andean and Himal Programs in translating the curriculum into Spanish and Nepali, so that these innovative materials can be used as an educational resource in Peru and Nepal as well as in the United States. Secondly, the United States Botanic Garden, Washington, D.C. has expressed interest in showcasing the curriculum through the creation of a temporary educational display on the Andes, Himalayas, and Appalachians. Thirdly, expansion of the pilot online collaborative project to include additional classrooms beyond the three designated locations was discussed during the June, 2002 workshop as a desirable addition. Finally, project partners in TMI's Andean Program helped develop a beautiful educational poster entitled "Protect the Native Plants of the Sierra Ancash" (see attachments) that is being distributed in local schools, communities, and tourist facilities throughout the Huascarán National Park region. Collectively, these outcomes serve as additional indicators of the uniqueness and desirability of the project and its products.

III. Planned activities for the time period September, 2002-September, 2003 (see: Table 1, Implementation Timeline, p. 37 of the proposal)

1. Workshop participants test a beta version of the online Collaborative Project
2. Final Edits made to Online Collaborative Project
3. Launch the Online Collaborative Project on www.kidsgardening.com
4. Distribute on-line evaluation survey to pilot teacher/members and students
5. Print and distribute the Mountain Adventures curricula to teacher/members throughout NGA's network
6. On-going monitoring of Online Collaborative Project activity
7. Distribution of post-project participant awareness survey to project participants
8. Collaborative Workshop 3 held at the Spruce Knob Mountain Center to (a) assess project impact and (b) plan for long-term continuation of most promising project components.

Attachments

1. Pre-Project Awareness Survey
2. May, 2002 Participant Incentive
3. Kids Gardening E-Mail News, May, 2002 announcing the Call for Curriculum Field Testers
4. Mountains, Plants, and Me Evaluation
5. Plants, People, and Biodiversity Protection meeting agenda, 27-29 June, 2002, Spruce Knob Mountain Center, WV
6. Minutes from June 27-29, 2002 workshop
 - A. Curriculum
 - B. On-line Collaborative Project
7. Discussion Papers 1-6
8. Mountains, Plants, and Me draft curriculum
9. "Protect the Native Plants of the Sierra of Ancash" color poster

Pre-Project Awareness Survey

[Posted on the NGA website 23 April, 2002]

This survey is an important part of a two-year project, *Plants, People, and Biodiversity Protection*, a collaborative effort of the National Gardening Association (NGA), The Mountain Institute (TMI) and Virginia Tech, funded by the United States Agency for International Development (USAID). Using native plants as the central theme, the goal of this project is to help increase U.S. public awareness for:

- the importance of indigenous plants in the U.S. and abroad
- their usefulness as food, medicine, fiber, dyes, and other products to people worldwide;
- the local/global linkages that exist between U. S. and international mountain communities in their historical as well as contemporary uses of; native plants, emphasizing the role of women as retainers of this knowledge; and
- the role of development assistance toward the protection of the world's natural and cultural heritage through community-based biodiversity protection projects.

Project outputs will include informative articles, middle-school lessons, and an online collaborative project involving students from the U.S., Nepal, and Peru.

By taking this survey you will be playing an important role in this project, but your part in this goes beyond simply taking the survey. We are asking you to:

- (a) take the survey and supply us with your email address
- (b) each time we post an article related to this project we will email you and ask you to read the article (there will be six articles published on our Web site)
- (c) at the close of the project, we will email you and ask you to take the survey again

Survey Questions:

- (a) The seeds from the Hawthorne tree (*Crataegus coccinea*) were an important resource for Native Americans (T)
- (b) The pawpaw is similar to the mango in its nutrition composition (F)
- (c) In the Himalayas many households rely on forest plants to supplement their diets (T)
- (d) The domestication and cultivation of native plants for food began in the eastern range of the Andes (T)
- (e) It is believed that almost 60 percent of the vegetables, grains, and legumes that we eat today

originated in the Andes (T)

(f) On the international market, Korean ginseng varieties are preferred over the wild American (F)

(g) Stinging nettle makes a strong homemade cloth when woven with wool (T)

(h) In the 1970s, the Volcanoes National Park lost more than half its original 328 square kilometers due to desertification (F)

(i) The annual U.S. Federal budget expends ____ toward foreign assistance:

- a. Less than 1%
- b. 2%
- c. 5%
- d. 10%

(j) What percentage of the U.S. federal budget do you think should be expended on foreign assistance ?

- a. Less than 1%
- b. 2%
- c. 5%
- d. 10%

May, 2002 participant incentive emailed to 122,000 National Gardening Association members

Learn About Native Plants and Win a \$100 Gift Certificate!

Dear Gardening Friend,

Would you like to learn more about native plants and be entered in our drawing to win a \$100 gift certificate for perennials, roses, seeds, tools or anything you want from the NGA Garden Shop?

You can if you sign up to participate in our People, Plants and Biodiversity project. Please click on <http://www.nationalgardening.com/special/tmi/survey.asp> to find out more about this interesting and important program.

Won't you please take just a few minutes now to sign up and participate? Thanks in advance for your help. We really appreciate it very much.

Happy gardening and best regards

Valerie Kelsey, Ed. D.
President
National Gardening Association

Call for Curriculum Field Testers
KIDS GARDEN E-MAIL NEWS
May 2002

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Sneak Peek at New Member Benefit

We invite you to review a sample issue of Growing Ideas Classroom Projects, one of the benefits of Education Membership in the National Gardening Association. Each monthly issue features a unique project along with related curriculum ideas and resources.

Native Beauty: Creating a Wildflower Planting
<http://www.kidsgardening.com/member-preview.htm>

Other Education Membership benefits include free online botany and gardening courses, and product discounts at our Gardening With Kids store. For details visit
<http://store.kidsgardening.com/nationalgardening/25-7608.html>

Save 25% on Top-Quality Plants!

We invite you to take advantage of NGA's partnership with Red Barn Gardens nursery and receive 25% off perennials, annuals, trees and bulbs. Choose among hundreds of top-quality plants to beautify your school or home gardens. Be sure to use code NGA12 at check out to reap your discount. This offer expires Tuesday, May 14th, so visit our nursery now at
<http://www.redbarngardens.com/cgi-bin/WebObjects/redbarn.woa/35/wa/insert?wosid=l2vStaaKR3s15wvbgJHAQ0&client=4001&promo=nga050702A&url=%2Fnganewsletter.html>

Go Wild in the Outdoor Classroom

In a native planting or wildflower patch students can learn firsthand about adaptations that enable plants to survive in their environments. They can begin to understand how plants and animals have evolved to depend

on one another, and explore factors that threaten them both. Language and history lessons also come to life as students delve into the folklore and culinary, medicinal, and other uses, past and present, of these humble residents. Check out this month's Teachers' Room, which features stories, activities, resources, and grants, to learn how to weave wild plants into your curriculum.
<http://www.kidsgardening.com/teachers.asp>

Gardening Safely with Children

The garden is a place of nourishment, learning, fun, and solace. But it's not a benign environment. It's certainly not "childproof" no matter what the age of the child. The safety issues are both human-made and natural, from handling tools, to playing with water, to avoiding allergy-triggering plants and insects. In the Family Resource Room this month you'll find tips for keeping your children safe in the garden.
<http://www.kidsgardening.com/family.asp>

2002 Community Tree Planting Grant

The National 4-H Council Youth Grant Program is offering Community Tree Planting Grants of \$200 to \$1,000 to stimulate community tree planting and/or reforestation projects nationwide. These grants, funded by Deft, Inc., will be awarded to communities in support of ongoing projects, or to stimulate new and creative youth-led projects. The application deadline is May 27, 2002.

The complete announcement and application can be found at
<http://www.grants.n4h.org>
Just click the link in the left-hand margin under "Tree Planting."

>From Garden to Grocery: Creating Food Awareness Awards

If you live in Colorado, Illinois, Iowa, Minnesota, or Wisconsin, you are eligible to apply for this new award sponsored by Cub Foods, Procter & Gamble, and the National Gardening Association. The award provides 20 schools and youth programs with educational and gardening tools students can use to create, maintain, and study a school garden. Winners will be selected based on their proposal for using gardening to increase students' nutrition awareness. Applications must be postmarked May 17, 2002 to qualify. To download an award application and guidelines, please visit
<http://www.kidsgardening.com/teachers2.asp#cub>

National Tree Trust Awards

The National Tree Trust has established an award to honor

outstanding achievements in volunteerism and community forestry. Applications are now being accepted for the Planting America's Future Awards, which will be presented to three individuals or organizations that have demonstrated success in mobilizing local citizens, business, government and others in projects to improve their community through the use of volunteers and trees.

The two award categories of interest to students and educators are described below:

***Youth Environmental Stewardship Award**

The Youth Environmental Stewardship Award category honors an individual under the age of 21. The winning individual will be the driving force behind a tree-related community project that involves use of volunteers and public land.

***Success in Environmental Education Award**

The Success in Environmental Education Award honors a "hands-on" education program that best helps students, K-12, improve their knowledge of trees and their role in our environment.

The application deadline is May 31, 2002. To print an application, visit
<http://www.nationaltreetrust.org/envirawards/envirawards.htm>

Healthy Sprout Award Winners

The National Gardening Association and Gardener's Supply Company are pleased to announce the winners of the 2002 Healthy Sprouts Awards. This annual award is given to 25 schools and community organizations that are making innovative and powerful educational links between gardening and nutrition. Each group will be given tools, seeds, garden products, and educational resources for growing a vegetable garden. The top 5 winners also receive \$500 grants. Learn more about their outstanding projects at <http://www.kidsgardening.com/healthysprouts2002.asp>

Call for Curriculum Field Testers

The National Gardening Association is seeking educators to field test a new curriculum designed to introduce middle school students to the beauty and value of native plants in mountainous regions of the world. This curriculum is part of a two-year project, Plants, People, and Biodiversity Protection, a collaborative effort of National Gardening Association, The Mountain Institute, and Virginia Tech. It is funded by the United States Agency for International Development (USAID).

This place-based curriculum, composed of five modules, takes students on an expedition through the Andean, Himalayan, and

Appalachian mountains, inspiring related investigations of native plants in their own backyard. Your participation includes field testing at least one module with your students in Fall 2002. In exchange for your participation, you will receive a copy of the published curriculum and a selection of vegetable and flower seeds. Please contact Amy Gifford (amyg@kidsgardening.com) for more information.

Tools for Teaching in the Outdoor Classroom

If you're looking for teaching tools for your wild plant habitat, visit our Gardening with Kids store. You'll find a Wildflower Fandex for plant identification, a Field Press for creating an herbarium, and a Journal for recording field notes and garden designs.

Wildflower Fandex

<http://store.kidsgardening.com/11-4118.html>

Botanical Field Press

<http://store.kidsgardening.com/24-1023.html>

Garden Journal

<http://store.kidsgardening.com/22-4010.html>

====Sponsoring Kids Garden News====

Hilton Garden Inn, a focused-service hotel brand providing an excellent lodging experience at a reasonable price in more than 130 locations throughout North America, is proud to sponsor the NGA Kidsgardening newsletter. This spring, all Hilton Garden Inn hotels look forward to working with schools in their respective communities to educate our young people about the importance of gardening and our environment!

<http://www.hiltongardeninn.com>

====Gardening With Kids Store====

The National Gardening Association's secure Kidsgardening Store features innovative products, from books to butterfly houses, for those who garden with kids in schools, at home, and in communities. We invite you to visit and browse:

<http://store.yahoo.com/nationalgardening/index.html>

SUBSCRIPTION INFORMATION

To add your name or a friend's name to our Kids Garden E-mail News mailing list (subscribe) visit:

<http://www.nationalgardening.com/newsletters/>

To remove your name from our Kids Garden E-mail News, visit

<http://list.nationalgardening.com/cgi-bin/bm-user.pl?action=unsub>

CONTACT NGA:

Phone: 888-538-7476

Sales: 800-538-7476, ext. 143

Web site: <http://www.kidsgardening.com>

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Mountains, Plants, and Me
Evaluation

Instructions:

- Please complete all questions. Use additional paper when necessary.
- Return completed evaluations to program administrators.

Special assignment:

- Please make a list of which words from the text you think should be included in the glossary.

Questions: (answer as applicable)

Unit

Is the unit goal clearly defined and stated?

Were any major concepts overlooked? Please make suggestions for how and where each concept might be addressed in the materials.

How does the unit emphasize depth of understanding? How might this be improved?

Do you think the curriculum materials will appeal to and support students with a range of capacities, learning styles, and “intelligences”?

What specific information should be included in the Introduction?

Which suggested embedded assessment do you think will be most useful? What other ideas do you have for documenting student gains?

Do you know of any additional resources that would be useful while teaching this unit?
Please provide a list of these resources.

Where would additional graphics help clarify the Teacher and/or Student Materials?

What other black line masters do you suggest including?

Modules (Please specify which module you are referring to)
How effective is the Teacher Materials section at assisting teachers to use the materials?
What features might you add or change?

Which module is the strongest? Please explain.

Which module is the weakest? Please explain.

Activities (Please specify which activity you are referring to)
Are the activity objectives directly related to the unit goal?

Is the activity developmentally appropriate? If not, how might it be modified?

Which activity is the strongest? Weakest? Please explain.

PLANTS, PEOPLE, AND BIODIVERSITY PROTECTION

AGENDA

June 27-29, 2002
Spruce Knob Mountain Center
Circleville, West Virginia

Thursday, June 27

Morning:

8:15-9:00 Breakfast

9:00-11:00

- Welcome back
- Introductions
- Overview of meeting
- Establish framework
- Guidelines

11:00-11:15 Coffee break

11:15-12:00

- Small group discussion of curriculum evaluation

12:00-1:00 Lunch

Afternoon:

1:00-2:00

- Small group discussion of curriculum evaluation (continued)

2:00-3:30

- Debriefing on critiques

3:30-3:45 Refreshments

3:45-5:00

- Identify specific recommendations
- Define structure for field test evaluation
- Determine name for published curriculum

6:00-7:00 Dinner

Friday, June 28

Morning:

8:15-9:00 Breakfast

9:00-12:00

- Field trip TBA

12:00-1:00 Lunch

Afternoon:

1:00-2:30

- Online collaborative project scrutiny

2:30-2:45 Refreshments

2:45-5:00

- Compile ideas for online collaborative project

6:00-7:00 Dinner

Saturday, June 29

Morning:

8:15-9:00 Breakfast

9:00-11:00

- Refine ideas for online collaborative project

11:00-11:15 Coffee break

11:15-12:00

- Small group work on online collaborative project

12:00-1:00 Lunch

Afternoon:

1:00-2:00

- Small group work on online collaborative project (continued)

2:00-3:30

- Presentations of group online collaborative projects

3:30-3:45 Refreshments

3:45-4:30

- Wrapping up
- Looking ahead

6:00-7:00 Dinner

PLANTS, PEOPLE, AND BIODIVERSITY PROTECTION
Minutes from June 27-29, 2002 meeting

Curriculum

EVALUATION

Teacher-participants were asked to complete evaluations of the draft curriculum following the pilot test. During the first day of the meeting a group discussion was held on these evaluations to determine specific recommendations for revisions. The topics addressed during this discussion included:

- Additional ways for teachers to make curriculum meaningful/relevant to students (i.e., making solar tea or trail mix)
- Stronger connection needs to be maintained between “hook” (the story of the Ice Maiden) and the expeditions
- Curriculum appropriate for 5th – 8th grade, not for 3rd – 4th
- Include a photograph at the beginning of each expedition, showing the peak, middle, and foreground of each mountain to help students formulate a mental picture of their expedition landscape
- Include more information on scientific field expeditions (specifically, leave no trace)
- More information wanted on time of year, temperature, rainfall, and season. Have students research when the best time of year would be to go on an expedition on their mountain. Have students calculate and use a conversion chart for temperature (°F to °C)
- Have students research and create a first-aid kit for their expedition
- Give students certain afflictions (diarrhea or sprained knee, for example) along the way to make the experience as authentic as possible. Have students develop an evacuation plan in case of emergency and then give them a reason to use the plan (i.e., sick person needing to be evacuated), again for authenticity sake
- Create a “Certificate of Completion” that students receive at the end of their expedition with a letter from Johan Reinhardt or another mountain expert
- Each module should have a children’s book associated with it for the teacher to use as a hook
- Provide side boxes with small, optional extension projects
- At the end of each day on the expedition, teams have a short debriefing session (Arm the teacher with questions that will enable him/her to guide these sessions)
- Have a local persona on each expedition (and include a photo) that students can identify with
- Have students pose a “Fact or Fiction” statement to the rest of the class (about their roles) and ask them to respond
- The student’s guide needs to look kid-friendly (spiral bound expedition log with tattered cover and pockets). The teacher’s guide should have same cover with pockets.

FIELD TEST EVALUATION STRUCTURE

Should we use the same format as the pilot test evaluation? What information do we want from the field test classrooms? What questions should we ask?

- Encourage teachers to include relevant comments in the sidebar of curriculum and provide a self-addressed, stamped envelope so teachers can return draft with comments
- What other classroom projects did this curriculum inspire/lead to? (letters, science fair project, etc.)
- What standards did your module address?
- Did you find that you required more information than was provided to teach your module? If yes, what additional information would you like to see included?
- What would make this module easier to implement?
- What specific activities did you use to appeal to different intelligences?
- How did you use the suggested resources? Do you have any additional resources to recommend?
- What ideas do you have for documenting student gains?
- What graphics would you like to see included in this module?
- Would a teaching basket be useful? What would you put in it (CD rom, video, poster, etc.)?
- How long did it take you to complete the module? The individual activities?
- Were the activities manageable in terms of time?
- What did like most about this module? What did you like least?
- What words would you like to see defined in the glossary?
- What questions do you have?

TITLE FOR PUBLISHED CURRICULUM

A final title was selected for the curriculum. All meeting participants suggested an unlimited number of titles from which the final selection was made. The suggested titles included:

1. Mountain Expedition: Exploring Biodiversity on our Planet
2. Peak Experiences: How Mountains Connect Us
3. S.U.M.M.I.T. (Students/Scholars/Schools Utilizing Mountains and Media in Training)
4. C.L.I.M.B. (Children Learning in Mountain Biomes)
5. Exploring the World's Mountains: My Expedition to the Himalayas, Andes, and Appalachians
6. Mountain Adventures: Exploring the Himalayas, Andes, and Appalachians
7. Mountain Adventure and Explorations: Exploring the Himalayas, Andes, and Appalachians
8. P.E.A.K. (Plant Explorations and Kids)
9. M.M.E. (Mountain and Me Explorations)
10. Peak Experiences: My Expeditions to the Himalayas, Andes, and Appalachians
11. Mountain Scape (Science, Culture, and Plant Ecology)

12. Exploring Mountain Terrain
13. Going Global: Exploring Mountains, Plants, and People
14. Bag A Peak: Exploring Diversity in Mountains, Plants, and People

And the winner is... **#6 Mountain Adventures: Exploring the Himalayas, Andes, and Appalachians.**

Online Collaborative Project

ONLINE COLLABORATIVE MODEL SCRUTINY

The larger group was divided into two smaller groups. Each group was given three online collaborative models to examine. The models were: 1) Journey North, 2) Monarch Watch, 3) Globe, 4) Investigate Biodiversity, 5) Forestwatch, and 6) Square of Life. Teacher-participants were asked to compile lists of what they like/dislike about these models and to begin to envision what this online collaborative project might look like.

Likes

- A simple portal home page
- Visually interesting
- Student-collected data
- Students involved in all steps of scientific process
- “Real” application
- Students work with real scientists
- Clear, consistent protocol
- Resources (bibliography, links, etc.)

Dislikes

- Too much complexity driven by professional development
- Not enough background information
- Expensive equipment required
- “Cute” icons
- Portal home page that is too busy
- Students not responsible for processing data
- Connections between students and educators are established (database of participants, keyword searchable database organized by project)

NEAT IDEAS

Entire group brainstormed the potential components of this online collaborative project based on the examination of the online collaborative models:

- Three locations have their own Web site, but all are interconnected through one project Web site
- End product is a book created by kids that can be translated into other languages

- End product is a working paper written by scientists using kids data
- Incorporate the concept of repeat photography
- Accessible to everyone, not just to schools involved in Online project
- Incorporate the collection and use of transect data
- Pyramid structure with four levels of exploration
- Address potato connection between all three locations
- Incorporate entrepreneurial projects
- “Ask the Expert” feature
- Students work collaboratively with the local “Explorers Club”
- Students conduct a backyard/schoolyard plant survey and compile data
- Students identify native plants in their backyard/schoolyard
- Students create Web site of native plant data from around the world
- Students create a cookbook using native plants
- Incorporate concept of seed saving and exchange
- Students create a reference guide to native plants, complete with student-derived drawings, photos, and observation notes
- Students create drawings/paintings of their surrounding landscape
- Students conduct interviews to collect oral histories
- Students conduct a food survey
- Use food (basic needs) as an entrée to the project then move on to everyday activities as a common bond then on to native plants
- End product is a narrative transcript of student exchanges (edited)
- Includes musical tape/cd of mountain music
- Students create a pass-a-long book of stories

DEVELOPMENT OF PRODUCT

Large group broke down into two smaller groups to begin working on an online collaborative product. Groups came back together after several hours to present their group’s proposed product and for discussion and refinement of final product.

Group One: SPLASH PAGE

Title

Himalayas

Andes

Appalachians

(Click on cover photo to access “slide show” of each mountain range)

Short, engaging introductory paragraph.

More
About
Project

Let's
Get
Started

Lesson Plans/
Branching Out

FAQ

Background
Information

Text in these boxes is linked to pages (each with gorgeous mountain header) with the following information:

More About Project

- Goals and Objectives
- Sponsors
- Standards
- Background information
- Final product exemplar: A collaboratively produced online presentation of students' research. Students research the three most important edible, medicinal, and utilitarian plants in their culture and later compare it to the two other cultures. Students create a list of questions that they would like to ask other students. Provide teacher with a list of sample questions to help guide the students.

Research Protocol

Introduction

Who is our class? Describe school, town, village and provide:

1. Picture of class
2. Picture of town, village
3. Picture of mountain
4. Water source
5. One aspect of your mountain you are really proud of
6. Something you are really concerned about

Ethnobotany: Divide class into three groups. Each group researches a different plant

- Edible plant
 1. Provide picture of plant in natural habitat and describe the habitat (field, forest, stream, alpine meadow, wetland)
 2. Provide a picture of plant as it is eaten and a recipe for dish using this particular plant
- Medicinal plant
 1. Provide picture of plant in natural habitat and describe the habitat

2. Provide instructions for the preparation and use of this plant for medicinal purposes
- Utilitarian plant
 1. Provide picture of plant in natural habitat and describe the habitat
 2. Provide instructions and possibly photos for crafting this plant into an instrument, basket, net, rope, building material, etc.

Conclusion

What is the message you want other students to take home about your research?

Let's Get Started

Link to pages with the following information:

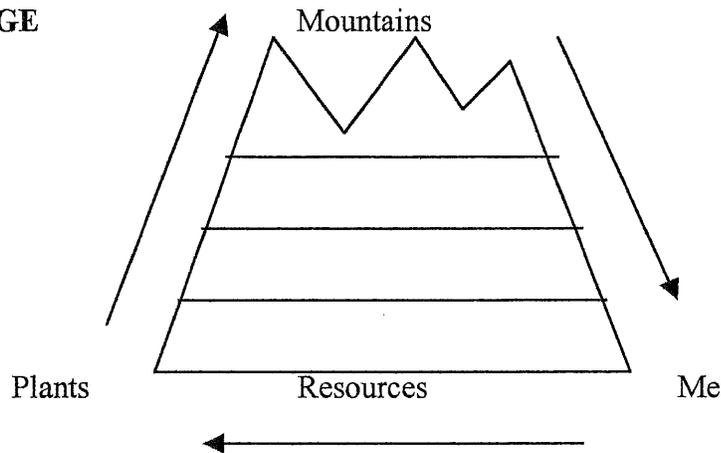
- Get registered!
- List of requirements (camera, email access, etc.)
- Project layout
 1. Review slide show of three mountains
 2. Generate questions
 3. Email participants (with introduction of themselves & questions)
 4. Respond to email
 5. Start research (see Research Protocol)
 6. Make presentation
 7. Put presentation online
 8. Respond to presentation/wrap up

Background Information

Provide teachers with necessary information to guide students in interviewing parents/grandparents/herbalists/village elders/historical society as a way to learn information about plants and place.

- Bibliography
- Web links
- Connection to other teachers

**Group Two:
SPLASH PAGE**



(Different ecosystems represented graphically in the horizontal sections of this fictitious mountain)

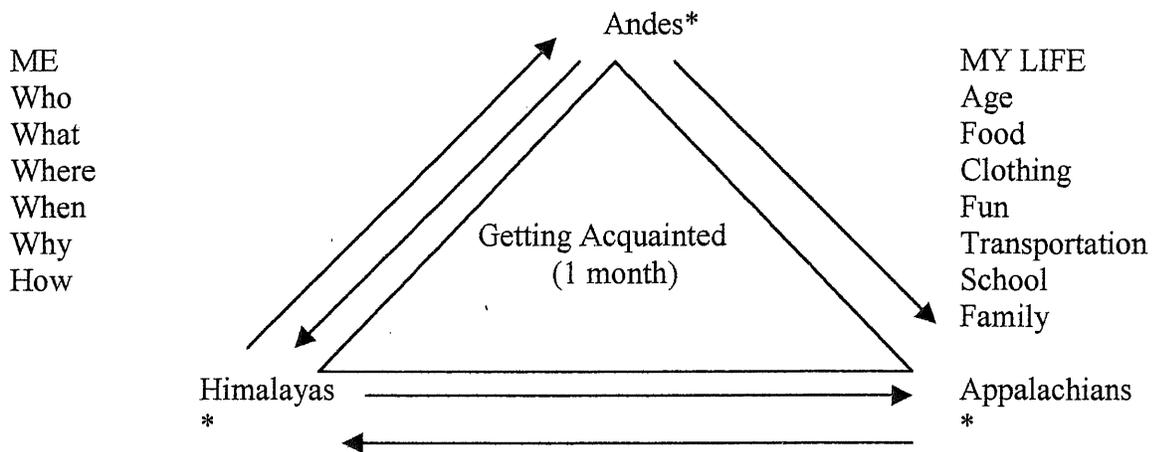
If you click on Mountains on the splash page, you come to a page with these links:

MOUNTAINS AS: (brief paragraph for each)

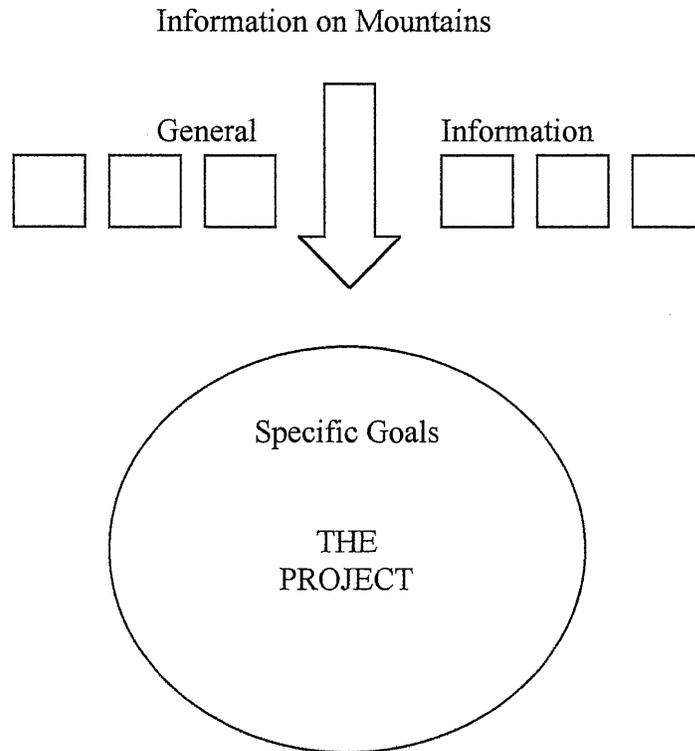
- Water sources
- Biodiversity hotspots
- Cultural diversity
- Sacred places
- Natural resources
- Recreation

(Navigation bar on each page includes tabs for 1) Me, 2) Mountains, 3) Plants, and 4) Resources)

If you click on Me on the splash page, you come to this page:



*Students collect and share environmental data (temperature, season, time of day, latitude and longitude, etc.)

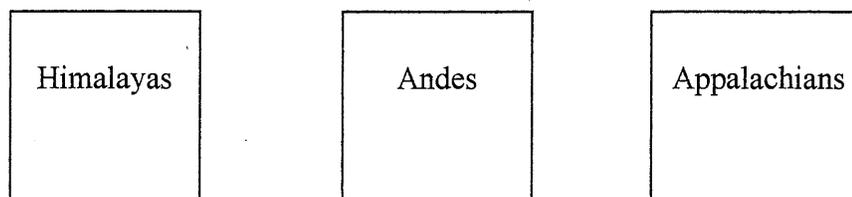


Provide field guides (Nepal, Peru, US) to all participating teachers

THE PROJECT

1. Students compile plant list and their uses with local expert
2. Students design questions and interview family and local experts (RE: How the plants are prepared, used, etc. (tape recorder) and photograph (camera))
3. Compile/Summarize/Synthesize and put information on Web
4. Feedback/Questions

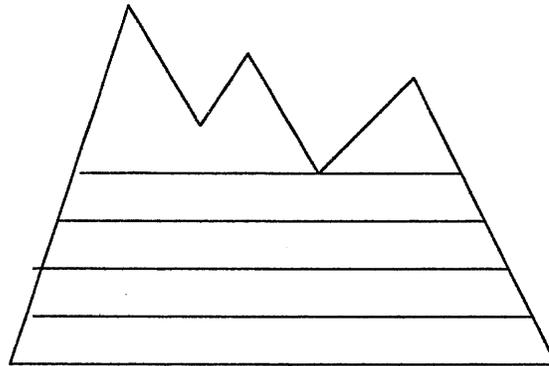
Proposed Online Collaborative Project Format SPLASH PAGE



(Click on cover photo to access “slide show” of each mountain range)

Short engaging paragraph

Why Mountains?



Each segment of the mountain graphically represents mountains as (mouseover identifies each segment as one of these, too):

- Water sources
- Biodiversity hotspots
- Cultural diversity
- Sacred places
- Natural resources
- Recreation

Navigation bar on each page has the following features:

- Introduction
- The Project (summary of entire project)
 - Let's get acquainted
 - Let's explore
 - Let's share
- Resources

The following information will be encompassed in the above Nav. bar categories:

In the class

Goals and objectives

Research project

Teacher resources

Outline

Basic plant parts

Guidelines

Bibliography

Standards

Timetable

Vocabulary

In the field

Goals and objectives

Research project

Photos
Interview
Background information
Guidelines
Requirements
Vocabulary
Timetable

Online

Goals and objectives
Email
Discussion board
Slide show

The group agreed that the research component of the online collaborative project should be a combination of the two groups proposals.

Looking Ahead

Teacher-participants are responsible for:

1. Providing feedback on draft online collaborative project
2. Attending the final meeting on Spruce Knob in June 2003



flowers & bulbs

fruits, veggies & herbs

home & hearth

lawns & landscaping

garden care & pests

kidsgardeni

SEARCH FOR

GO

[NGA Garden Shop](#)[Free E-newsletters](#)[Better Gardener Club](#)[Club Log-in](#)**gardening resources**[Regional Reports](#)[Q&A Library](#)[Article Library](#)[Buyer's Guide](#)[How-To Projects](#)[Pest Control Library](#)[Zone Finder](#)[Dictionary](#)[Food Gardening Guide](#)[Online Courses](#)**community**[Message Boards](#)[Seed Swap](#)[Events Calendar](#)[Recipes](#)**free stuff**[E-cards](#)[Wallpaper](#)[E-newsletters](#)**business to business**[Advertising](#)[Content Licensing](#)[Garden Market Research](#)[Become an Affiliate](#)**about us**[Who We Are](#)[Back to Home](#)

Plants, People, and Biodiversity Protection

Gardeners are hearing a lot of buzz these days about using native plants in the landscape, from sowing lawns of prairie wildflowers to designing yardsized wildlife habitats. While we are restoring these plants to their place in our backyards, there are people in the developing world who depend on indigenous plant populations for food, fiber, medicine, shelter, and more.

How much Americans know about the use of native plants by the rest of the world is part of a two year project, *Plants, People and Biodiversity Protection*, a collaborative effort of the National Gardening Association, The Mountain Institute, Virginia Tech, and United States Agency for International Development (USAID). The following series of articles were written to help people understand the important role native plants play in mountain communities around the world.

[Discussion Paper 1](#)[**Introduction**](#)[Discussion Paper 2](#)[**Mountains and Plants**](#)[Discussion Paper 3](#)[**Native Plants as Food**](#)[NEW Discussion Paper 4](#)[**Native Plants as Medicine**](#)

***Meconopsis betonicifolia*, the Himalayan blue poppy.**



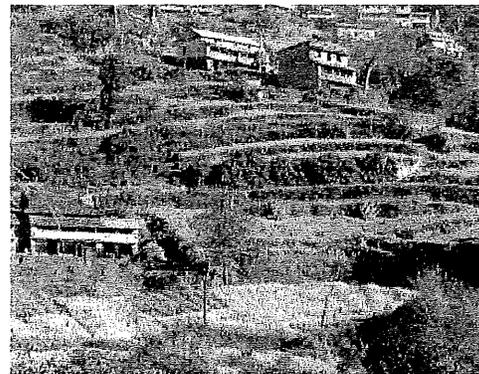


The Mountain Institute



Introduction Increasing Local/Global Connections through Plants, People, and Biodiversity Protection

The Global Importance of Native Plants Native plants and their products play extremely important roles in local life and national economies throughout the developed and developing worlds. This is particularly apparent in mountain environments, where the rapid changes in altitude, temperature, and habitats along the mountain slope result in unusually high biodiversity and endemism (plants or animals confined to specific environments). Whether in the Himalaya, Andes, or Appalachian mountains, hundreds of indigenous plants traditionally have provided people with food items (e.g., mushrooms, nuts, greens), medicinal supplements (e.g., ginseng, distilled products, essential oils), and the means to make utilitarian products (e.g., rope, baskets). More than 130 plants indigenous to the Appalachians, for example, are used as dietary or medicinal supplements, and 172 “useful plants” have been catalogued for Nepal’s Langtang National Park alone. In 1993, the United States exported more than 76 tons of wild harvested ginseng worth more than \$20 million, and in 1994 the value of annual production of herbal medicine in India was more than U.S. \$166 million. These products are normally referred to in the development literature as “Non-Timber Forest Products” (NTFPs) or “Special Forest Products” (SFPs). Increasingly, their conservation and sustainable use are being advocated as key components in the success of domestic and international programs that promote sustainable forestry, alternative income generation, niche market food production, new medicinal discoveries, and ecotourism.



**Photo 1: Hill farming, Nepal
(A.L. Hammett)**

The Project: *Plants, People, and Biodiversity Protection* is a two-year project that will be implemented by The Mountain Institute (TMI) in partnership with the National Gardening Association (NGA); the College of Natural Resources, Virginia Tech,

Blacksburg, Virginia; and the United States Agency for International Development (USAID). Using plants as the central theme, the goal of the project is to help increase U.S. public awareness of:

- (a) the importance of indigenous plants in the U.S. and abroad,
- (b) their usefulness as food, medicine, fiber, dye, and other products to millions of people worldwide,
- (c) the local/global linkages that exist between U.S. and international mountain communities in their historical as well as contemporary uses of native plants, emphasizing the role of women as retainers of this knowledge, and
- (d) the role of development assistance toward the protection of the world's natural and cultural heritage through community-based biodiversity protection projects.



Photo 2: Peruvian woman making basket from Chakpá (FAO)

Project Outputs: Project materials will include informative articles, middle-school lessons, and an on-line collaborative project involving students from the U.S., Nepal, and Peru.

The six thematic articles (hard copy and online) begin with the Introduction shown here and are followed by a general description of Mountains and Plants (Discussion Paper #2). Parallels between the domestic and international uses of native plants for Food (#3), Medicine (#4), and Fiber and other uses (#5) will then be presented. The concluding article (#6) will highlight the importance of USAID's international

assistance efforts which protect these indigenous plants through community-based biodiversity conservation programs in mountainous countries throughout the world. The cross-cultural role of women as traditional keepers of botanical knowledge is another key theme that is stressed within each of the articles.

In the second part of the project, middle-school-level curricula using the theme "Mountains, Plants, and Me" will be developed with participant NGA teacher/members (hard copy and online). Created by a team of U.S. teachers, NGA curriculum development specialists, and TMI mountain experts, these lessons will provide students

with (a) innovative, hands-on plant-people-biodiversity activities, (b) access to new library and Web-based resources, and (c) opportunities to learn about mountain research, adventure, and scientific expeditions. Students will launch their own expeditions to Mt. Huascarán in the Andes, Mt. Makalu in the Himalaya, and Blair Mountain in the Appalachians, exploring each region's biodiversity, cultural diversity, ethnobotany, and hydrology along the way.

Finally, NGA and TMI will produce a collaborative online student project focusing on native plants and their uses. It will be geared for middle-school teachers and students, have the theme on the theme *Plants, People, and Biodiversity Connections*. The previously mentioned thematic articles and curricula lessons will serve as a foundation for this student project. TMI staff in Nepal (Kathmandu) and Peru (Huaraz) will recruit the local schools, teachers, and students interested in participating in the project, providing online as well as in-classroom support throughout the life of the project. The project will provide American, Nepali, and Peruvian students with unique opportunities to explore their own schoolyard and local habitats for native plants, investigate the histories of and uses for these indigenous plants through family and community member interviews, and submit their findings online for comparison and discussion. The project will also supply a model for engaging students to apply lessons learned from overseas development efforts in their own regions.



**Photo 3: Central Andes, Peru
(The Mountain Institute)**

The Implementers **The Mountain Institute**, established in 1972, is a nonprofit organization dedicated to the strengthening of mountain communities, the conservation of their natural resources, and the promotion of cultural heritage in three of the world's major mountain ranges--the Andes, Appalachians, and Himalaya. **The National Gardening Association**, also founded in 1972, uses the theme of gardening to promote environmental responsibility, to advance multidisciplinary learning and scientific literacy, and to create partnerships that restore and enhance U.S. communities. **Virginia Tech's** College of Natural Resources, Center for Forest Products Marketing and Management, has developed a special program on non-timber forest products that evaluates the

utilization and marketing of forest products in the Appalachian, Himalaya, and Central American regions, also providing extension, training and educational programs throughout the region and worldwide. The **U.S. Agency for International Development (USAID)** has administered the foreign assistance programs of the United States since 1961. The **Development Education Program**, which funds the Plants, People, and Biodiversity Protection project, is designed to increase U.S. public awareness of the importance of humanitarian aid while promoting understanding of international affairs. These two issues have assumed additional and undeniable importance for students, teachers, and the American public in general since the attacks of September 11, 2001.

Plants, People, and Biodiversity Protection is a state-of-the-art program that will create new and innovative teaching materials on mountains, plants, conservation, and the need for increased international communication and understanding. Your comments and suggestions will always be welcome.

Alton C. Byers, Ph.D.
Director, Research and Education
The Mountain Institute



Discussion Paper #2

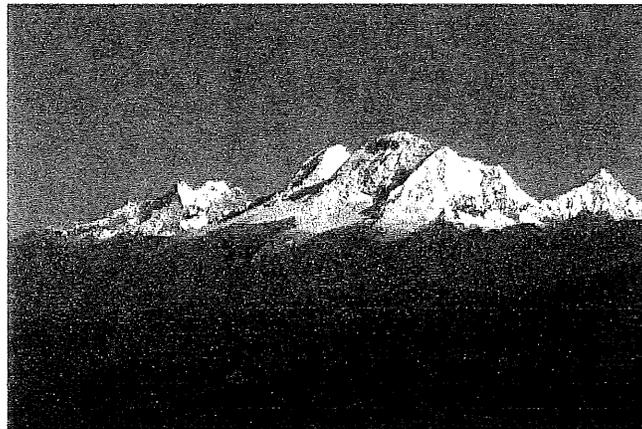
Mountains and Plants

"In Chile and Argentina, the spirit of the Pehue'n tree (Araucaria araucana), known as the monkey-puzzle tree, provides food during periods of scarcity and is also believed to have a positive influence on the harvest. The spirit is especially kind to women and children. This tree is also connected to the god who lives in volcanoes and is the creator of storms and thunder"

- E. Bernbaum and J.D. Spoon, Seasonal Interpreters Handbook, The Mountain Institute, 2002

What Are Mountains?

Mountains are regions of land that rise steeply above the surrounding terrain. They are three-dimensional, extending north-south, east-west, and vertically. Mountains are higher in elevation (or altitude) than hills and are normally found in groups or ranges consisting of ridges, peaks, and intermontane (between mountain) valleys. Much of a mountain's surface area is steeply sloped, displaying distinct variations in climate and vegetation zones from its base to its summit. There are several principal mountain types which are classified according to their mode of origin, including volcanic, faulted, folded, and various combinations of the three. Volcanic mountains are formed from molten material issuing from within the earth and accumulating on the surfaces as lava, ash, and other volcanic debris. Mt. Rainier in the Cascades and Mt. Fuji in Japan are classic examples of the volcanic cone form. Faulted mountains result from the displacement of segments



**Photo 1: Huascarán, Peru
(Alton Byers)**

of the earth's surface along fracture zones; one example is the Sierra Nevada mountains of California. Folded mountains result when rock strata are compressed into a series of wavelike troughs from external compression forces, such as the slow but relentless convergence of continental and other continental or oceanic plates. Examples of folded mountains are the Himalaya in Asia, Appalachians in North America, and Swiss Alps.

Where Are Mountains?

Mountains are found on every continent from the equator to the poles. Approximately 24 percent of the Earth's surface area (about one-quarter) is covered by mountains (Figure 1), and they are located in 75 percent of the world's countries. The longest north-south mountain system in the world is in the cordilleras (Spanish for "range") of the Americas

that span 7,250 kilometers from the Arctic to Antarctica. In Asia, the geologically young (60 million years) Himalayas are a 2,500 kilometer arc situated between the Indus Gorge to the west and Brahmaputra Gorge to the east. The Himalayas contain the world's highest mountain--Everest, or "Sagarmatha" to the Hindus and "Qomolangma" to the Tibetans-- whose height was recently re-established at 8,852 meters above sea level--2 meters higher than the 45 year old measurement shown on most maps! The Appalachians span nearly the entire length of the eastern coast of North America, 2,600 kilometers from the St. Lawrence River of Canada southwest-ward to Georgia and Alabama in the U.S. Their ancient geological age (350 million years old) is reflected in their smooth and rolling topographies seen today. When the Appalachians were first formed, it is believed they reached elevations of more than 6,000 meters above sea level (the highest peak in the range today is Mt. Mitchell in North Carolina at 2,038 meters)!

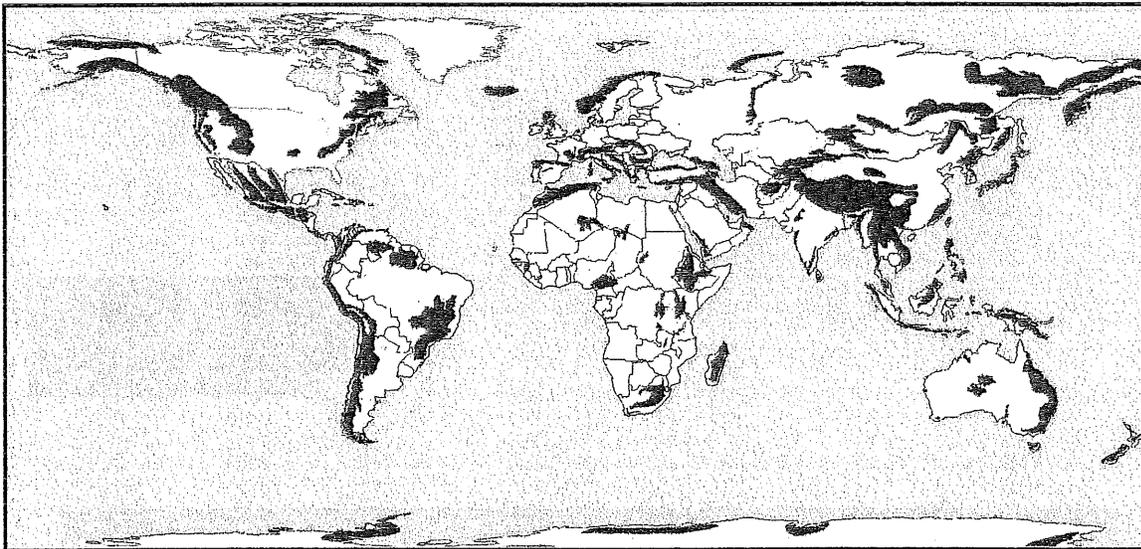


Figure 1: Mountains of the world (highlighted in green) (The Mountain Institute, 2001)

Mountains and People

Mountains are home to 1/10th of the world's population, or about half a billion people. Another 40 percent live in adjacent and lower watershed areas, meaning that more than half the global population is directly or indirectly dependent on mountain resources, especially water.

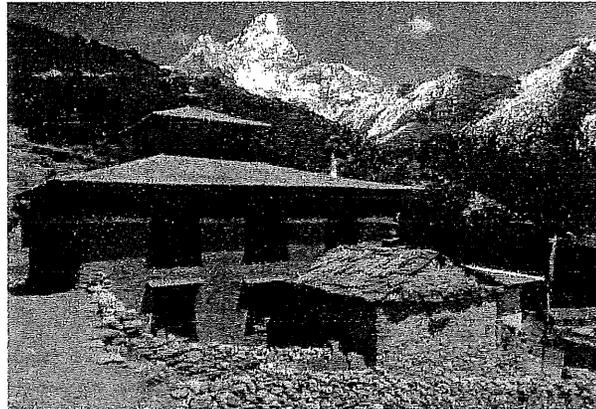
Mountain communities are as diverse as mountains themselves. Historically, they have been comparatively isolated and have developed their own distinctive cultures, customs,

Mountain communities are among the poorest and most disadvantaged in the world.

and livelihoods. A large proportion of these communities are tribal groups and minorities, such as the Tibetans and Yi in China, the Amhars in Ethiopia, and the Quechua in the Central Andes. The southwestern province of Yunnan in China alone is home to more than 26 different ethnic groups.

Most mountain communities depend on agriculture and pastoral grazing animals (cattle, yaks, llamas, sheep, and goats) to survive, and the most important food staples in the world—potatoes, rice, corn, and beans—were first domesticated in mountains. Unfortunately, many mountain communities are among the poorest in the world, remaining on the economic margins of society with little access to education, decision-making power, and financial resources.

Many mountains are sacred, such as Gang Rinpoche (Kailash) in Tibet, which is sacred to four religions of the world: Hindus, Buddhists, Jains, and followers of Tibet's native religion, Bon. Other sacred mountains include Shasta (sacred mountain to the Navajo and Hopi in North America), Ama Dablam (Nepal), Ampato in Peru (site of the "Ice Maiden" discovered in 1995), and Kilimanjaro (Tanzania, Africa).



**Photo 2: Ama Dablam from the Monastery at Pangboche
(William Marler)**

More than half of the world's population relies on water from mountain areas for drinking, agriculture, industry, hydroelectricity, and many other purposes. For example, about 90 percent of the water flowing into the Indus River basin originates from the mountains of the Hindu-Kush, Karakoram, and western Himalaya. Natural resources such as timber, non-timber forest products (e.g., wild food and herbs), and minerals, as well as hydroelectric power, are all gathered in or originate in mountain ecosystems.

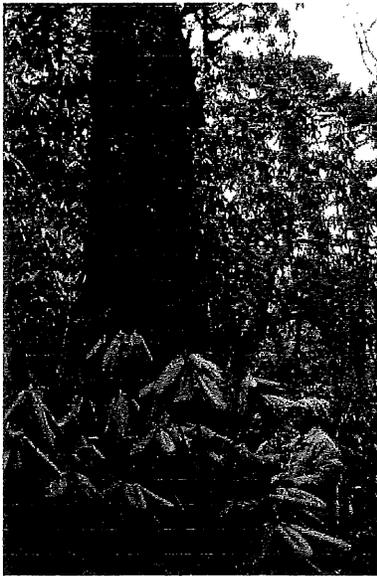
Ecotourism is the fastest growing industry in mountain regions today.

Mountains are fast becoming popular tourist destinations. The climate, scenic beauty, and abundance of recreational activities are key reasons tourists travel to the mountains every year

for vacations. In Nepal, the Everest region is a popular destination for both mountaineers and trekkers. In 2000, an estimated 27,000 people hiked the trails to the Everest base camp, and approximately 80 percent of households in the area now derive a large part of their annual income from tourism. Other popular mountain destinations include Machu Picchu, Peru, and the numerous ski resorts in North America's Rocky Mountains and the Swiss Alps. The impacts of tourism on mountain peoples and environments, however, are not always positive, and most experts agree that greater planning and monitoring is needed to avoid tourism-related problems such as increased forest-cover loss, the increased cost of living for the local population, and the erosion of cultural heritage.

Mountain Ecosystems

Diversity The combination of high elevation, steep slopes, and deep valleys allows mountains to harbor a great diversity of species and habitats within a small area and creating high levels of endemism (i.e., many species there are endemic to or evolved



**Photo 3: Forests of Makalu,
Nepal
(Alton Byers)**

within that special environment). Because of the rapid changes in altitude and temperature along a mountain slope, multiple ecological zones can be encountered within a short distance that can range from dense tropical jungles to permanent snow and ice within a few horizontal kilometers. In the rugged Makalu region of east Nepal, for example, it is estimated that there are 3,000 plant species, including 25 species of rhododendron, 50 species of primroses, 45 species of orchids, 80 species of fodder trees and shrubs, and 60 species of medicinal plants.

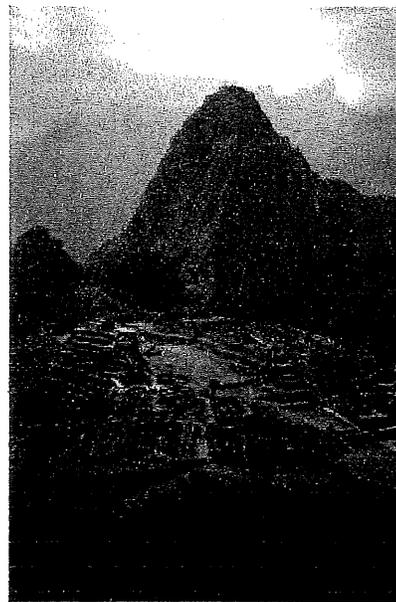
Corridors: Many mountains can be thought of “islands” of high biodiversity rising above “seas” of human-transformed landscapes below. Mountains are often sanctuaries for plants and animals long since eliminated from the more intensely farmed lowlands. Many plant and animal species are found only on mountains, having evolved over centuries of isolation to inhabit their specialized environments. Mountains also function as biological corridors, connecting isolated high-altitude habitats, so that plant and animal species can migrate between them.

Useful Products The highly diverse forests of mountains provide communities with wood (for cooking and building) and many other forest products. Women are the main users of mountains forests and, as such, are the primary resource managers in many mountain regions. They have an intimate knowledge of their complex and diverse

Mountains act as a refuge or sanctuary for plants and animals long since eliminated from more intensively farmed lowlands.

mountain environments, and often know the use and proper management of hundreds of native species for food, fodder, fuel, medicine, and microenterprise purposes. Although women are considered the main users of mountain forests, all members of mountain communities are intimately connected with the mountains and their resources.

Protection Mountain ecosystems also play a critical role in catching and storing precipitation, reducing erosion, regulating stream flow, and acting as a filtering system to clean water. At the same time, mountains are among the most fragile ecosystems in the world. Their steep slopes and thin soils make them especially susceptible to soil loss, gully formation, and catastrophic events such as landslides. Increased or poorly planned human activity in mountain areas, such as timber harvesting and the construction of hydroelectric dams, can cause the rapid environmental degradation of these sensitive areas. This can have devastating downstream impacts, such as high river siltation and floods. Additionally, development projects that do not adequately blend conservation with livelihood improvement needs have contributed to an irreplaceable loss of much of the world's mountain biodiversity. On example is the clear-cutting of more than half of the Virunga Volcanoes National Park (3,000 square miles) in Rwanda, home of the famous mountain gorilla and numerous other endangered species, for an agricultural expansion project during the 1970s and 1980s.



**Photo 4: Machu Picchu, Peru
(Johan Reinhard)**

Conclusion

Mountains encompass the richest diversity of ecosystems, cultures, communities, and sacredness found on any landform in the world. There is a strong interconnectedness between mountains and the communities living



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among them. They are important to millions of people worldwide as the primary sources of fresh water, natural resources, and remaining “hotspots” of biodiversity. The study of mountains presents unusually rich opportunities for students and teachers to explore a fascinating world of physical and cultural processes, problems, and prospective solutions. Mountain cultures, communities, vegetation, soils, wildlife, literature, histories, and expeditions are but a few of the topics available for a lifetime of further exploration.

Upcoming Events

Plants, People, and Biodiversity Protection is also supporting the “**Mountain Agenda**”, an international initiative designed to raise the position of mountain ecosystems and peoples to the same level of priority and concern that is given to other endangered ecosystems such as tropical rainforests, wetlands, and oceans. Additionally, the project is designed to complement the United Nations’ designation of 2002 as the “**International Year of the Mountains**” (<http://www.mountains2002.org>)

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FAO. *Unasylva*. <http://www.fao.org/docrep/w9300e/w9300e00.htm>. [This is a journal put out by FAO. Each issue usually features a specific theme, with the link above containing a special issue on mountains as well as several articles on medicinal and food plants. Issue #195 focuses on mountains.]

International Centre for Integrated Mountain Development.

<http://www.icimod.org.sg/>. [The International Centre for Integrated Mountain Development (ICIMOD) is committed to the promotion of sustainable mountain development, and is based in Kathmandu, Nepal. Its Web site offers extensive information on many issues related to mountain development, such as publications and a database.]

International Year of the Mountain. <http://www.mountains2002.org/>. [A site developed to disseminate information about mountains, e.g., mountain ecology, cultures, and the numerous problems now facing mountain regions. This site has links to many other "mountain" Web sites as well as research centers, books, journals, publications, and other information.]

The Mountain Forum. <http://www.mtnforum.org> [A global network of people and organizations interested in mountain communities, environments, and sustainable development. The web site includes a mountain atlas, a large on-line library of mountain documents and links, a calendar of mountain events, access to email discussion lists, and interactive membership services.]

The Mountain Institute. <http://www.mountain.org> [A non-profit organization dedicated to advancing mountain cultures and protecting mountain environments throughout the world. TMI implements community-based conservation projects in the Andes, Himalayas, and Appalachian mountains with a focus on improved livelihoods, the conservation of high priority mountain biodiversity, and mountain education and advocacy.]

Mountain Voices <http://www.mountainvoices.org/index.htm> [The nonprofit organization Panos <http://www.panos.org.uk/>, based in the United Kingdom, has developed this site dedicated to the stories and oral testimony of mountain peoples from all over the world.]

United Nations Sustainable Development. *Agenda 21, Ch. 13: Managing Fragile Ecosystems: Sustainable Mountain Development*
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[An excellent site for students to learn about different ecosystems, including mountains, grasslands, forests, oceans, and others.]

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Discussion Paper #3

Native Plants as Food

"Long before man learned to hunt, harvested his first crop, or domesticated his first animal, he had collected an extensive body of plant lore. He knew what plants could be used as food and as medicine, and which would fill a number of his other needs including shelter, implements, and clothing. And even after he became a farmer, he continued to gather and use those plants that grew wild and needed no cultivation.... Today, the number of people [in the U.S.] who regularly gather and use wild plants has dwindled. Fortunately, the plants are still out there growing....."

- Alan Hall, *The Wild Food Trail Guide*, 1976

What Are Native Plants?

Native plants are those species that occur naturally in the region in which they evolved. Over time, plants evolve in response to the physical and biological characteristics of a region: climate, soil, precipitation, and interaction with other species. Native plants, therefore, have particular traits that make them uniquely suitable to local environments. Native plants gathered in the wild serve as important sources of food and income for people in mountain communities worldwide. These plants are gathered in the form of fruits, leaves, flowers, roots, tubers, twigs, bark, and stems. The high diversity of plant species in mountains plays a significant role in the food and nutrient security of many households. Native species provide important sources of protein, fat, vitamins, sugars, and minerals, and are obtainable during different seasons. These native plant species also provide ecological security to those dependent communities, as the species are disease resistant, grow in diverse climatic and habitat conditions, and ensure sufficient production even in sometimes harsh conditions.

The value of these species helps to ensure their conservation and preservation of local knowledge. Preserving the knowledge of native plants is important to their survival. Roger Tory Peterson, one of the world's best-known naturalists, once said, "to know the name of something is the first step in its conservation." Once you learn to eat or use a wild food from your land or the surrounding environment, you tend to develop a greater interest in both protecting and conserving the plant for yourself and future generations.

"If you really knew and loved to eat the nuts from your farmland, how easy would it be to see them cut down?" - Mrs. Edeline Wood, President, West Virginia Wild Foods Association

Native Plants as Food in the Appalachian Mountains

The mountains of Appalachia provide a diverse range of edible native plants, from nuts to mushrooms. Many trees in this region produce edible nuts, berries, and fruits that are

harvested, consumed, and marketed throughout the region. There are also many mushrooms and wild vegetables, such as ramps (a wild leek), wintercress, and other leafy plants, that are edible. As in many other parts of the world, dozens of the native and non-native plant species collected in the Appalachians are linked to important cultural traditions. For example, during the spring harvesting of ramps, many communities organize festivals to celebrate the harvest. These festivals include the preparation of ramps using all sorts of recipes and different methods – everything from freshly roasted and pickled ramps, to ramp mousse! Below are some other examples of edible native plants found in the Appalachian Mountains.

Nuts

Black walnuts (*Juglans nigra*) grow throughout the Appalachians, usually in small groves in mixed forests, and located on the lower portions of the east or north slopes of mountains or stream terraces. The nuts are enclosed in a smooth, green husk that will turn black with time. To remove the nut from the husk, it is easiest to rinse the nuts and rub off the husk. Wear rubber gloves because the stain is hard to remove and has been used traditionally as a leather and fiber dye! The best time to harvest black walnuts is after the first frost.

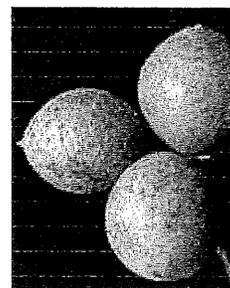
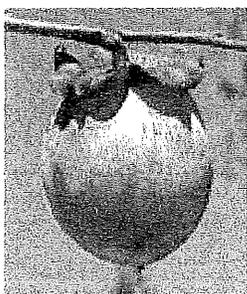


Photo 1:
Black walnuts in husks
(Virginia Tech
Dendrology fact sheet)

Hazelnuts, also known as filberts, are produced by several species of *Corylus* found in several regions of the world. In the Appalachians, the species American hazel (*Corylus americana*) is a shrub reaching no more than 12 feet in height. It grows along forest edges and streams as well as in meadows and roadsides. Hazelnuts from this species are small, with thick shells, and have a fairly high protein value. The nuts are sweet and can be eaten raw or ground.



**Photo 2: Persimmon
fruit**
(Virginia Tech
Dendrology fact sheet)

Fruits

Persimmon is the common name for almost 200 species of the Ebony family. In the Appalachian Mountains, the species *Diospyros virginiana* is found growing throughout the region, from mountaintops to river bottoms. The tree produces a plumlike berry that is green before ripening, turning orange to black when ripe. Although very bitter when

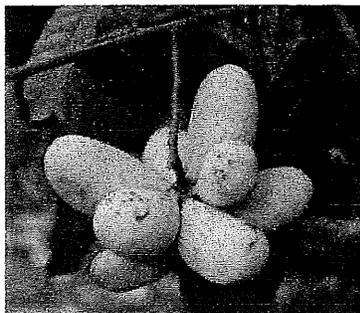


Photo 3: Pawpaw fruit cluster
(D.R. Layne, Kentucky State
University)

green, it is sweet and edible when ripe. Persimmons are sometimes called “the sugarplum of the mountains” and also have medicinal value.

Pawpaw (*Asimina triloba*) is another native fruit of the Appalachian Mountains. The taste of pawpaws is often compared to that of bananas, mangos, pineapples, and papayas. It is sweet and kidney-shaped, and is North America’s largest native fruit and only temperate member of the tropical custard apple family. The fruit grows in clusters that ripen in the fall. A deciduous, large shrub or small tree, the pawpaw grows in mixed

hardwood forests, on the slopes of ravines, along streams, and in floodplains. The pawpaw is similar to the banana in its nutritional composition. It is high in potassium, magnesium, calcium, phosphorus, zinc, and iron, as well as being a source of vitamins A and C.

Wild Vegetables

Ramps (*Allium tricoccum*) are a wild leek. Ramps can be found growing in patches in rich, moist, deciduous forests. The bulbs are spicy, with a taste some call a cross between scallions and garlic. In the Appalachians they are harvested around the middle of April. As mentioned previously, several harvest festivals take place during this time, such as the Elkins Annual International Ramp Cook-Off and Festival in Elkins, WV.



Photo 4: Ramps
(Stephen L. Solheim, University of
Wisconsin-Madison)

Jerusalem artichoke (*Helianthus tuberosus*) is a member of the sunflower family. It is neither from Jerusalem nor an artichoke, and derives its name from the Italian *girasole*, which means “turning toward the sun.” It is very different from the globe artichoke commonly seen pickled in the gourmet section of supermarkets. The edible part of the plant is the root or tubers, which resemble small potatoes when mature. Young immature tubers are elongated white roots. The plant usually has several tubers clustered at the base of each stem. The plant is tall, upright, and somewhat bushy with bristly woody stems, green pointed leaves, and yellow sunflower-like flowers. Jerusalem artichokes can be eaten fresh or raw, cooked similar to potatoes, or pickled. The tubers can also be fermented to produce alcohol.

Mushrooms

There are hundreds of different species of wild edible mushrooms in North America, although some definitely taste better than others. In the mossy, sloping hardwood forests of Appalachia, chantarelles (*Cantharellus cibarius*) and thick-footed morels (*Morchella crassipes*) can be found. In pine forests in late autumn the short-stemmed bolete (*Suillus brevipes*) often appears. Field mushrooms, or champignons (*Agaricus campestris*) and fairy-ring mushrooms, also called Scotch Bonnets (*Marasmius oreades*), can also be found in meadows and pastures. Many people throughout the Appalachians not only harvest these mushrooms, but cultivate them as well. Extreme care should be taken in the identification of any mushroom that one plans to eat.



Photo 5: Sulfur shelf Mushroom, Nepal
(Alton Byers)

Native Plants as Food in the Himalayas

“Forestry projects should not only look at the trees in the “forests,” but also at the jangal’s non-forest resources, which are of nutritional, economic, cultural, and religious importance for the foraging farmers and their families.”

Ephrosine Daniggelis, Hidden Wealth, 1997

Between 1993 and 1995, Ephrosine Daniggellis spent 20 months living and working among the Rai and Sherpa communities of the upper and remote Apsuwa Valley in eastern Nepal, part of the new Makalu-Barun National Park and Buffer Zone that The Mountain Institute helped establish with the government of Nepal in 1992. The “jangal” is the local name for the rich subtropical, broad-leaved, evergreen, and other forests on the slopes of the world’s highest mountains, and the Rai and Sherpa people have an intimate knowledge of the multi-functional role of the forest resources. In her book, *Hidden Wealth*, Ephrosine writes that “47 forest plants are consumed by the local population, 38 are eaten by livestock, 19 have medicinal value, 5 serve religious purposes, 11 are used as household implements or building materials, and 11 are traded (both raw and processed).”



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In several areas of the Himalaya, households are unable to meet daily food requirements by relying solely on crops and purchased foods. Many households do not produce enough food or cash to feed the entire family. These households rely on forest plants for supplementary diet needs. Research has found that some of these rural households



**Photo 6: Girl plowing hillside field in Nepal
(The Mountain Institute)**

consume nearly 190 different wild species of plants. Some of the species used include sulfur shelf mushrooms, fiddleheads, bamboo shoots, and stinging nettle (which makes a delicious green vegetable as well as string when dried). Tea (*Camellia sinensis var. Assamica*) originated in the Himalaya and is now consumed all over the world. Several species of rice also originated in the Himalaya, and many spices are native to the region as well.

The diverse and unique Himalayan ecosystems are at risk of losing their species richness because of a number of threats that include growing population (placing more pressure on the ecosystem), slash-and-burn agriculture, and the unsustainable overharvesting of many previously abundant plants. Clearly, such a rich and valuable resource needs protection for future generations, and a first step lies in increasing local/global awareness for the importance of plants, people, and biodiversity protection.

Native Plants as Food in the Andes

The Andes contain the most extreme range of landscape types, climates, and vegetation communities in the world. Permanent snow and ice, volcanoes, tropical rain forest, and high-altitude deserts can all be found within a relatively short distance of one another. This range of ecosystems results in an exceptionally rich biodiversity and a wealth of resources. The eastern range of the Andes (*Cordillera Oriental*) is composed of uplands, peak-studded plateaus, and deep valleys. It



**Photo 7: Sweet potato flower
(CGIAR)**

is here that one of the most important stages in agricultural history began: the domestication and cultivation of native plants for food. The earliest evidence of plant cultivation in these mountains dates to approximately 10,000 years ago. Early inhabitants domesticated native plants and developed intricate cropping systems in accordance with the altitudes and geographic characteristics of the area, a kind of insurance policy against crop failure within any particular altitudinal niche. Spanish "conquistadores" were amazed by the inhabitants' highly developed agriculture and levels of productivity, and fed their armies from the Incan royal granaries for 15 years following their arrival.

The Andes Mountains, one of the six world sites of pristine agricultural developments, hold a global record of native domesticates that now represent many of the world's most important staple crops. These crops include potatoes, corn, beans, manioc (cassava or



Photo 8: Chirimoya
(California Dept. of Food and Agriculture)

tapioca root), and quinoa. Potatoes have more than 14,000 different varieties. Many other native root crops such as *oca* (*Oxalis tuberosa*), *olluco* (*Ollucus tuberosum*), *izano* (*Tropaeolum tuberosum*), *maca* (*Lepidium meyenii*), and seed crops of the Chenopod and Amaranth families, and dozens of fruits, are now known worldwide. It is believed that almost 60 percent of the vegetables, grains, and legumes that we eat today originated in the Andes. They include sweet potatoes, kidney beans, lima beans, string beans, crookneck squash,

winter squash, tomatoes, chili peppers, and papaya. People in the Andes today still rely heavily on these native plants as well as many others for their daily food.

The Andes Mountain range continues to amaze the world with the variety and quality of its plants. People throughout the world are beginning to acknowledge the values of the lesser-known crops in the region such as the fruits *chirimoya* (*Annona cherimola*) and melon pear or *pepino dulce* (sweet cucumber) (*Solanum muricatum*). In addition to these important native plants of the Andes are two Andean camelids (llama for packing and alpaca for wool), which have become major sources of wealth for mountain communities.

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<http://www.cdfa.ca.gov/phpps/pe/page2.htm>. [This site has descriptions for several native and non-native plant species in the United States.]

Consultative Group on International Agriculture Research (CGIAR).

<http://www.worldbank.org/html/cgiar/photo/photo.html>. [Subgroup of the World Bank focuses on crop and agricultural research.]

Food and Agricultural Organisation of the United Nations (FAO). Non-wood Forest Products Web site. <http://www.fao.org/forestry/FOP/FOPW/NWFP/nwfp-e.stm>. [An excellent site for information on food, medicine, crafts, oils, and any other non-wood product from forests. There are many downloadable publications - organized by region, product, and issue. The main site (www.fao.org) also has information on fisheries, water, agriculture, nutrition, and gender issues.]

FAO 1994. *Neglected crops 1492 from a different perspective*

<http://www.fao.org/docrep/T0646E/T0646E00.htm#Contents>. [A valuable resource that discusses various crops throughout the Americas and Caribbean that did not develop into major world crops. This includes fruits and vegetables that are now becoming more popular.]

FAO *Unasylva*. <http://www.fao.org/docrep/w9300e/w9300e00.htm>. [This is a journal published by the FAO. Each issue usually features a specific theme, with the link above containing a special issue on mountains as well as several articles on medicinal and food plants.]

Foraging and Ethnobotany Links Page. <http://www.foraging.com/>. [As part of a series of Web pages on early human diets, this site contains several interesting, informative links.]

International Centre for Integrated Mountain Development.

<http://www.icimod.org.sg/>. [The International Centre for Integrated Mountain Development (ICIMOD) is committed to the promotion of sustainable mountain development, and is based in Kathmandu, Nepal. Its Web site offers extensive information on many issues related to mountain development, such as publications and a database.]

Mildred E. Mathias Botanical Gardens.

<http://www.botgard.ucla.edu/html/botanytextbooks/economicbotany/index.html>. [Produced by the University of California, Los Angeles, this site contains write-ups on some of the world's most economically important crops, their histories, and photos.]

Native American Ethnobotany Database. <http://www.umd.umich.edu/cgi-bin/herb>.

[The purpose of this site is to serve as a database or encyclopedia on medicinal, food, dye, and other uses of plants used by Native Americans.]

United States Non-timber Forest Products Database. <http://ifcae.org/ntfp/>. [This database was developed to enable users to search for information about non-timber forest products (NTFPs) in their region. It contains lists of many plants used for food, medicine, and other purposes.]

Virginia Tech Special/Non-Timber Forest Products Page.

<http://www.sfp.forprod.vt.edu/>. [There are several fact sheets on the site that focus on food, medicinal, and additional products from plants/trees in Appalachia. There are also publications, workshops, and an NTFP forum.]

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Discussion Paper #4

Native Plants as Medicine

"You must ask permission from a plant, or the medicine will not work. Plants are alive, you must give them a good talk."

- Walking Buffalo (Navajo, Southwest U.S.)

[Note: Nowhere in this discussion paper do we encourage self-diagnosis or self-medication! However, a list of references and organizations offering courses in wild edible and medicinal plants is provided here that can help introduce one to the efficacious use of local plants].

For thousands of years, people worldwide have used plants medicinally. The majority of the populations of most developing countries, especially those in rural areas, still depend on local plants for many of their medicinal needs. Forests are great storehouses of medicines, and most of our modern medicines originated from forest plants. For example, a common and globally used remedy today, aspirin, was first derived from the bark of the white willow tree. Even today, walking through a forest is for many people equivalent to walking through a modern-day pharmacy; at every turn there is a leaf, flower, or root that fights infections, clots blood, alleviates pain, soothes upset stomachs, or helps to restore health and vigor. Medicinal plants are gathered and converted to teas, tinctures, and many other substances to treat ailments.

Native Plants as Medicine in the Appalachian Mountains

The use of plants for medicinal purposes in North American has its roots in the numerous Native American tribes. In fact, more than 200 wild medicinal plants and formulas were passed on to early settlers, with many of these still listed as official drugs in the *United States Pharmacopoeia*. One famous medicinal plant harvested in the Appalachian Mountains is ginseng.

American ginseng (*Panax quinquefolium*) grows wild in the Appalachians and is known for its reenergizing abilities. The harvesting of ginseng is a cultural tradition in this region, and is known as "gatherin' 'sang." This tradition began more than 300 years ago when a Jesuit monk in Canada began exporting the roots to China. George Washington reported seeing entire mule trains loaded with the

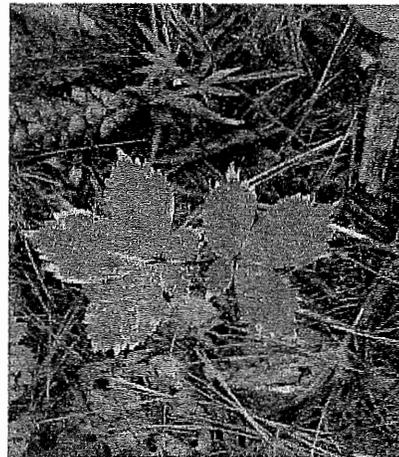


Photo 1: Ginseng
(A.L. Hammett)

roots, and Daniel Boone hired Native Americans to pick ginseng to fund his campaign for Congress. In some regions of the Appalachian mountains it is illegal to harvest ginseng, whereas in others it is legal only during the fall. Many people cultivate ginseng by using methods that mimic the natural state. Plants grown by this method are known as “wild simulated” or “woods-grown” ginseng; nursery-grown seedlings are sown on forested slopes under a canopy of hardwood trees. In other parts of North America, ginseng is cultivated commercially under tarps or wooden slats. Wild and commercially cultivated ginseng produce annual crops in the United States and Canada worth more than \$25 million, with the price of a dried pound rising sometimes as high as \$500. The main market for ginseng is Asia, where it is revered for its medicinal properties. Wild American ginseng is preferred over the Korean varieties, often sold for 500 times more than the price of commercially grown varieties. Ginseng is known for its abilities to stimulate physical and mental activity, and as an aphrodisiac.

Other important Appalachian medicinal plants include Black and Blue Cohosh.

Black cohosh (*Actaea racemosa*) is deeply embedded in Native American folklore. *Cohosh* is a Native American word meaning “rough,” which refers to the plant’s root texture. Black cohosh is used for ailments ranging from mild depression and fever to nervous disorders and snakebites. Today it is commonly used for treating gynecological problems; for example, for stimulating menstruation, for which it earned the name “squaw” root. It is also used to relieve cold symptoms, constipation, headaches.

Blue cohosh (*Caulophyllum thalictroides* and *C. giganteum*) grows in the same areas as Black cohosh and is also known for its ability to relieve gynecological problems. The rhizomes and roots were traditionally known as “women’s herbs” and were used by several Native American tribes to treat problems associated with the uterus. The plant was also used to treat sore throats, rheumatism, bronchitis and cramps.

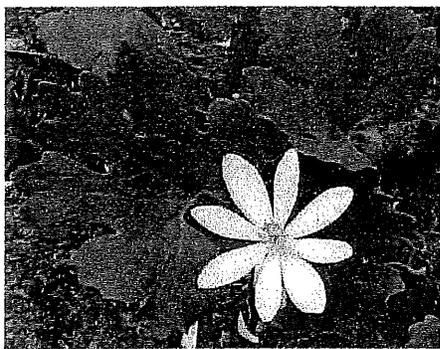


Photo 2: Bloodroot
(L. Mayer)

Bloodroot (*Sanguinaria canadensis*) is another common plant of the Appalachians whose roots are used medicinally. A member of the poppy family, bloodroot has many historic and modern medicinal uses. Traditionally, tea made from the rhizome was

used to treat rheumatism, asthma, various lung ailments, laryngitis, and fevers. Because of its toxicity in high doses, bloodroot has been classified as unsafe by the United States Department of Agriculture. However, in controlled doses it is still used in many modern medicines such as cough syrups, tinctures, and skin ointments for ulcers and cancers. It is also used in anti-plaque and anti-gingivitis oral rinses and toothpastes.

Many other plants in the Appalachian mountains and throughout the United States have known medicinal uses; these plants include mint, rose, yarrow, raspberry, and willow. Many plants serve multiple purposes as food and medicine. In fact, most plants have many uses serving as food, fodder, medicine, shelter, insecticides, fuel wood, yeast starters, paper, and ornamentals.

The **black walnut** (*Juglans nigra*) tree, mentioned as a food source in Discussion Paper #3, also has a rich history of medicinal use around the world. Native Americans used inner bark tea as an emetic (a substance to induce vomiting) and laxative, and chewed the bark for toothaches. The bark is still used as a dentifrice (tooth cleaner) in Pakistan. The husk of the nut is chewed for colic and used as a poultice for inflammation, and the juice of the husk is used for the treatment of ringworm, tetter (eczema), diphtheria, and fungal infections. *Juglans insularis* is used in Cuba as an herb decoction in bathwater for treatment of various skin diseases of children. The fruit and bark of *J. nigra* act against dermatomycosis, and the Greeks and Romans used it to cure other fungal diseases. The leaf extract has been used as phytoestrogen body cream and, together with ginseng, can be used for making lubricants. Walnut pollen is a common allergen, used in the treatment of allergies. The chemicals ellagic acid and juglone are being studied for use as cancer therapy drugs. A strong tincture of the leaves and nuts of black walnut has been used as a remedy in the treatment of bilious and cramp colic. The nut is a food source rich in manganese which is important for nerves and cartilage.

Native Plants as Medicine in the Himalaya

While the “forest as pharmacy” has been replaced by Rite Aids and Wal-Marts in the U.S., much of the world still relies on medicinal plants in day-to-day life. The Himalaya region is rich in diverse,



Photo 3: Selling medicinal plant products, Nepal (A.L. Hammett)



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traditional medical knowledge because of its cultural and environmental diversity. Tibetan, Ayurvedic, and Unani medicine are some of the medical systems and traditions from this region. The use of medicinal plants reflects the long history of human interaction with the Himalayan ecosystem. Some of the earliest uses of medicinal plants in the Himalaya are documented in the sacred Hindu religious texts, the Vedas, from 4,500 years ago.



Photo 4: Carrying *chiraito* to the market, Nepal (Ang Rita Sherpa)

In Nepal's eastern Himalaya grow more than 700 known medicinal plants. About 20 of these species are currently undergoing commercial exploitation. The most important of these is *chiraito* (*Swertia chirata*), tons of which are harvested annually and carried by porter for hundreds of miles to Indian pharmaceutical buyers in the south. Chiraito is the most common source of indigenous medicine in this mountainous region, largely because of its anthelmintic (anti-worm) properties in a region where ascaris (roundworm) is endemic among villagers. On average, Nepal exports a wide range of crude herbs and drugs worth well over \$400,000 per year. Other mountainous area plant species important in international trade are cardamom (*Amomum subulatum*), *jatamansi* (*Nardostachys jatamansi*), *kutki* (*Picrorhiza kurroa*), and *bikh* (*Aconitum spicatum*).

More familiar to Americans is the Jack-in-the-pulpit (*Arisaema*), commonly used for stomach ailments; a *Vaccinium* (blueberry) species used to treat fevers; and *Allium* (wild onion) used for cuts. Medicinal plants are also used to treat livestock, especially important in areas where veterinary services are unavailable. The ritual knowledge is secretly held within families, but the medicine is universally shared. For example, Rai farmers who suffer from various ailments will come to the household of a Sherpa known for his knowledge of medicine, bringing a wooden jar of raksi (local wine) in lieu of payment.

Native Plants as Medicine in the Andes

Native plants in the Andes have been used for millennia as medicines. The high biodiversity of the Andes has resulted in an abundance of plants high in nutrients and

pharmaceutical value. Close to 90 percent of the approximately 4,000 kinds of useful plants from the Andes-Amazon region have applications in medicine. Yet, unlike the medicinal folk cultures of Asia, such as Indian Ayurvedic and Chinese medicines, the folk medicines of the Andes do not have wide global use or recognition. One plant that is better known is the *quina* tree. When Spanish Jesuit monks came to the Andes, they were introduced to the use of the *quina* tree bark as a remedy for malaria. These monks brought this knowledge back to Spain from the Andes. The Spanish countess of Cinchona was treated and cured by *quina* bark, and it was from this incident that the tree received its formal name – *Cinchona officinalis*.

Another well-known medicinal plant from the Andes is *coca* (*Erthroxylum coca*), better known today as the basis for cocaine. The leaves of this plant remain an important medicinal product for many peoples of the Andes. Quechua villagers, for example, chew coca leaves mixed with lime to reduce fatigue caused by the high altitudes. It is also used traditionally to reduce feelings of hunger and pain, as a calmative agent, and as a local anesthetic.

In contrast to the medicinal plants in the Himalaya and the Appalachians, which are globally traded, most of the medicinal plants in the Andes are only locally traded.

Muña (*Minthostachys mollis* or *andina*) is a flower of the mint family that is used to aid in digestion and as a washing solution to treat fungal skin infections. Cabello de Angel, or *wancu-wancu* (*Cuscuta odorata*) is a leafless vine with hundreds of little white

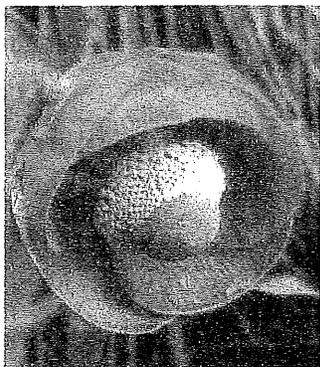


Photo 6: Rima Rima, Peru
(The Mountain Institute)

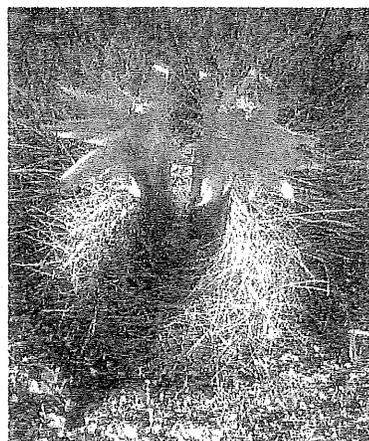


Photo 5: Curicasha, Peru
(The Mountain Institute)

flowers. The dried and powdered plant cauterizes wounds, and the stems are used to make a tea to treat liver diseases. Another medicinal plant used locally is *Curicasha* (*Matucana yanganucensis*), a round, barrel-shaped cactus. Curicasha is used to treat diabetes after boiling it in water with a fern called *cuti-cuti*. Many of the plants in the Andes are embedded in myth and folklore. *Rima rima* (*Krapfia weberbauerii*) is a herbaceous plant with yellow-red flowers. “Rima” means “to speak” in the Quechua language. It is said that if a

child hasn't learned to speak by a certain age, s/he should be tapped gently on the tongue with this flower. Blossoms are also used to adorn women's hats.

One medicinal plant that is gaining popularity globally is *Maca* (*Lepidium meyenii*), a pre-Columbian crop that was and continues to be grown at high altitude (about 3,500 meters/11,500 feet). This plant is rich in protein, and has many minerals and vitamins. It is used primarily to restore energy and has been called "nature's answer to Viagra." *Maca* has also been recognized as a good source of nutrients for strengthening bones and teeth.

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FAO. Unasyuva. <http://www.fao.org/docrep/w9300e/w9300e00.htm#>. [This is a journal published by FAO. Each issue usually features a specific theme, with the link above containing a special issue on mountains as well as several articles on medicinal and food plants.]

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<http://www.icimod.org.sg/>. [The International Centre for Integrated Mountain Development (ICIMOD) is committed to the promotion of sustainable mountain development and is based in Kathmandu, Nepal. This site offers extensive information on many issues related to mountain development, such as publications and a database.]

Native American Ethnobotany Database. <http://www.umd.umich.edu/cgi-bin/herb>.

[The purpose of this site is to serve as a database or encyclopedia on medicinal, food, dye, and other uses of plants used by Native Americans.]

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Virginia Tech Special/Non-Timber Forest Products Page.
<http://www.sfp.forprod.vt.edu/>. [Several fact sheets on the site focus on medicinal, food, and additional products from plants/trees in the Appalachians. There are also publications, workshops and an NTFP forum.]

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Discussion Paper #5

Native Plants for Fiber, Dyes, and Other Uses

"The varied uses of plants by the Chippewa indicate the large extent to which they understood and utilized the natural resources of their environment."

- Frances Densmore 1926

In Discussion Papers #3 and #4, we highlighted the importance of plants for food and medicine. People throughout the world have also used plants to make cordage, rope, baskets, soap, glue, dyes, tannins, candles, pot scrubbers, jewelry, and countless other items for thousands of years. Households depend on such products for both subsistence use and cash income. Women in particular depend on these types of products to supply primary and supplementary incomes for households, which are used to provide their families with food, clothing, and educational material, such as the funds to attend school. Because of this, the conservation of important species is crucial to the survival of mountain households.

Important Plants in the Appalachian Mountains

Cordage/Ropes

In the early 1900s, a woodsman named Bernard Mason wrote, "I have seen basswood rope in the Chippewa villages that seemed superior in every way to the commercial Manila rope we use today, much lighter in weight, smoother, silky to the touch, easier to handle, being free from the slivers or 'whiskers' that cut and burn the skin, less inclined to kink, and smooth and oily to the touch when wet." Indeed, the inner bark of basswood (*Tilia* sp.), whose flower also makes an excellent tea and is the source of delicious honey, separates into long, thin, flat fibers that are ideal for rope making, and that have been used for this purpose for thousands of years. In the absence of basswood, Native Americans used elm, hickory, white oak, red cedar, cypress, pawpaw, Osage orange, leatherwood, and black locust. Twine has also traditionally been made from stinging nettle, milkweed, and dogbane.



**Photo 1: Dogbane,
Appalachian Mountains
(Marc Kummel)**

Dyes and Tannins

Before chemical dyes were synthesized from plant sources, the plants themselves were used as sources of dyes. To dye cloth, yarn, tools, and handicrafts such as baskets, people used the roots, leaves, and flowers of plants: bloodroot and wild plum leaves for dark red,

Box 2: How to dye with Bloodroot

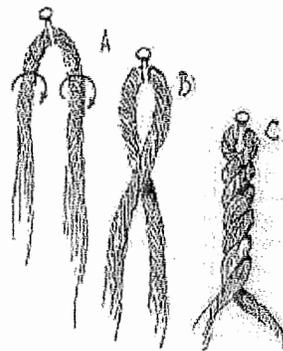
The juice of the bloodroot stem is orange or red and has been used for generations as a dye.

- Cut fresh roots into small pieces and soak for an hour before boiling.
- Boil for 30 minutes and strain.
- Heat the dye bath until it is lukewarm.
- Add desired material and simmer until it receives the desired color.
- Rinse and dry.

butternut or black walnut shells for black, alder for yellow, goldthread roots for bright yellow, and rotten maple wood for purple, for example. The ripe flesh of the fruit pawpaw was also used as a yellow dye.

Box 1: How to make a bracelet using milkweed, dogbane, or stinging nettle fibers

- Fibers from plants can be used to make cords in two different ways: braiding (usually done with flat, split materials such as flattened straw) and twining.
- Milkweed, dogbane, and stinging nettle can be used to make cord using the twining technique.
- Collect plants in the fall, when they are dry. Do not pull the roots out of the ground, because that will prevent the plant from growing in the spring. Using fresh, green plant material is not recommended, because it will shrink when it dries.
- For cordage of milkweed or dogbane: cut the stems at the base of the plant and strip off any remaining dead leaves.
- For stinging nettle: Wear gloves when collecting stinging nettle! Snip off any leaves and remove the stinging hairs on the stems by pulling the stems through your gloved hands. After removing the stinging hairs, you can make cordage without gloves.
- The next step is to separate the strands: For stinging nettle stems, simply peel away the outer layer of the stem. For milkweed and dogbane, lay the stems on a stump or log and lightly tap them with a rubber or wooden mallet to crack them. Next, pull off the stem's outer layer, and you will see the strands separate from the inside part of the stem. (You can store stem strands or leaves in a dry place. When you are ready to make cordage, sprinkle the strands with water to make them more flexible.)
- After preparing a bundle of fiber half the thickness of the finished cord you desire, place your hands 6 to 12 inches apart and about one third of the way from one end. Twisting the fibers clockwise with one hand, wind the bundle tight (making single-ply cordage).
- Bring your hands closer together and keep twisting.
- A kink should begin to form between your hands in a counterclockwise direction
- Twist until two or three rotations occur (when the kink forms a loop and the fibers begin to rotate around each other). This is the start of a two-ply cord.
- Attach something to the end (such as a clothespin) and begin to finger twist counter-rotating - each hand applying a clockwise (S) twist into a ply, while passing the right ply over, and the left ply under.
- After your cord is finished, you can cut or carefully burn off the overlap ends to make your cord less fuzzy.



For more details see:

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Kidder, Norm. *Making Cordage by Hand*. <http://www.primitiveways.com/cordage.html>

Tree bark, especially that from trees high in tannin, such as the chestnut oak (*Quercus prinus*), tanned the majority of the country's leather until the 1940s. The bark is finely ground, left to steep in water for several weeks, and strained. Then the fleshed and de-haired deer or cow skin is immersed for 2 to 3 months. After stretching and oiling, the tanned skin takes on a beautiful brown color, with a woody aroma second to none!

Other Uses

Plants have also been used to produce essential oils (from the word "essence"), candles, and artisan products. The Appalachian Mountains are home to several species of vines, such as grapevines (including the fox grape and summer grape), used to make baskets, wreaths, and furniture. Oak strips, which separate freely when pounded with a wooden mallet, are also used to make baskets.

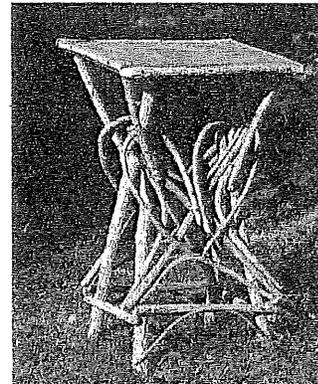


Photo 2: Table made from vines (A.L. Hammett)

Many plants are used in cosmetics. Essential oils are used to scent cosmetics, soaps, and other items. Several can be used in soaps and moisturizers. One such plant is the sweet buckeye (*Aesculus octandra*), whose seeds are rich in saponins. Sassafras (*Sassafras officinale*) oil is still distilled from the roots and root bark of the tree and was formerly used as a fragrance in numerous household products such as floor wax, polish, soap, detergent, and cleaning agents. Exported by the ton to Europe during colonial times, sassafras was also the original ingredient in root beer. Wintergreen (*Gaultheria procumbens*) oil is commonly used as perfume and flavoring in toothpastes and chewing gum. Yarrow (*Achillea millefolium*) is sometimes used as a mosquito repellent applied by rubbing exposed skin with the crushed plant.



Photo 3: Stinging nettle, Nepal (The Mountain Institute)

Seeds and nuts from many plant species have been and still are used as beads. Native Americans used bits of shell, bones, chips of rock, seeds, nuts, beans, bits of minerals, quills, teeth, claws, fish and lizard scales, and pearls to adorn their clothing. Some even made their own beads of clay. The hawthorne tree (*Crataegus coccinea*) was an important source of small seeds used for intricate beadwork. Black cherry (*Prunus serotina*) wood and walnut (*Juglans* sp.) wood knives were commonly used to carve the beads.

Bamboo

In the lush forests and pastures on the slopes of the eastern Himalaya, Daniggelis tells us that “bamboo is life.” Entire houses are made of various bamboo species, from pillars to roof beams to woven mats that serve as roofs.

“Women and children are seen carrying large bamboo containers filled with water. The water is collected from split bamboo pipes placed above the river, and is carried back in baskets woven of bamboo strips. Babies are kept in kokros (woven bamboo baskets). Buttermilk, butter, raksi (wine) and jad are stored in bamboo containers of various sizes. Animals wear bamboo muzzles as they are led through maturing fields. It is a common sight to see Rai men sitting outdoors on the bamboo house platform weaving bhakari (cow shelter bamboo mats), namlo (bamboo straps for carrying goods), or ghum (bamboo raincoats). Up in the lekh (pastures) with the shepherds, bamboo musical instruments add entertainment to the long hours around the fire. Even the slippery bridges that I crossed were often large bamboo poles fastened together with bamboo lashings... ..”

Ephrosine Daniggelis, Hidden Wealth, 2001

Important Plants in the Himalaya

In the Himalayan Mountains, the everyday life of many rural households revolves around the use of plants. Bamboo, for example, is an essential plant throughout Asia; more than 80 important uses have been documented. Another plant of great value is *lokta* (*Daphne bholua*), a paper-bark bush that grows as an understory shrub between the altitudes of 1,500 and 3,000 m. The inner bark is processed to make a beautiful paper that has become very popular with tourists in Kathmandu, while providing a valuable source of extra income to the mountain farmers.

Allo (*Girardinia diversifolia*), or stinging nettle, produces a long and strong fiber that is used extensively for rope, string, and gunny sacks, much like our own milkweed and dogbane. When woven with wool, it makes a strong homemade cloth that has been worn for thousands of years, and that recently enjoyed a “rediscovery” by the international market. Local women formed a highly successful cooperative in the Makalu-Baru region to harvest the *allo* and produce the *allo* cloth, which is now being made into suitcoats, briefcases, and bags for tourists.



**Photo 4: Girl with bamboo,
Nepal
(The Mountain Institute)**



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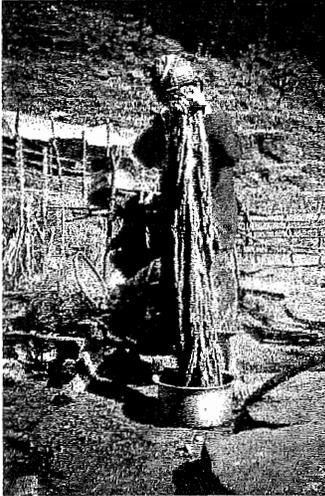


Photo 5: Girl preparing
Allo in Nepal
(The Mountain Institute)

As in the Appalachians, plants in the Himalaya are used to dye clothes, mats, and other products. For example, the fruit of the *bedda* nut tree (*Terminalia bellirica*) is used as black dye for matting and ink, and night-jasmine (*Nyctanthes arbortristis*) is used as a yellow dye.

Asia is famous for its essential oils and perfumes, such as sandalwood (*Santalum album*). In Nepal, the rhizomes of the plant *jatamansi* (*Nardostachys grandiflora*) are used in perfumery. *Jatamansi* has an odor that is best described as sweet, woody, and spicy, and is also an important local medicinal plant.

Important Plants in the Andes

Mountain communities of the Andes use a variety of plants for dyeing wool, baskets, and other textiles. In Peru, Quechua people weave fiber bags called shicras out of several different plant species that include *junco* (*Schoenoplectus* sp. or *Cyperus* sp.), *totora* (*Scirpus* sp. or *Typha* sp.), and *carricillo* (*Phragmites australis*). The bags are then dyed different colors with the roots, leaves, and flowers of plants. The fruit, bark, and leaves of *nogal* (*Juglans neotropica*) are used as a black or yellow dye for wool, and also as a hair dye (*nogal* is in the same family as the black walnut tree found in the Appalachians). Another plant used for dye is *tara* (*Caesalpinia spinosa*), whose seed pods are also used for tanning leather. Peru is a major exporter of powdered *tara*, and scientists are currently investigating the uses of gum derived from the plant for use as a thickening and stabilizing agent. As in Appalachia, there are several plants in the Andes that are used locally as soap. The bark of *roque* (*Collectia spinosissima*) is sometimes used as a substitute for soap for washing clothes. It is also an important plant for firewood.



Photo 6: Weaving baskets from
Chapká (FAO)



**Photo 7: Thatched roof, Andes
(The Mountain Institute)**

The roots of *yulaq parasha* (*Orthrosenthus chimborocensis*) produce a strong yellow fiber used to produce brooms. Another plant fiber commonly used in the Andes is *wishllaq* or *mutuy* (*Cassia hookeriana*), whose branches are used to construct baskets. The branches of *qantuta* (*Antua buxifolia*) are also used to make baskets. *Chapká* (*Oreocalli grandiflora*) is woven to produce baskets used for storage and transportation.

Many of the houses in the Andean region are built with thatched roofs made from grasses and other fibrous plants. Several species of grasses are used for these roofs, such as *Qontsi casha* (*Arnadesia dombeyana*) and *ichu* (*Stipa* sp.).

Puya (*Puya rainmondii*), an extremely rare plant with a thick stem up to 39 feet high whose 20,000 flowers bloom only once in the life of the plant (at 28 years old), has a variety of uses. Children use the dry, de-leafed stem as an insulated bench, which they take to school. It is also used as insulation in construction. In addition, the spiny leaves are used for doors and fences.

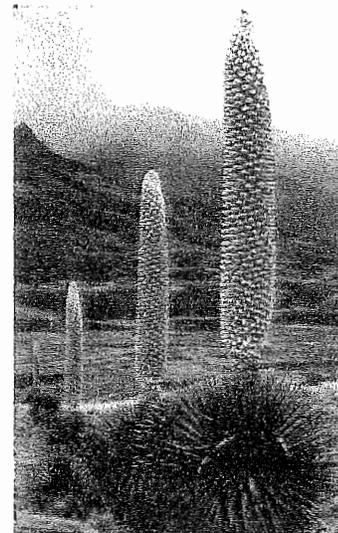


Photo 8: Puya, Peru (The Mountain Institute)

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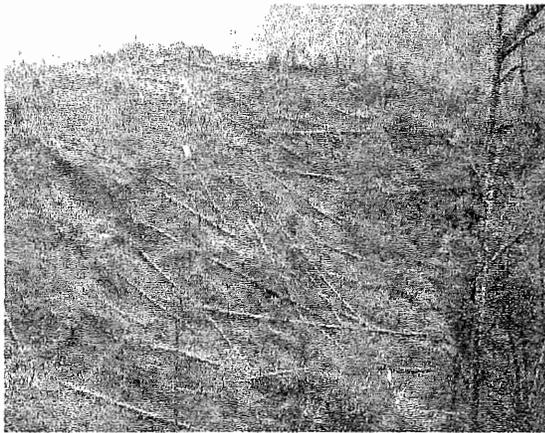
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USAID AND THE CONSERVATION OF MOUNTAIN BIODIVERSITY

Mountain communities are among the poorest and most disadvantaged in the world. Because upland poverty levels are exceptionally high, access to education, decision-making powers, financial resources, and land rights are inequitably distributed between upland and lowland communities. Out-migration of young people is characteristic of many mountain areas, and traditional mountain cultures are rapidly becoming assimilated into mainstream cultures as communication technology reaches even the remotest of mountain villages. Many mountain regions have recent histories of large-scale natural resource extraction with little economic return for local people, such as the removal of



**Photo 1: Slash and Burn, Nepal
(The Mountain Institute)**

more than 90 percent of West Virginia's old-growth forests between 1890 and 1910. Major problems and threats to biodiversity in the world's mountains are often linked to poverty, and include warfare, deforestation, expanding slash-and-burn agriculture, deteriorating rangeland conditions due to overgrazing, and the conversion of old-growth forests to monocultures and cash crops. Other threats come from outside influences, such as inappropriate adventure tourism, large-scale international mining operations, and poorly regulated timber harvesting.

The Role of Foreign Assistance

Funds provided by governments for humanitarian and environmental purposes can help address a number of contemporary problems in mountain regions through projects that promote sustainable community development based on conservation principles. The United States Agency for International Development (USAID) is the government agency responsible for administering the United States foreign assistance efforts. USAID has programs in more than 90 countries worldwide that are focused specifically on environmental objectives, such as reducing the threat of global climate change, increasing the conservation of biodiversity, and improving the management of natural resources. The USAID offices in these countries, known as missions, coordinate the different

programs and activities in partnership with international environmental organizations, national environmental groups, private voluntary organizations, indigenous organizations, universities, private companies, international agencies, nongovernmental organizations (NGOs), foreign governments, and other U.S. government agencies.

Africa	Asia and the Near East	Latin American and the Caribbean	Europe and Eurasia
Angola	Bangladesh	Bolivia	Albania
Benin	Cambodia	Brazil	Armenia
Congo	Egypt	Ecuador	Bosnia and Herzegovina
Ethiopia	India	El Salvador	Bulgaria
Eritrea	Indonesia	Haiti	Georgia/Azerbaijan
Ghana	Jordan	Honduras	Croatia
Guinea	Lebanon	Jamaica	Kazakhstan
Kenya	Mongolia	Mexico	Kosovo and Montenegro
Liberia	Morocco	Guatemala	Kyrgyzstan
Madagascar	Nepal	Nicaragua	Latvia
Mali	Philippines	Panama	Lithuania
Malawi	Sri Lanka	Paraguay	Moldova
Mozambique	West Bank/Gaza	Peru	Poland
Namibia			Macedonia
Nigeria			Romania
Rwanda			Tajikistan
Senegal			Turkmenistan
Somalia			Ukraine
South Africa			Uzbekistan
Tanzania			
Uganda			
Zambia			
Zimbabwe			

Table 1: Countries with USAID Projects

Many of the challenges encountered in mountain environments and by mountain communities in the developing world are being addressed by these programs, and the lessons learned are often directly applicable to conditions found in the U.S. Several examples of the ways in which USAID is helping to protect biodiversity, while improving the quality of life for many mountain people are shown below:

Makalu-Barun National Park and Buffer Zone, Nepal: A New National Park and Conservation Area in the Nepal Himalaya

The Makalu-Barun National Park and Conservation Area covers a total area of 2,330 square kilometers in the rugged mountains of eastern Nepal, known throughout the world as a key “biodiversity hotspot.” Within a north-south distance of some 40 kilometers, elevations range from 435 meters to the 8,000 meter peaks of the high Himalaya. Distinct

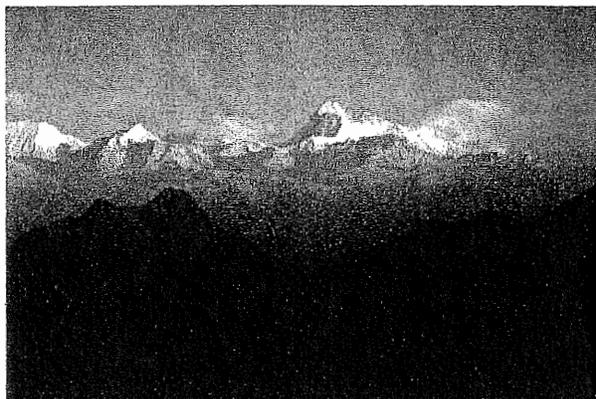


Photo 2: Makalu-Barun National Park, Nepal
(Alton Byers)

vegetation zones correspond to this precipitation/ temperature gradient, with more than 3,000 plant species, 25 species of mammals, 200 species of birds, and 84 species of fish recorded in the region. With USAID and other international donor support, a management plan was developed by a Nepali Task Force between 1988 and 1992 that led to the official designation in 1993 of the region as a national park and “conservation area,”

with the latter representing a multiple-use zone inhabited by 32,000 people. During the past 10 years, park staff and conservation area residents, assisted by The Mountain Institute, have made substantial progress in protecting an area of unusual natural beauty and biological diversity while improving the livelihoods of local people.

Huascarán National Park, Peru

The 3,400 square kilometer Huascarán National Park is located in the Department of Ancash in north-central Peru and includes most of the Cordillera Blanca, the highest range of the Peruvian Andes and the highest range within the world’s tropical zone. The national park was established in 1975, declared a UNESCO Biosphere Reserve in 1977, and named a World Natural Heritage Site in 1985. The park contains 60 peaks with altitudes surpassing 5,700 meters, the highest being Huascarán at 6,768 meters. Most of the terrain below 4,800 m is characterized by high altitude grassland (*puna*) with remnant *queñual* (*Polylepis* sp.) forests located within the upper, inner valley slopes. Although thought to have been greatly reduced during the past century, the *Polylepis* forests contain a diversity of flora and fauna within the park while providing habitat for many species of endemic Andean birds. Approximately 779 plant, 112 bird,



Photo 3: Huascarán National Park, Perú
(Alton Byers)

and 10 mammal species have been recorded in the region.

Key environmental issues and challenges currently facing the region include the reduction of *Polylepis* forests; overgrazing of alpine and subalpine pastures; concentrated tourism; uncertain land titles and park boundaries; government policies supportive of resource extraction within the national park; and subsequent external pressures such as new roads, mining, dams, and tourist infrastructure. With USAID support, The Mountain Institute worked between 1994 and 1996 with the government, NGOs, the private sector, and local communities to produce the *Huascarán National Park Ecotourism Management Plan*, the country's first participatory plan for a protected area. Since then, biodiversity protection, landscape restoration, community development, and education programs have been funded by USAID, which in turn has helped to leverage additional funds from other



Photo 4: Volcanoes National Park, Rwanda
(Alton Byers)

international donors, notably the government of the Netherlands.

Volcanoes National Park, Ruhengeri Prefecture, Rwanda

The home of the mountain gorilla made famous by the movie *Gorillas in the Mist*, the Volcanoes National Park lost more than half of its original 328 square kilometers in the 1970s due to agricultural expansion.

The most biodiverse of the lower afro-montane forest has thus been lost forever, although the remaining highlands on the shoulders of the volcanoes are a global treasure of alpine, subalpine, and forest plant and animal species. They include the giant forms of *senecio*, *lobelia*, and bamboos of importance to the mountain gorillas, forest elephants, buffalo, and at least 180 different species of birds. To help protect the park while improving the livelihoods of people living in the surrounding provinces, USAID established the Ruhengeri Resource Analysis and Management (RRAM) project between 1985 and 1990. Activities included agroforestry, agricultural, and erosion control trials in addition to the provision of technical assistance to the national park.

Blue and John Crow Mountains National Park, Jamaica

The Nature Conservancy, USAID, and other organizations throughout Latin America and the Caribbean have been working together since 1990 through a program called "Parks in Peril." This program was established to assist in the conservation of threatened national

parcs and reserves of global biological significance. Funding provided by the Parks in Peril and USAID Protected Areas Resource Conservation (PARC) project has enabled the Jamaica Conservation and Development Trust (JCDDT) to establish park infrastructure, post and secure park boundaries, hire and train park rangers, and conduct valuable scientific research to improve watershed management. A complementary project with the Private Voluntary Cooperation program of USAID has focused on building leadership and developing sustainable microenterprises in local communities.



**Photo 5: Blue Mountains, Jamaica
(Robert J. Althouse)**

Maya Biosphere Reserve, Guatemala

The Maya Biosphere Reserve, encompassing approximately 1.6 million hectares of Guatemala's tropical lowland forest and wetland ecosystems, was created in 1990. It forms the core of the largest tract of intact tropical forests remaining in Meso-America, and is one of the most important regions in the world in terms of biological diversity. Administration of the reserve is carried out by the Guatemalan National Council of Protected Areas (CONAP), USAID, The Nature Conservancy, Conservation International, and CARE International.

The USAID Guatemalan Mission has defined "Improved Natural Resources Management and Biodiversity Conservation" as one of its key strategic objectives. This goal extends from the Maya Biosphere Reserve to other regions such as the Atilan/Volcanoes and Motagua/ Polochic areas. A central strategy for achieving this goal is to work with communities living in and around the protected areas, and to promote the participation of civil society. This includes the involvement of women, as they play a key role in decisions over crops,

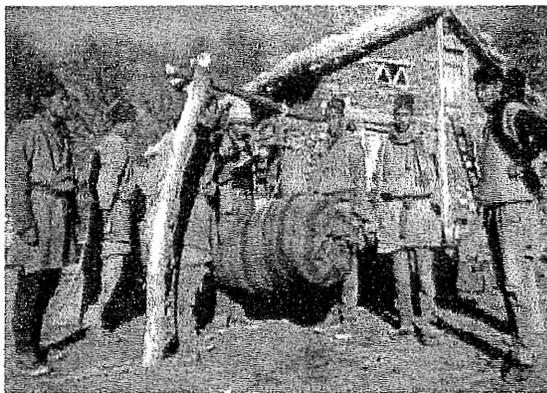


Photo 6: Collectors of jatamansi and other forest plants, Nepal (A.L. Hammett)

water use, firewood, and household management. The Women in Development Technical Assistance Project (WIDTech), an organization funded by USAID's Office of Women in Development, is involved in this project to ensure full integration of women in conservation strategies. Four main issues of concern to women that the project addresses are (1) economic activities, (2) sustainable use of natural resources, (3) policy, laws, and regulations analysis, and (4) the strengthening of local nongovernmental organizations.

Institute of Forestry Project, Nepal

Natural resource management in Nepal has undergone a radical shift in the past 20 years, with the traditional state-managed national forest model now replaced with a locally managed community forest model. Local people now set the management goals, conduct management activities, and protect all forest resources, working in partnership with forestry professionals who help provide the scientific input needed for the best results. Included in this new model was training these professionals to work as extension agents or facilitators, providing technical expertise to village-centered management groups. This required a radical shift in the professional culture of the Nepali natural resource establishment, as foresters became advisors to local communities instead of "police."

To change the professional roles and culture of Nepali foresters required a change in how they were educated, a process that was greatly facilitated by USAID through the Institute of Forestry (IOF) project (1989-1995). Through radical alterations in the curriculum and facilities, the IOF now embraces a holistic, as opposed to a forest-specific, approach to community-based management of natural resources. Faculty and administration at the institute worked with outside groups to create a new curriculum that now includes park management, conservation biodiversity, improved utilization of fuel wood, and management of wildlife resources. For instance, many non-timber forest products (e.g., medicinal plants, bamboo, and fodder species) now incorporated in the curriculum are included in community forest management plans. The impact of this project is felt throughout the country as personnel trained at the IOF now serve at all levels within government, NGOs, and donor-funded operations.



**Photo 7: Gorillas in Volcanoes National Park, Rwanda
(Alton Byers)**

The Biodiversity Support Program

The African continent and Madagascar contain a great wealth of biodiversity. Renewable natural resources support the subsistence of millions of people in Africa, and make an important contribution to many national economies. Africa's ecosystems contribute to the stability of local, regional, and global ecological processes. However, Africa continues to lose biological diversity and natural resources as a result of habitat alteration, overharvesting, and pollution. In response, the Biodiversity Support Program (BSP), funded by USAID, operated from 1989 to 2001 as a consortium of the World Wildlife Fund (WWF), The Nature Conservancy (TNC), and the World Resources Institute (WRI).

The Africa and Madagascar program exemplifies BSP's worldwide program working with partners in Africa and elsewhere to help conserve biodiversity and to encourage the wise use of natural resources through the promotion of sustainable livelihoods. Taking a broad landscape approach, the program (a) analyzed traditional and new approaches to biodiversity conservation, (b) published curricula and field manuals, (c) strengthened African capacity for conservation through training, (d) promoted exchanges and networking among different regions of Africa and Madagascar, (e) provided technical assistance to USAID and other partners, and (f) acted as a neutral facilitator. For example, the Biodiversity Analysis for Africa (BAA) project was designed to advance biodiversity conservation and meet human needs by analyzing biodiversity conservation

initiatives, strategies, and approaches. Another example, the Wildlife Trade in Medicinals project, studied wildlife medicinal trade within the region and with outside markets to promote sustainable levels of trade. Further information on these projects and their impact in sustaining biodiversity resources in Africa and other regions can be found at the BSP Web site: <http://www.bsponline.org/>. Virginia Tech and its partners have assisted in several BSP projects both in Africa and in Asia.



**Photo 8: Medicine Man,
Panama (A.L. Hammett)**

Sustaining Biodiversity in the Panama Canal Watershed

USAID, with the help of the U.S. Forest Service, is currently supporting a project in Panama to sustainably

manage the Panama Canal Watershed (PCW) and its buffer zone areas. The main goal is to foster income-generating activities in the PCW that contribute to biodiversity conservation. A Virginia Tech team is compiling and analyzing information on nature-based enterprises in the PCW to determine which products offer the greatest potential for increasing environmentally sustainable incomes for local inhabitants. Specifically, the program seeks to identify the potential of new and already existing products (e.g., honey, tagua, baskets, etc.) and enterprises (e.g., eco-tourism, arts/crafts, etc.); evaluate environmental impact of improved enterprises (e.g., to biodiversity, soil conservation); and examine the economic and social impacts of nature-based businesses (e.g., gender and distribution of benefits). The project will lay the groundwork for the USAID nature-based enterprise and biodiversity programs in the PCW.

Bolivia Sustainable Forest Management Project (BOLFOR)

BOLFOR is a project undertaken by Chemonics International, an environmental consulting firm based in Washington, D.C., in conjunction with USAID. The goal of this project is to reduce degradation of forest, soil, and water resources and to protect the biological diversity of Bolivia's forests. It also seeks to assist Bolivia in building its public- and private-sector capacity to develop and implement programs for sustainable forest use. Among its many activities, BOLFOR has supported the formation and regulation of voluntary certification in sustainable forest management, provided advice on the development and enactment of a new forestry law, and strengthened market development for environmentally sustainable products. Virginia Tech and the USDA Forest Service have teamed up to support the project's forest certification and marketing of lesser-known species.

Conclusion

The United States Agency for International Development (USAID) has administered the foreign assistance programs of the United States since 1961. Although many Americans believe that a large portion of their tax money is spent on foreign aid, the reality is far different: Economic and humanitarian assistance abroad constitutes less than one-half of 1 percent of the federal budget. This small amount represents an especially sound investment for all Americans, fostering cross-cultural communication and understanding, improved livelihoods, and the conservation of biodiversity and other natural resources. Terrorism, conflicts, and wars do not happen because we know too much about other countries and their people. Especially in these uncertain times, USAID will continue to play a particularly important role in foreign relations and the long-term security of American citizens.



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Organizations That Work with USAID

Cooperative for Assistance and Relief Everywhere (CARE). <http://www.care.org>. [CARE works in conjunction with USAID, other international/national organizations, and local NGOs and communities to promote environmental, social, economic, education, and health care development in developing countries. This Web site enables viewers to search its programs and has links to its partners.]

Nature Conservancy. <http://nature.org/>. [The Nature Conservancy was established in 1951 with a goal to preserve the natural communities that represent the diversity of life on earth. It works with many other organizations to establish and manage protected areas.]

World Wildlife Fund (WWF). <http://www.panda.org>. [WWF is an international environmental nongovernmental organization that has chapters in more than 45 countries. The main goal of WWF is the conservation of natural ecosystems and flora and fauna. Its main priorities include reducing global climate change, conserving forests, protecting endangered species, and preventing the pollution of fresh and salt waters.]

Women in Development Technical Assistance Program (WIDTech). <http://www.widtech.org>. [WidTech is a consortium of four different agencies: Development Alternatives, Inc. (DAI), The International Center for Research on Women (ICRW), the Academy for Educational Development (AED), and Development Associates (DA). Its goal is to assist organizations, such as USAID, in more effectively addressing gender-based constraints and maximizing women's

contributions. It works on various projects with USAID and other organizations such as The Nature Conservancy.]

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