

# JOHN SIMON GUGGENHEIM FOUNDATION FELLOWSHIP

## FINAL REPORT

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## I. INTRODUCTION

The John Simon Guggenheim Fellowship (2001-2002) provided me with an opportunity to explore and document new ways of overcoming obstacles in communicating scientific research to the general public. I used this year as a springboard to break out of the traditional routine of teaching, research, and professional tasks at my academic institution to investigate three questions:

- 1) What are the existing obstacles for academic scientists who do basic research to communicate directly with the general public, particularly those who do not traditionally gravitate towards understanding nature or science?
- 2) How might I link my research interest and expertise – forest canopy ecology – to activities or interests held important by these audiences to enhance awareness and interest in nature and science?
- 3) How will these activities be viewed and assessed by my academic colleagues? Can I inspire other researchers to carry out similar actions?

These questions had been formulated well before the Fellowship. Although my academic background has centered on basic ecological research, and I have mainly published results for scientific audiences, I had become increasingly aware of the need for scientists to communicate research and conservation messages more directly to non-scientists. My observations of the field of nature interpretation, informal science education, the media treatment of science, however, indicated that most efforts to communicate science are geared towards “the converted”, i.e., those people who are already aware of the need of concern for the environment. I felt that a greater need exists for communication to the “environmentally unaware”, and wanted to figure out ways to address the widening gap between nature and humans, and between science and society.

Humans have always depended on their understanding of the natural world for survival and inspiration. In recent decades, humans have become more distant and less knowledgeable of the biota around them. This has resulted in environmental problems that endanger the maintenance of our own

and other species in an unprecedented manner. A key to reversing this trend is to provide information about the natural world to all people. Humans need to understand the distribution, diversity, and function of our planet's inhabitants as well as the means by which we discover new information about them. The large and growing pool of knowledge about the natural world that is generated by scientists must find its way into the minds and spirits of the general public. Effective conservation requires an informed, supportive and participatory public. Through conservation awareness we inform, promote debate, and inspire change.

However, communication of science by scientists to the general public via mass media is only minimally valued within the reward system recognized by scholars. At best, these efforts are viewed as a distraction from the "real work" of academics (e.g., writing grant proposals, producing scholarly articles and books for peers and scientific audiences). At worst, efforts to communicate with non-scientists are met with disinterest, disdain, or jealousy. Some scientists do make efforts to communicate to non-scientists. Most of this effort, however, is carried out either by their communicating with the either with via the popular media.

I wished to explore the idea that outreach efforts by scientists via non-traditional media can directly improve the health of human society by awakening the awareness of the general public to the importance of tightening its links with nature. Such efforts might also result in positive feedback for scientific funding via an improved social and political climate that is supportive of research activities. These activities are becoming more and more important as human connections to nature become increasingly distant.

I used the resources of my Guggenheim Fellowship to explore the process by which a working scientist can become a more effective communicator to the general public without endangering his/her scientific career and reputation. As a "case study" of this effort, I integrated my own forest canopy research program with its communication to the general public in novel ways. I also documented and communicated the process of this translation, and the reactions evoked from other scientists and communicators by these actions. These efforts might serve as a potential model for other scientists who are interested in outreach work, and for other communicators interested in science.

## **II. FELLOWSHIP PROJECT ACTIVITIES**

### **II. A. General Project Activities**

I took a leave of absence for two academic quarters (Fall 2001-Winter 2002) from my tasks as a professor at The Evergreen State College. My approach comprised five steps:

*1) Brainstorm potential venues and strategies:* I generated ideas to link my research with other values by thinking about how forest canopies and trees in general relate to different aspects and elements of society. I discussed these ideas with my students, colleagues, and friends; created a mobile that had all the potential venues hanging together in a balanced manner that I hung in my office to contemplate; and shared these ideas with a group I established four years ago called "Thoughtcatchers" (we meet once a month to discuss ideas and inventions).

*2) Develop, assess, and expand projects:* From the pool of potential ideas, I chose a subset and developed strategies to implement them. I made connections with contacts at the institutions in which I would be communicating, developed specialized talks, and gathered images for presentations. I also gauged which of these activities appeared to be the most successful in terms of both awakening awareness in the audience and moving them to actions and developed these further by soliciting (or responding to requests) from additional institutions or individuals.

3) *Integrate and synthesize experiences*: I drew emerging themes from the results my communication efforts generated in order to find patterns that could be more generally applied to other fields of science and other scientists. I also read the informal science education literature to learn how these approaches might fold into existing theory and practices of communication and media work.

4) *Communicate results to peers and others*: I have communicated to two types of audiences: my scientific peers, and the general public. I spoke at scientific meetings and write scientific articles for journals about research content, as well as communicating results of my outreach efforts. I also spoke, wrote articles, organized public events, and participated in television programs for non-scientists about these activities.

5) *Evaluate projects and consider next steps*: I am currently evaluating the success and failures of these projects and deciding which are worthwhile for me to pursue in greater depth. I am pursuing funding sources to expand this, and have been successful in garnering grants from other sources to expand these activities to other scientists and to other scientific fields.

## **II. B. Project Themes and Activities**

### ***1. Data Sonification***

I observed that many non-scientists are intimidated by traditional presentations of data in the form of tables and charts, which are often displayed with little regard for visual aesthetics. Some people relate more easily to aural than visual data, so I worked with a computer musician to “translate” my data into sound. I worked with Dr. Arun Chandra, a computer musician, to sonify sets of data on nutrient retranslocation that I gathered from the Monteverde Cloud Forest Reserve as part of a National Science Foundation-sponsored canopy research grant (Fig. 1, attached CD, track 1). Dr. Chandra has transmogrified the numerical data to sounds to create aural patterns from which novel patterns may be discerned. This has resulted in a publication (Chandra & Nadkarni 2002, Appendix 1) and presentations at ecology and computer music professional meetings.

### ***2. Trees and Spirituality in Places of Worship***

I developed a novel way to create awareness and a sense of stewardship for trees and forests that involves my speaking to people in places of worship and meditation. Although some church-goers are interested and aware of environmental issues, the religious world is not a typical outlet for environmental scientists. However, people who come to church or synagogue or a temple are in a receptive mode – they make time, dress carefully, sit quietly, and have open hearts and minds in that time and place to consider spiritual matters, matters of their spirit and of truth. It struck me that churches would be a good venue to explore links between the ecological values of trees and their spiritual values to evoke a stronger sense of conservation.

I first simply attended and listened to a wide range of places of worship in the Pacific Northwest. After a few months, I approached the clergy or rabbi and offered to give a sermon or lead a discussion group on trees and spirituality. The congregations I spoke to ranged from the fundamentalist to the progressive, including Unitarian Universalist groups (Fig. 2), Zen Buddhist temples (Fig. 3), Jewish synagogues, Catholic churches, and interfaith organizations. I presented the sermons not as a scholar of religious studies nor as a particularly religious person myself. Rather, I portrayed myself both as a scientist interested in understanding trees with my intellect, and as a person who cares deeply and passionately about trees with my heart.

I started my sermons with an explanation that my own affinity for trees began when I was a child, which developed into making a career of studying and communicating about trees. I then articulated

some of the relationships between trees and spirituality, both in a general sense for many different religions, and then focusing on the connections that have the strongest bearings on that particular faith. I described the importance of trees, grouping these into ecological, economic, aesthetic, and spiritual values, with an emphasis on the spiritual. Finally, I discussed actions that we might take as a result of heightened awareness, and opened up the subject for discussion.

For Christian-based churches, I focused on how the holy scriptures of the Judeo-Christian tradition reflect the attitude of followers of that faith on trees. I downloaded the text of the Bible and searched for all references to “tree” and “forest”. I categorized the 328 references into six groups (Fig. 4). More than 50% of the references described the use of trees for symbolic, aesthetic, and practical purposes. It is clear that trees are not only inextricably tied into human needs—for food, shade, wood, rituals, ornamentation—but are at the base of what is most spiritual. As the Bible and other holy writings amply demonstrate, trees are symbols—analogs to god, and to that which is holy—and are used to help humans understand what is basic about life. In places of worship for other religions, I discussed that trees are linked closely to a number of spiritual concepts: enlightenment, breathing, silence and stillness, time and dynamics of life, and the hidden spheres within each of us.

I ended my sermons with a call to the congregation to remember these links to spirituality when they encounter trees in any context. I also provided materials and information about specific actions (such as joining a church-related or secular organization that carries out conservation activities). Discussion followed many of these sermons that repeatedly impressed me with the knowledge, fervor, and sense of connection that people have with trees. These discussions also reinforced my general sense that places of worship can be used to communicate aspects of science, particularly the awakening or reinforcement of interest in a biological or ecological topic. Once awakened, content can be provided and actions can be elicited in other venues. But the initial ‘wake up call’ can be well-delivered from the pulpit.

For the future, I intend to continue with these activities, and have a list of invitations at places of worship. I have published these results in an ecological journal, *Environmental Practitioner* (Nadkarni 2002), and am preparing a manuscript for the more general journal, *Orion*. I have also written up these ideas for church newsletters (e.g., *Dharma News*, Seattle, Washington) and am preparing a manuscript for the widely read lay magazine, *Christianity Today*.

### **3. Trees, Sports, and Toys**

Many people in our society are attached to sports, and spend a great deal of time, energy, emotion and money on organized sports. If we can find a direct link between trees and sports, we may be able to emotionally connect a large group of people to forest conservation and to understanding more about trees.

*3.A. Baseball cards:* A rule of the American and National Leagues is that all bats used by professional teams must be made of wood. My students and I developed a set of baseball cards, whereby we mocked up images of famous hard-hitting baseball players with slogans extolling trees and forests, e.g., “*Without trees, I’d be batting zero*”; “*I swing for trees*” (Fig. 5). On the reverse side of the baseball card, we have facts about trees, and a website address that provides information on forest canopies.

We are now pursuing direct contact with baseball players and their agents to gain permission to distribute these commercially. We have made initial contacts with the Seattle Mariners, and are planning to stage a poster giveaway next year. Other related ideas include applying this same tactic with other sports that use wooden implements – cricket, golf, lacrosse.

*3.B. Canopy logo Skateboards:* Skateboards have become a nearly universal source of recreation and transportation among the nation's youth. The skateboard culture supports its own language, slang, clothing, and customs among mainly young men, often in urban settings. Skateboard parks in towns and cities have become increasingly important focal points for youth.

Based on the fact that all skateboard decks are made of wood, I have made the link between skateboards and trees more evident so that these youth will feel a greater affinity and sense of value for forests. One step was to create a "treetop logo" for skateboards - designed by my students - and market that in local and regional outlets (Fig. 6). Another task has been to give informal talks at an after-school program at a local indoor skateboard park in Olympia, Washington. This new facility aims to provide an encouraging place for homework. In our informal presentations, my students emphasize links between trees and boards – discussing the different kinds of wood that exist, and why (physiologically) different woods create different resilience and flexibility. We also distribute pamphlets and information sheets on organizations and websites where they can get more information. There has been strong interest in these topics, as they relate directly to the topic of interest to the users.

*3.C. Treetop Barbie:* Young girls are attracted to dolls that exemplify grownup women, so I developed a "Treetop Barbie" that includes accessories that depict those of a canopy researcher (Fig. 7). These include climbing clothes, harness, crossbow (to shoot lines into the canopy), safety helmet, and vest with field notebook and measuring tape. Included in the ensemble is printed information about the field of forest canopy research and how this area of science needs young girls to join the search for canopy information. The website of the International Canopy Network ([www.evergreen.edu/ican](http://www.evergreen.edu/ican)) is also included so that interested girls and their parents can gain easy access to more information about trees and forest canopies.

#### **4. Canopy Access Tools**

Getting to the forest canopy can be an obstacle that prevents people from appreciating its ecological and aesthetic values. I explored ways in which people could view the canopy environment, directly or indirectly.

*4.1. Canopy Platforms:* In Fall 2001, I designed and constructed safe, inexpensive prototype platforms (4 x 6 ft). These consist of a framework of pipes on which hangs webbing that supports a plywood floor. A set of green canvas "wall pieces" surrounds the perimeter to give novice visitors a sense of containment and safety, and to prevent art and writing materials from rolling off the platform (Fig. 8). These can be hauled into and positioned within the canopy by a single person. They can be temporarily "disabled" by disengaging the webbing on one side to discourage access when we are not present.

To develop strategies for teaching our team how to climb safely and efficiently, and to get an idea of how to approach the presentation of the canopy platform to others, I invited 10-15 art and music students into the canopy to spend time on the platform. Trained climbers who encouraged artistic inspiration and expression accompanied them. We wrote up a sound safety protocol and created worksheets that could be filled out by canopy platform visitors to describe their canopy experience. The 11 students who ascended to the canopy platform produced photography, drawing, music in the platform. One of them (see below) created canopy rap music. Experience from these campus canopy platforms directly led me to the interdisciplinary canopy project sponsored by the National Geographic Society (see below).

*4.2. Canopy Headlamps:* Not all people can get into the canopy, and so I designed a piece of three-dimensional kinetic art to "bring the canopy to the ground-bound". A metal-working art student and I developed a "Canopy HeadLamp", a structure that is worn on the head to simulate being in the canopy. It consists of a bicycle helmet attached to a metal frame that holds panels with images of the

forest canopy. These are derived from photographs snapped in a panorama fashion from the canopy. The entire set of panels can be spun slowly or quickly to give the wearer a sense of the dynamic 3-D images one sees from the canopy perspective (Figs. 9-12). We are currently modifying the current prototype to make it more mobile and are taking sets of photographs from other forest types to provide a variety of images to the wearer. We anticipate showing this in a group show at The Evergreen State College in Fall, 2003.

## **5. *Activities with At-Risk Youth***

Communicating information about wildlands and trees to urban youth is difficult because many have no personal connection or positive experience with this habitat. Figuring out how to link the interests of youth – especially urban youth – with nature, however, is critical if we are to think about conservation in the next generation of humans and of trees.

*5.1. Canopy Rap:* I invited a former undergraduate student to spend time in one of our canopy platforms on campus, urging him to create some rap music. This student, George (“Duke”) Brady, had been in my program, “From Lab to Living Room”, where he displayed his expertise and passion for rap music. Duke learned how to climb from my other students, and spent several afternoons aloft (Fig. 13). He created a free-style (extemporaneous) rap song about the canopy (CD, Tracks 2 & 3). The rap song was dynamic, informative, and ultimately oriented toward forest conservation (Appendix 2). Duke captured the wonder of being in the canopy and provided evocative imagery (he described moss-covered branches as “green cheetohs”). He also related the canopy and its wonder to his passion for rap music, creating riffs on the role of hip hop in today’s culture. His final lines concerned the need to care for the forest (“maybe I’ll live in a tree top, like a hermit I would never burn it or chop it down.”).

Both Duke and I were inspired to follow up this project. First, Duke chose to take four units of forest ecology readings with me as his advisor during the following academic quarter. This was a very different academic track than his other classes, but he was motivated by a desire to learn more about the world he had rapped about. Second, I invited Duke to present his work as an example of canopy outreach activities as part of a keynote talk I delivered at the annual meeting of the Association for Tropical Biology in Panama City, Panama in July, 2002. Duke prepared another rap song, which expressed his feelings about biologists and rainforests, and the need to respect and communicate with each other (CD, Track 3, Appendix 3). Duke delivered this piece of art to over 600 professional tropical biologists who expressed great enthusiasm for his performance and the message he conveyed.

This exercise was among the most successful, as it provided a direct and rapid output from a person with a passion that could incorporate the forest canopy experience and relate it to a segment of the general public that might not be moved by traditional means of communication about the natural world. Duke’s performance in Panama, and the positive reaction of the audience was fundamental in demonstrating to me that my professional colleagues value this type of communication, rather than disdaining it.

*5.2. Canopy graffiti art:* Graffiti art created by urban youth could be a powerful statement about links between humans and the natural environment because of its strong aesthetics, its urban location, and its appeal to urban youth. Inspired by the rap songs created by Duke Brady, a group of Evergreen students created a piece of graffiti that interpreted the forest canopy. The leader of the group (known only as “Pete”) took on the action of painting the canopy with three of his companions. The result was a inspiring combination of urban elements and forest imagery (Fig. 14). The piece was created during an evening dormitory teach-in organized by students in my lab to teach Evergreen students about the forest canopy. It currently hangs in the Administration Building.

## **6. *Legislators Aloft***

A key element of promoting progress in environmental issues is to convince policy- and decision-makers of the importance of nature and its protection. Scientists currently play only minor (but increasing) roles in this process, as there are many obstacles in the direct communication between academics and those involved with creating laws and policies. Scientists are often uncomfortable with having to make definitive statements about a particular phenomenon or issue, or predicting with certainty the outcome of an action, since available data are often not sufficient. Policy-makers frequently become impatient with this attitude, and sometimes feel insecure in trying to grasp technical aspects of issues that go beyond their training and experience.

However, scientists and decision-makers have much to offer each other. I explored this in my academic field by inviting a set of legislators and their aides to and a set of forest canopy researchers and students to the forest canopy. Working with the legislative liaisons of The Nature Conservancy of Washington, I identified 12 state congresspeople and their aides who were willing to visit the canopy. We installed four canopy-level platforms in the old-growth forest of Millersylvania State Park (15 miles from the state capital). I delivered a short talk on the importance of canopy organisms and processes before the climb, after which we taught them how to ascend to the platforms. Much of our treetop discussions centered around issues relevant to pending legislation concerning forests in Washington State, including the Biodiversity Initiative, forest management regulations, and the use of state Trust lands for construction of primary and secondary schools. The event was covered by the local and regional press (Appendix 4).

Our conclusions were that both researchers and legislators were highly receptive to listening to each others' points of view. The immediacy of nature we experienced in the canopy helped to break down the typical barriers that exist between these two factions. Avenues are now more open for mutual consulting when issues arise; the participants have a familiar face to approach when questions come up in either direction. Another positive offshoot of this event was that the park interpreters at the state park have become very interested in forest canopy studies and have invited my students and me to provide scientifically sound materials for summer interpretive talks to park visitors.

### ***7. Canopy camouflage clothing***

The clothes that we wear can reflect and communicate societal values. The display of plants on apparel in our society has mainly been used as "camouflage clothing" by two groups: a) the military and b) people who hunt animals. People who would like to wear botanical clothing often refrain from doing so because of the negative stigma of those two groups. The available clothing is often not botanically correct (e.g., different plant species are mixed), the material is uncomfortable, and only outdoor applications exist.

I have been developing a line of canopy camouflage clothing to both bring images of canopy-dwelling plants into the daily lives of people as well as to actively use the clothing as a means of disseminating scientifically sound information about the plants that are depicted. I have worked with clothing and material designers to create prototype fabric and clothing that could eventually be distributed by a clothing company. I have also contacted distribution companies to see if they are interested in the clothing, and to send them prototype "fact sheets" that would accompany each piece of clothing. For example, one of my designs (Fig. 15) depicts a species of canopy dwelling moss. Its fact sheet includes the scientific and common name; how this plant enhances wildlife habitat, and its roles in the forest ecosystem.

### ***8. Trees, Healing, and Hospitals***

One powerful way that trees can be used and be recognized as worthwhile in our society is their use as an inspiration for healing. After one of my church talks, a medical doctor in the congregation invited me to speak about trees and healing to medical residents at his regional teaching

hospital. I presented examples of how health practitioners can use trees and images of trees to provide hope and inspiration for their patients. For example, cancer patients who face regimes of chemotherapy might be encouraged to learn that trees can sustain tumors (“burls”) for centuries (Fig. 16). Amputee victims might gain heart by knowing that trees lose limbs and adapt to the loss by growing epicormic branches. The death of individual trees creates light gaps for young saplings in the rainforests (Fig. 17). The residents filled out a formal evaluation of this seminar; over 65% of the residents stated that they felt that the talk was “useful or “very useful” to their ability to treat patients.

## **9. *Plants in Prisons***

One of the values that characterize plants is their ability to inspire regeneration and renewal because of their ability to regrow from seeds and plant parts. A segment of our society that clearly needs to be in contact with this theme of the ability to start anew are incarcerated persons. My *Plants in Prisons project* brings plants (in particular, canopy-dwelling mosses) to prisoners to expose them to the recuperative power of plants. The concept is that prisoners could be trained to grow mosses for the horticultural moss trade at the same time they reap the emotional benefits of working with plants.

This project also addresses a pressing environmental issue in the Pacific Northwest, which is the over-exploitation of mosses from wild forests for the commercial floral/horticulture industry. The increasing market for “secondary forest products” such as mushrooms, mosses, lichens, and ferns is putting unsustainable pressure on these plants, especially in old-growth forests. One solution may be to develop the capacity to “farm” these plants, rather than “mine” them from the wild. In Winter, 2001, I began to explore the possibilities of bringing mosses to prisons (starting with those that have existing horticulture programs or greenhouses) and develop protocols to raise large amounts to be sold to regional moss brokers. This would have the multiple benefits of training prisoners in horticulture; reducing some pressure on primary forests; and providing prisoners with daily contact with growing plants.

Canopy-dwelling mosses particularly lend themselves to work with prisoners for several reasons. First, their small body size and lack of root systems allow people to work on them without the use of sharp or potentially dangerous implements. Secondly, because their physiology is adapted to the severe drying cycles encountered in the forest canopy, they are extremely hardy, and can live for many weeks with minimal care. Third, they are emblematic of the flora of the Pacific Northwest, and may help to “place” inmates in their location, which is important in establishing a sense of home and place during and after their period of incarceration. Lastly, because they occur in the canopy, in temperate rainforests, they provide a connection to wild lands and pristine habitats, something that could be an important connector to someone forced to live indoors nearly all the time.

To date, I have worked with two prisons (Purdy Correctional Center, in Gig Harbor, WA, the state’s only women’s prison - minimum to maximum security inmates, and Cedar Creek Penitentiary, in Shelton, WA - minimum and medium security adult men). Administrators at both institutions are receptive to the concept, and the latter has provided eight inmates to participate in a pilot project in conjunction with a long-term civilian volunteer. I have coordinated this effort with Dr. Patricia Muir (botany professor from Oregon State University) who is carrying out academic research on sociological and ecological aspects of the harvesting of secondary forest products. I anticipate that by December 2003, we will work out protocols for a pilot study (choosing species, planting medium, methods of measuring growth rates), and by mid-2004, we will be able to go into production.

## **10. *Branching Out - Combining Canopy Science and Art***

Although traditional academic structures nearly always separate the disciplines of art and science, the two fields hold much in common. Practitioners of both strive to observe, document, and communicate

aspects of the natural world. They work both singly and in groups, and share their work with their peers and others for feedback, modification, and clues into next steps to take. The potential synergism that might be derived from bringing together artists and scientists directly, to explore and discuss the multiple values of the natural world has been not been much explored much by scientists, artists, nor by people interested in the conservation of nature.

In summer 2001, I initiated a project to bring people who focus on aesthetic values to the canopy. This was supported by an initial pilot grant from the Conservation Trust of the National Geographic Society. We installed four of our forest canopy platforms in an old-growth and secondary forest in Washington State. Nineteen visual artists and musicians spent a week at the site, with 3-hr shifts in the canopy. I encouraged them to express what they saw, heard, thought, and felt with their media of choice. The results have been stunning: pastels, acrylics, charcoal images; and oboe, bamboo flute, opera, and classical guitar music that capture the aesthetic values of the forest canopy (Figs. 18, 19, 20, 21; CD Tracks 4-7). The artists in the initial group rapidly recruited a cadre of artists for a second session through their professional contacts and networks.

Products of this project include an art exhibit (“Branching Out: New Eyes in Old-Growth Forests), part of an Art/Science Chautauqua that I organised in April, 2003 at the Evergreen State College. The project also drew attention to the regional press (Appendix 5). In addition, I received a second award from the Conservation Trust to apply this to other ecosystems and with other scientists and artists, a project that will be implemented in 2003-2004.

### **III. COMMUNICATION OF FELLOWSHIP RESULTS**

#### **III. A. Web Communication**

Electronic communication is a new and growing form of communication among the general public. Because of its availability to those with sufficient education and financial resources to have access to the web, and its ability to be responsive and accessible to many people who might not have access to libraries, this is a potentially powerful tool for communication of scientific results to non-scientists.

I was invited to contribute a series of articles to a representative electronic journal, *Grist*, a well-established e-journal for progressive laypeople. Its features include discussions of environmental issues, analysis of social norms, and conversations with prominent conservationists. I was asked to participate one of their features, the *Grist Diary*, in which the contributor provides a daily 1500 word “journal entry” about his/her life for a week in an effort to convey the daily life of people involved in conservation and sustainability efforts. I published my journal, describing various research and outreach project activities (including these Guggenheim projects), a trip to Boston for a global climate change meeting, and decisions to accept corporate funding (Appendix 6).

#### **III. B. Television Programs**

In my original proposal to the Guggenheim Foundation, I had anticipated working with producer/writers of a new television series on forest canopies throughout the process of program development in order to introduce, maintain, and review strong scientific content. I had two possibilities. One was a film that was being pitched to the Natural History Unit of the National Geographic Society; the other was a series that was being explored by the Animal Planet Channel. As I worked further with both of these groups, it became evident that the pressures from the corporate headquarters were demanding that the tone of the films become more sensationalistic (e.g., highlighting and exaggerating the dangers of canopy research (e.g., falling, poisonous snakes) than educational. Despite my efforts to convince the producers that presenting the wonders of canopy life would attract as many viewers as sensationalizing the topic, this attitude prevailed to the point where I

could not in good scientific conscience stretch my credibility, and so I withdrew from these two projects.

I did, however, pursue another educational television opportunity for children, presented by “Dragonfly TV”, which produces half-hour science programs on various topics, with kids as presenters and a faced-paced format. I consulted on content, and they filmed my canopy research activities. This has been aired on PBS on their children series, “Science is Cool”, in which young children serve as the “presenters” of scientists who describe their work in quick-cutting editing style with a background of current music.

### **III.C. Research Communication During the Guggenheim Fellowship**

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## **IV. FUTURE DIRECTIONS FOR FELLOWSHIP ACTIVITIES**

Support from the Guggenheim Fellowship has allowed me to develop professionally in ways that grew naturally from my application and also in ways I did not foresee when I embarked on this Fellowship.

### **IV.A. Follow-up Projects**

In conjunction with my students and some of my colleagues, I am following up on the preliminary work for which the Guggenheim Fellowship provided support. For example, I continue to give talks in places of worship, prisons, hospitals, and skateboard parks. My students and I are actively marketing canopy camouflage clothing to outdoor recreation clothing companies and skateboards with our canopy logo to regional skateboard companies.

We have extended the concepts that germinated during the Guggenheim year to other fields. For example, we are investigating ways to create urban playground equipment in the form of botanically correct trees that are safe for children, cost-effective to install and maintain, and which appeal to urban youth. We have also made preliminary designs and queries to cereal companies to create a cereal box that would highlight forest canopies, and have gotten some positive feedback for this concept from "alternative" major cereal company (Barbara's).

In terms of academics, I continue with my own scientific research in Costa Rica and the Pacific Northwest grant support from the National Science Foundation. I give invited and plenary talks at scientific meetings (e.g., Association for Tropical Biology, Forest Ecology, Ecological Society of America) and publish in scientific journals. My work with public outreach has taught me that keeping an active research program is critical to maintain credibility from scientists and non-scientists.

#### **IV.B. The Research Conservation Ambassador Program**

The most exciting development from the Guggenheim projects has been the development of a new line of academic pursuits for which I am now actively soliciting academic funding. The concepts that emerged from all of the individual projects I describe above have melded into the idea of developing a "Research/Conservation Ambassador Program."

I plan to initiate a pilot program to help establish direct communication links between ecologists and the general public, focusing on those who are not inclined to visit traditional informal science education institutions (Fig. 22). A set of collaborating academic researchers and informal science educators will explore ways by which academic researchers can effectively and creatively disseminate scientific research results to public audiences. My research/education team will recruit 5-10 "Research/Conservation Ambassadors" and train them to speak and write directly to the public. We will work with each Research Ambassador and brainstorm a non-scientist group that would be interested in his/her area of research because it relates to the public audiences's hobbies or trades (Fig. 23). Our team will help the Research Ambassador to generate at least one venue for a public talk and/or workshop to an audience that is related to his/her research subject, and to write at least one lay article destined for a popular publication.

To reduce the "academic overhead" of these efforts, our program will provide an honorarium, a letter of acknowledgment from a high-level academic professional, assistance with graphics and advice on the appropriate level of language, and evaluation tools of these efforts. Throughout the process, we will work with evaluation professionals to do formative and summative assessments of our experts to modify protocols for future Research Ambassadors. This could lead to positive feedback mechanisms for both research and conservation within and outside of academia (Fig. 24).

I have obtained funding from the National Geographic Society (\$20K, 2003-2004) for a pilot version of this project, and have a larger grant pending with the National Science Foundation's Informal Science Education Program. The program officers are interested in documenting the obstacles that academics face when trying to communicate science to the general public, and are eager to see successful examples. If funded, I will be able to train a small cadre of other scientists besides myself in other fields of science besides canopy studies, and test the idea that researchers can become effective communicators and advocates of science and nature in our society.

## **V. SUMMARY**

The support of the John Simon Guggenheim Foundation has been profoundly learningful in the short- and long-term. It has positively affected my research and professional career in ways that I did not foresee at the outset. The activities I was able to explore, nearly all of which went beyond traditional academic limits, were ones that I would not otherwise have investigated, and which led to new ways of thinking and “being” an academic.

The financial support provided, though important, was not as critical as the prestige and “stamp of academic approval” conferred with the Fellowship. “Having a Guggenheim” clearly opened doors and minds. I believe that many of the non-conventional pathways I was able to forge – e.g., talking in churches, hospitals, and prisons – was possible because I presented myself as a Guggenheim Fellow, rather than a professor on academic leave.

The non-traditional pathways and the modes in which they developed have also had a strong influence on the students with whom I have worked. I maintain an active Canopy Research Lab, and many of my students are supported by work-study funds or volunteer. Prior to the Guggenheim year, they had observed me carrying out traditional academic tasks; teaching, doing ecological research, and sitting on college committees. This year, however, they witnessed me carrying out such activities as learning to skateboard, reading the Bible and Koran, carrying on endless conversations with prison administrators, and learning how to bolt together canopy platforms. This has helped them to see that academia can be a flexible and multi-faceted place to engage one’s professional life, which is especially important at their stage of development (upper level undergraduate), when they are making decisions about what they want to do in their lives.

In conclusion, I am extremely grateful for the opportunity that the John Simon Guggenheim Foundation provided. I will hold the experiences it supported as being valuable for the rest of my professional life.

## **VI. BUDGET SUMMARY**

The total amount of the Guggenheim Fellowship was \$36,000, which was paid in two installments (October 2001, January 2002). This was used as replacement salary for my taking a Leave Without Pay from the Evergreen State College for the Fall and Winter Quarter, 2001-2002. The amount was nearly equivalent to 85% of my salary for that period.