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Investing in Natural Capital

A Financial Assessment of Social Forestry in Northern India

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This study quantifies the tangible, economic benefits of a nongovernmental organization's social forestry project to local people and analyzes the potential return from this investment in natural capital. The analysis was conducted in the Kumaun hill region of Uttaranchal, India, using participatory rapid appraisal, household survey, avoided cost method, and present value investment analysis. The annual value (based on the ecosystem service of goods provision) of the forest resource to local people was estimated at 903,337 rupees, and the total return on 8 years of investment through 2021 was projected to be 883%. Quantitative and qualitative results show that social forestry is a solid investment in natural and human capital. Overall, this study serves as one example of how ecosystem service valuation can be employed to achieve conservation and development goals.

Keywords: *ecosystem services; resource valuation; social forestry; India; poverty alleviation; avoided cost; return on investment*

Many rural people throughout the developing world depend on forests for their livelihoods (Hunn, 1999). For the estimated tens of millions of people worldwide who depend on forests as a dominant source of subsistence and cash income, the degradation and destruction of these natural resources will often lead to community impoverishment (Angelsen & Wunder, 2003; Byron & Arnold, 1997). To counteract these trends, nongovernmental organizations (NGOs) and government agencies from around the world have funded and implemented various social forestry projects to restore and conserve forests as a way to alleviate poverty. Social forestry, at the broadest level, is generally distinguished from conventional forestry

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by its sensitivity to local socioeconomic needs and conditions, decentralized activity, and prioritization of equitable distribution of benefits to local people (Shah, 1988).

Social forestry projects that fund and sustain reforestation efforts are effectively "investing in the natural capital" of the local communities that rely on the forest. Although there is no financial return in a market sense, there may be huge gains to the communities in terms of value created. Forests are generally perceived as having significant value for people who depend on ecosystem services to subsist—yet these supposed values often go unmeasured by the largely urban-based market economy. Ecosystem services are "the conditions and processes through which ecosystems, and the species that make them up, sustain and fulfill human life" (Daily, 1997, p. 3). There are four broad types of these services: (a) provision of goods (e.g., timber), (b) life-sustaining processes (e.g., air purification), (c) life-fulfilling processes (e.g., aesthetic value), and (d) conservation of options (e.g., a forest's potential for providing medicines that are yet to be discovered; Daily et al., 2000). These services are undoubtedly essential to humanity's survival, yet their inherent value has often been overlooked.

During the past few years, however, the recognition and use of ecosystem service valuation has begun to attract increasing global attention. *The Economist* ("Are You Being Served," 2005) featured ecosystem services in a cover story that noted, "The valuation of ecosystem services is not without its difficulties. Nevertheless, the fact that there is a growing consensus about how and where it is appropriate is an important step forward for economists and environmentalists" (p. 78).

In development settings where the quality of people's basic livelihoods is often linked directly to the health of a natural resource, ecosystem service valuation offers a unique opportunity for collaboration among practitioners engaged in development, philanthropy, and conservation. This case study stands at the intersection of current trends in each of these three fields. From the development perspective, there is growing international interest in the potential of forests to alleviate poverty (Angelsen & Wunder, 2003). There is also mounting pressure for philanthropic organizations to find ways to measure and quantify the social impacts of their grants and projects (Emerson, Wachowicz, & Chun, 1999). Finally, there is an increasing urgency within the conservation community to discover and develop new ways to protect and invest in natural systems through an ecosystem services framework (Daily, 1997; Millenium Ecosystem Assessment, 2005). By demonstrating one method of how ecosystem service valuation can be used to assess the social and environmental returns of development projects, the current study has applications for academics and practitioners from all three communities.

About the Study

Given the potentially significant value forests represent to rural people throughout the developing world, there is a critical need to (a) explicitly value ecosystem

services in development settings and (b) incorporate these values into development planning and funding. This case study seeks to fulfill both of these challenges by evaluating one NGO's social forestry projects in northern India.

Central Himalayan Rural Action Group's Social Forestry Program

The Central Himalayan Rural Action Group (CHIRAG) has promoted social forestry projects in the Kumaun hill region of northern India since 1989. CHIRAG is a grassroots rural development NGO based in the Nainital district of Uttaranchal, India. The organization has been operating in the area since 1986 with the goal of improving the quality of life of villagers of the region (especially women and the poorer sections) and making them more self-reliant. CHIRAG began its social forestry projects in the Naukuchiatal area in 1989. The majority of people living in the villages in this area depend directly on the forest for their livelihood. The forest resource is essential for fodder and fuelwood collection, for agricultural productivity, and for vital ecological services such as water purification and soil retention.

The Forest Department's timber extraction practices during the British colonial era involved large-scale extraction of the regional forests. By the end of the colonial era in the 1950s, the local forests had become significantly degraded, and forest cover was reduced significantly. The shrunken resource base was not sufficient for local needs; and, for the next three decades, local extraction for fuelwood and fodder decimated the forest areas that remained. When CHIRAG began operations in the late 1980s, most of the nearby hillsides were extensively denuded of trees and dominated by the invasive shrub species *Lantana camara*. Although local communities continued to depend on the forest goods, women were often forced to walk long distances to collect fuelwood or fodder or collect from *Lantana* shrub brambles that were much more time-consuming to gather.

Throughout the duration of the social forestry program, CHIRAG has worked with nine villages in the Naukuchiatal area. The longest running project—located in Thapalia Mehra Gaon—began in 1989. In this village, a major aspect of the social forestry project, and the focus of the current study, is where the villagers actively participated in raising seedlings, planting, and protecting the communally owned village forest "plantation."[1] For 8 years throughout the lifetime of the project (1989-2001), CHIRAG offered financial incentives to the women of households to raise seedlings on their own land. A typical participating household would raise between 1,000 and 2,000 seedlings and then would aid in the transplanting of the seedlings to the growing plantation. In 1993, after the first few years of planting had proven to be successful, the *Van Suraksha Samiti* (forest protection committee) was founded. At the time the data in the current study were gathered, there were six women and three men on the committee. The gender ratios of the committee are purposefully skewed toward women because women in this area are the household members who are most responsible for all chores related to the forest. Three villagers were also

selected and employed to serve as *chaukidar* (forest guards) to protect the growing forest. The villagers of Thapalia Mehra Gaon all agree to obey certain rules about access to the plantation; however, if rules are broken, then the *chaukidar* mete out financial punishments. The two most important rules in the plantation are that villagers do not graze their animals or remove any leaves/branches/wood (except for the invasive species *Lantana*) from the area. Ultimately, the *Van Suraksha Samiti* and the CHIRAG field workers will decide when to open the plantation area for harvest. At the time the current study was conducted, the *Van Suraksha Samiti* and the CHIRAG field workers had agreed to open up areas of the plantation when the trees in each area were approximately 15 years old, to ensure that they were mature enough to withstand local harvesting patterns.

Purpose of Study

CHIRAG's collaborative efforts with the villagers of Thapalia Mehra Gaon have improved the local forest resource by successfully fostering an approximate 5-km^2 area of healthy village forest. The range of ecosystem services and goods provided by this new area represent potentially significant economic benefits to the villagers. The current study aims to specifically quantify and analyze the returns on this investment in natural capital.

The specific purpose of the current study was twofold: (a) to quantify the tangible, economic benefits of the forest resource to the villagers of Thapalia Mehra Gaon and (b) to forecast the projected returns of CHIRAG's investment in natural capital. Although the scale of the current study was limited to one village and one broad type of ecosystem service, the methods and outcomes can be applied to the larger region. On a more global level, the current study also has implications for NGOs, multilateral lending institutions, and governments that are seeking to create economic value for forest-dependent people by investing in the environment.

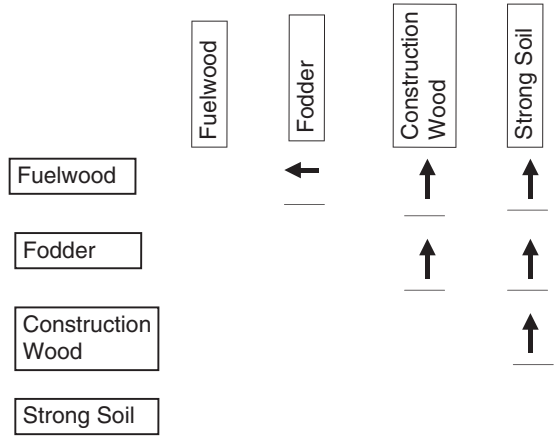
Method

The primary methods used to collect data on tangible forest benefits were participatory rapid appraisal (PRA) and household surveys. When the data were collected, the methods used to quantify benefits and analyze projected benefits as an investment return were the avoided cost method and present value analysis, respectively.

PRA: The Forest Benefits Scoring and Ranking Matrix

The PRA activity was used in an attempt to overcome the bias of an academic "outsider"—a major challenge the author faced in conducting a subsistence-level

Figure 1
Sample Hypothetical Forest Benefits Scoring and Ranking Exercise



valuation. It was important for the author to ascertain the values of the villagers, rather than assume or infer the values based on personal experience in a nonsubsistence economy. To ascertain what the villagers of Thapalia Mehra Gaon perceived the values of the forest to be, a scoring and ranking matrix was used. The aim of this PRA exercise was for participants to rank two sets of identical cards by comparing the items on each card one by one and then deciding which was the more important within each pair. In the hypothetical example provided in Figure 1, each arrow points to the item that "won" in each comparison (i.e., construction wood is more important than fodder, but less important than strong soil). The ranking list that would result from this sample activity would be #1 strong soil (with 3 votes), #2 construction wood (with 2 votes), #3 fuelwood (with 1 vote), and #4 fodder (with 0 votes).

In the current study, the participants were given two sets of cards with 10 to 15 forest benefits written in Hindi and illustrated for participants who were unable to read. The original set of cards was created based on the author's observations of which forest goods were used and casual discussions with villagers about which life-sustaining processes they most often associated with the forest. In addition, participants were asked at the beginning of the activity if they would like to add any new forest benefits that were not already depicted on the original cards. If any participants wanted to add additional benefits, the facilitator wrote and drew the new benefits on blank cards and then added them to the matrix exercise. The results of the

PRA activities were used to clarify which benefits the local people valued, which in turn informed the creation of a household survey.

Household Survey

The household survey was designed and implemented to ascertain the quantity, type, and significance of goods and services the forest was providing to the villagers. The survey also asked about alternative goods that would be used if the forest resource were no longer available, and the spiritual and social values that the local people assoicated with the CHIRAG projects and the forest resource itself. Participant observation (i.e., the author's experience living in various households in Thapalia Mehra Gaon and helping with women's chores) was used to frame the questions and the content in the survey design. In total, 34 household surveys were conducted in Hindi and Kumaoni (the local dialect) with the female heads of each household. The 34 households were selected from the pool of those participating in the social forestry program by raising seedlings on their land. Women were targeted specifically because the chores of fetching fuelwood and fodder are almost exclusively performed by women in this region.

Avoided Cost Method

Valuation of forest goods was based on the avoided cost method. Subsistence-level goods collected from the forest are usually considered "free," in that no market price is paid for them. To value these goods, the price of alternative substitute goods was examined. For each forest good, an alternative "market-based" good was identified, and that good's price was used to stand as a proxy for the value of the forest good. The premise for this valuation is that if the forest goods were not available, a villager would be forced to buy an alternative to maintain equivalent levels of consumption.[2] The price of that alternative is the cost that a villager avoids by having the forest good, and thus the inferred "value" of the forest good.

From the household surveys, the forest goods used and levels of consumption were recorded. In addition, respondents were asked which (if any) alternative market-based goods they would use to replace each of the forest goods they were currently using. Throughout the survey, there was generally a consensus over which market alternative would be used. Table 1 depicts the alternative market goods and the conversion calculations that were used to calculate the value of the forest goods.

After the data from the 34 household surveys were collected, each forest good was converted into its equivalent market good. For all forest goods in the survey, an alternative market good was identified and prices calculated for a time period of 1 year. The sum of all avoided costs was totaled to equal the annual total value of forest goods to the 34 households in the current survey. These results were then scaled upward to represent the entire village (106 households). The author verified

Table 1
Market-Based Goods Used as Proxies for Value of Forest Goods

Forest Good	Market Alternative	Conversion Calculation
Fodder (*chara patti*)	Store-bought fodder (*bhusa*)	# of animals x (% of current diet is *chara patti* × weekly store-bought fodder consumption per animal) × # of weeks per year *chara patti* is collected Cow, bull, horse = 70 kg/week; buffalo = 105 kg/week; calves = 35 kg/week Example: 2 cows × (.50 [% of diet is *chara patti*] × 70 [kg/wk]) × 16 weeks = 560 kg of store-bought fodder
Fuelwood (cooking)	Liquid petroleum gas (LPG)	# of months firewood is used for cooking × 1 cylinder per month per household of six members
Fuelwood (heating)	Coal or electric heating	Coal: # of weeks fuelwood is used for heating × 4 weeks per month × 7 kg of coal used per week Electric heating: # of months fuelwood is burned = # of months of electric bill
Construction wood	Store-bought wood	A "medium-sized house" refers to the wood required for two doors and frames plus four windows and frames.
Khad	Urea and di-ammonium phosphate (DAP)	# of *nali* × (1 additional kg of DAP and .5 additional kg of urea) (where 1 *nali* = ~202 m^2 of agricultural field)
Rope (made from bhimal wood)	Store-bought rope	1 m of bhimal rope = 1 m of store-bought rope
Ashes	Vim™ soap	(# of people in household) × 4 bars per year

that the sample was sufficiently representative (and thus, suitable for scaling) with a CHIRAG development associate who had extensive experience visiting or working with all households in the village.

Present Value Analysis

The basic parameter for the investment analysis in the current study was the present value of the future village forests that CHIRAG and the villagers were creating through the social forestry program. The future value of forest goods (F) that local people will receive from the village forest resource is related to the present value (PV) in the following formula:

$$PV = (F) / ((1 + r)^t),$$

where r is the discount rate and t is the time period of the investment (i.e., how many years the local people must wait before they can harvest the planted trees). The magnitude of the discount rate was selected to reflect the time preferences and opportunity costs of the "investors." The social forestry project in Thapalia Mehra Gaon was funded by the National Wastelands Development Board (NWDB), the National Afforestation and Eco-Development Board (NAEB), the Berkeley Reforestation Trust (BRT), and the Methodist Development Relief Fund (MDRF). These government programs and private foundations faced an opportunity cost of not investing in another public sector project. Lal (1992) used a 5% discount rate when he estimated the capitalized annual value of India's entire forest stock because 5% was the interest rate on savings accounts in national banks. Thus, a discount rate of 5% was selected for the current study.

Present value (PV) and net present value (i.e., present value minus the initial implementation costs or $PV - C$) were used to calculate gross returns and the return on investment (ROI). For the current study, the ROI is defined as

$$\text{ROI} = (PV - C) / C$$

where PV is the discounted value of the future amount of forest goods and C is the implementation cost of the social forestry project. It is important to note that this ROI does not represent the investment's internal rate of return (IRR) or a standard annual return on investment as would be typically used in financial reporting. The ROI in the current study is best described as the net PV of the investment return in terms of a percentage of the initial investment.

Each planting year was treated as a separate investment. The total costs C (which includes administrative costs, seeds, financial incentives for participating households, and project support equipment) for each planting year are referred to as the "initial investment." Returns were analyzed through 2021 (i.e., 20 years from the original gathering of data in 2001). Demand may change during this period because of population or income growth; however, the changes are unlikely to be large in only one generation. In addition, the marginal amount of fuelwood and fodder that a 25- or 30-year-old tree (vs. a 20-year-old tree) would produce is not large enough to suggest that returns after the 20-year point are significant enough to consider in the analysis. Returns for the 8 investment (i.e., planting) years are thus projected out to the year 2021. Each of the eight ROIs is distinct because each began with a different monetary amount invested, and each investment will have a different age in 2021. For simplicity in reporting, however, it was necessary to calculate what the total return on all eight investments would be. The total return was calculated by applying the same ROI formula to the sum of the initial amounts invested and the sum of the net PVs from each of the 8 years of investment.

Table 2
Participatory Rapid Appraisal (PRA)
Results: Forest Good Scoring and/or Ranking Exercise

Name of Good, Service, or Benefit (Hindi)	Name of Good, Service, or Benefit (English)	PRA Session #1		PRA Session #2	
		Tallies	Ranking	Tallies	Ranking
Pani srotr	Water springs	11	1st	12	3rd
Acchi hawa	Good air	10	2nd	10	4th
Pahar mazboot; Acchi Mitti	Strong hills; good soil	9	3rd	13	2nd
Lakri makaan banane ke lieh	Construction wood	8	4th	14	1st
Chara (khane ke lieh)	Fodder	6	6th	8	6th
Samay bachat	Saving time	6	6th	9	5th
Lakri Eedhan	Fuelwood	5	8th	6	9th
Phal aur sabji	Fruits and vegetables	5	8th	NA	NA
Jangal janwar & cheeriyae	Forest animals and birds	3	9th	3	13th
Dawai	Medicine	2	10th	5	11th
Khad	Fertilizer (organic)	1	11th	4	11th
Chara patti (bichane ke lieh)	Leaves for animal bedding	0	12th	7	8th
Masala	Spices	NA	NA	7	8th
Kafee	Coffee	NA	NA	3	13th
Kagaz	Paper	NA	NA	2	15th
Rang	Color	NA	NA	2	15th

Note: The NA entries refer to forest goods or benefits that were added to the original set of cards by the participants in one session, but not the other.

Results and Discussion

PRA

In both PRA activities that were conducted, the three "life-sustaining processes" services (as opposed to the various "goods provision" services) placed in the top four spots of the participants' ranked list. Refer to Table 2 for a complete list of the PRA results from both sessions.

Respondents insisted that provision of water, air, and soil were the most important forest benefits because they were the basis for the production of all other forest goods, and they could not be bought in the market for any price. In effect, they were the most essential for life itself. The significance of these exercises lies not so much in the exact ranking order but in the overall trend. Even though the collection of fodder and fuelwood is often a daily reality for the villagers, they value other ecosystems services before the provision of key ecosystem goods. The results demonstrate the strong and intuitive connection that the villagers have with their local forest. This

Table 3
Calculating Annual Value of Forest Goods at Village Level

	Number of Households in Survey Sample	Total Forest Good Value for Sample (Rupees/Year)	Average Forest Good Value (Rupees/Year/ Household)	Number of Households in Village	Total Forest Good Value for Village (Rupees/Year)
High forest dependence	29	282,605	9,745	91	886,795
Low forest dependence	5	5,515	1,103	15	16,545
Total	34	288,120	10,848	106	903,340

Note: A household classified as "high forest dependence" if the per capita avoided annual cost was more than 500 rupees or the respondents reported collecting goods from the forest for 2 or more months a year.

outcome also suggests that incorporating valuation of other types of ecosystem services (beyond provision of goods) into development planning in the area may be a way to justify even more funding for social forestry programs in the future.

Valuation and Investment Results

Valuation of forest goods. Using the survey results and the conversion calculations shown in Table 1, the annual value of the forest for each of the 34 households was calculated. These calculations were then summed to equal the estimated value of the forest for the survey sample (288,120 rupees). The estimates for the households were then separated into subsamples of high forest dependence and low forest dependence. This separation was necessary to account for the fact that some households relied much less on the forest than others because they had a smaller number of farm animals or had wage earners who were employed in town. The average value of the forest goods for each subsample was then used to calculate the value at the village level. (Refer to Table 3 for the supporting data.) The annual value of the forest resource to the entire village of approximately 600 individuals in 106 households, based solely on the provision of forest goods, was estimated at 903,337 rupees or 9 *lakh*, approximately US$18,000 in 2002 dollars.

This total village-level value roughly equates to a value of approximately $180 per household per year. Considering that a typical household from the poorer sector of this village is financially supported by a day laborer's earnings of approximately $350 per year, the estimated value of the forest is clearly significant. The forest provides each village household with the equivalent value of more than one half of a poor household's annual earnings through the ecosystem services involved in goods provision.

Quantitative returns of social forestry projects. Each of the ROIs from the 8 investment years is shown in Table 4. The results, with one exception, show that each investment has a positive projected return.

Table 4
Summary of Projected Investment Returns in 2021

Year of Investment (i.e., Planting Year)	Age of Investment in 2021	Initial Investment (in Rupees)	Net Present Value (*PV* - *C*)	Individual ROI in 2021
1989	32	229,555	6,337,766	2761%
1990	31	210,731	–210,731	–100%
1991	30	343,870	5,950,939	1731%
1992	29	242,658	5,868,492	2418%
1993	28	290,988	5,659,654	1945%
1999	22	967,606	2,986,447	309%
2000	21	664,156	2,938,790	442%
2001	20	680,972	2,522,051	370%
Total overall investments		3,630,536	32,053,408	883%

Note: The Net Present Value (NPV) figure is equivalent to the sum of the discounted future returns through 2021 minus the Initial Investment of that year. For example, in 1993 the NPV is 1,972,456 rupees (i.e., the present value of the projected returns in 2021 associated with the initial investment in 1993) minus the initial investment (290,988 rupees).

Although it might seem intuitive that the projected return should increase with the age of the investment, this trend does not generally hold in the current study because of the variability of species planted and survival rates among planting years. In 1990, the plantation area was destroyed by fire so the ROI is –100%. Even with the inclusion of the one aberrant year, CHIRAG's overall "portfolio" of investments represented by the 8 years of planting was forecasted to have a solidly positive projected return. The total return on all eight investments through 2021 is projected to be 883%. This result—along with the individual returns of each separate investment—show that the CHIRAG social forestry projects are, on a purely financial level, a good investment in the natural capital of this one village forest.

Qualitative values of village forest. Although the current study focused on the quantifiable, tangible benefits of the forest resource, the forest does yield other significant advantages to the local people in the form of life-fulfilling processes and other social benefits. Thus, CHIRAG's social forestry projects, in addition to their role as an investment in natural capital, are also an investment in human capital. Table 5 summarizes the important social, religious, and cultural values associated with CHIRAG's projects and the forest resource itself.

Limitations of Valuation Process

When using any proxy in a valuation study such as this, there will always be limitations or shortcomings that are important to highlight when considering the validity of the ultimate results. In this case, there are thoughtful arguments to both sides of

Table 5
Nonquantifiable Benefits From Social Forestry Projects

	List of Associated Values	Example
Social values	Income generation and employment; environmental education; benefits to women: empowerment, increased respect and status, improved forest work conditions	Households that participate in the project by raising trees on their land are rewarded with a financial incentive. This extra income is controlled by the woman and is crucial to households' ability to cover extra expenses such as schoolbooks for children.
Religious values	Use of forest goods in *puja*, cremation, and in ownership of cows	The local people (100% Hindu) rely on forest fodder and products to own cows—a sacred animal in the Hindu religion—and give them a nutritious diet.
Cultural values	Livelihood (agricultural productivity and animal husbandry), inspiration for traditional songs, indigenous knowledge of medicinal plants	Elder women refer to the forest as *meht*—a special term used when a young man or woman gets married and leaves his or her childhood home. This perception of the forest as a *meht* suggests a very intimate, familial connection.

the discussion of whether the figure of 9 lakh represents a lower or upper bound. The estimate could be a lower bound in the sense that the figure does not include the value of the ecosystem services beyond goods provision. The villagers also associate other religious, social, and cultural values (i.e., "life-fulfilling" ecosystem services) with the forest that cannot be quantified and, thus, are not included in this valuation. Furthermore, the estimate does not consider the potential "implicit" avoided costs that arise when a household switches to a market good (e.g., the long-term negative impact of using inorganic fertilizers in place of organic ones).

On the other hand, this valuation does not take into account the potential implicit benefits from switching to a market good. For example, when women use liquid petroleum gas (LPG) cylinders and cook stoves instead of gathering fuelwood, they can gain up to 3 extra hours a day that they might spend in what they consider a more valuable way (e.g., earning income for the household). Another more philosophical contention is that using a market good price is unfair because a fluctuation in the price of the market good (due to other market drivers) should not change the inherent value of the forest good. Finally, there is the contention that the avoided cost method that uses market goods at an equivalent level of consumption is not "realistic" because if the forest resource really were to disappear, villagers would likely reduce their consumption of a higher priced good. (See endnote 2 for additional discussion on this point and author's motivation for using this method.)

The author readily acknowledges the limitations and controversies posed by the use of avoided cost method in the current study. However, in the author's view a more

concerning alternative to the rough approximation presented here is a scenario under which these subsistence-level values are never incorporated into land-use or development planning decisions. Although the use of substitute goods is appropriate for this valuation study, in development practice one often weighs the much larger costs associated with substitute lives (H. Hummel, personal communication, February 16, 2005). In this case study, most of the respondents do not actually possess the financial resources to replace nonmarket forest goods with market substitutes—a fact that raises the stakes significantly for the development practitioners in the area and the villagers themselves. Under a scenario in which the forest resource continues to degrade (which it most likely will without CHIRAG's interventions), the vast majority of the population will leave the rural hill areas for more urban areas—thereby running the risk of substituting their current life for that of poor urban migrants.[3]

Conclusion

The current study has shown the economic benefits and investment returns rendered from the CHIRAG social forestry projects, thereby supporting these projects as worthy of future investment. To further increase the support for these types of projects, the returns on these programs could be compared to returns from other donor-funded programs at CHIRAG (e.g., women's empowerment groups, income generation, agricultural diversification) to further justify the allocation and prioritization of philanthropic funds. The current study has been used by CHIRAG as additional testimony to its financial supporters of the great value created through the social forestry program. Investments in CHIRAG social forestry programs are funds that appear to be legitimately invested by government and private international donors who interested in positive returns on their investment in natural capital. In the years since the current study was completed, CHIRAG has also expanded the program to new village areas in the larger region.

The results of this case study also contribute to larger research trends at the intersections of development, philanthropy, and conservation circles, particularly those multisector groups already engaged in or considering pursuing social forestry programs. The ideas and methods presented here offer one way for development practitioners to evaluate and justify the funding they receive to invest in the communities where they work. The results also offer guidance to international philanthropic bodies that are seeking to maximize the effectiveness and social return of their grants for social forestry and related work. Finally, this case study provides the conservation community with one example for how ecosystem service valuation can open the door to additional funding and partnerships for the conservation and restoration of vital ecosystems. Although conservation and development have historically been ostensibly competing interests, the growing popularity of ecosystem service valuation is quickly creating new spaces for collaboration. The social forestry program evaluated here serves as one small example for how conservationists could work with the

development community to restore and protect an ecosystem because of the immense value it creates for the people and the environment.

Notes

1. It is important to note that although the Central Himalayan Rural Action Group (CHIRAG) refers to the area as a "plantation," the restored area is not a site for farm forestry. CHIRAG carefully chooses which species to plant to meet the needs and desires of the villagers and to create a robust village forest ecosystem. Over the 9 planting years in Thapalia Mehra Gaon, between 20 and 40 tree species (native and introduced) have been planted in varying proportions in the plantation area. CHIRAG's decision to reforest the area with native and nonnative species reflects the goal of investing in natural capital such that the investment directly improves the livelihood of the local communities. The majority of all species were selected for their capacity to provide fuelwood and fodder—one ecosystem service that is highly valued by the local people.

2. It is important to clarify the fundamental premise of this application of the avoided cost method because it highlights the difference between the current study and a more typical economic analysis of environmental valuations in development settings. For example, Köhlin and Amacher (2005) found significant positive welfare impacts stemming from a community forest plantation in Orissa—-a project which was partially implemented by the Swedish Development Agency—-using production function methods. Production functions incorporate an entire demand curve and account for what some may argue is the more realistic assumption that, when forced to replace a public good with a private good, some consumers may actually reduce their levels of consumption. The premise of the valuation in the current study is more normative in the sense that it incorporates only a single point of the demand curve equivalent to a certain level of consumption. In other words, the study constrains the valuation to reflect a situation in which the villagers do not reduce their consumption because a typical aim of development programs is an improvement in the welfare of a community. The author concedes that, in the actual event that villagers were suddenly unable to access the forest resource, they might not have the economic means to replace their consumption of forest goods entirely with market goods and would likely reduce their level of consumption to match their economic means. However, the intent of the current study was to interpret the value from the investor's perspective. The author believes that the government and private philanthropic groups that invested in this project would be interested in considering the value as inferred from a hypothetical equivalent level of consumption/lifestyle rather than the value as inferred from a more realistic, but effectively "forced" lower level of consumption/lifestyle.

3. The historical experience of other villages in the region over the past two decades has borne out this reality of the forced substitution of lives when faced with the lack of a local forest resource. Villages where the local forest became totally degraded experienced high rates of migration to urban areas where their ultimate economic fate is largely unknown. Although some may have improved their socioeconomic status, others may have not. Ironically, 15 or 20 years after the abandonment of the villages and protected by their isolation from human impact, the local forests have begun to naturally regenerate (R. Thadani, personal communication, March 30, 2002). Although from a purely ecological perspective these anecdotes might be viewed as ultimately successful outcomes for the forest, from a more interdisciplinary and holistic view this may not always be a positive development outcome, especially for the communities forced to leave their cultural homelands.

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