



Pergamon

www.elsevier.com/locate/worlddev

World Development Vol. xx, No. x, pp. xxx-xxx, 2002

© 2002 Published by Elsevier Science Ltd.

Printed in Great Britain

0305-750X/02/\$ - see front matter

PII: S0305-750X(02)00178-X

Grassroots to Grassroots: Why Forest Preservation was Rapid at Loma Alta, Ecuador

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Summary. — What social arrangements stop deforestation? This paper chronicles the sociological factors underlying the rapid establishment, in 14 months, of a community-owned protected forest in Ecuador. Methods developed by the International Forestry Resources and Institutions (IFRI) research program provide a stakeholder analysis related to trends in deforestation. Interviews, community meetings, and informal discussions provide data on attitudes of local people during and after establishment of the forest preserve. Knowledge and resources external to the community motivated local people to preserve a cloud forest, but local institutions and communal land tenure were critical for the rapid establishment of the protected area.

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Key words — ICDP, forest conservation, sustainable development, Latin America, poverty

1. INTRODUCTION

Decentralization and conservation policies are changing the face of rural development in the tropics (Larson, 2002; Pinkerton, 1992). Now more than ever, nongovernment organizations (NGOs) are becoming involved in conservation and development at the village level (Atack, 1999). Integrated conservation and development projects (ICDPs) merge conservation of natural resources with local development in less-developed countries. ICDP organizations may be regional, national, or international, small or large, but they all tend to confront rural communities with new incentives ranging from educating girls to ecotourism (Smith & Ward, 2000; Wood, 1999). Reducing the rate of deforestation, especially in tropical areas, is a major goal of many ICDP organizations, especially those concerned with the loss of biodiversity. Because there is no one-size-fits-all approach to ending the tropical deforestation process (Bhattarai & Hammig, 2000), case studies that successfully integrate forest conservation with rural land use in tropical communities continue to provide empirical guidance for conservationists, rural developers and policy makers.

This study explores the socio-cultural and institutional relationships among two US-based nonprofit ICDP organizations and local stakeholders in forest conservation at Loma

Alta, a watershed owned by a community of rural families in western Ecuador. I attempt to explain why, at this particular location and social setting in Latin America, a protected area was established in only 14 months. The case study comprises an introduction to ICDP setting at Loma Alta, a brief description of data collection methods, an overview of the social processes that lead to making a communally owned protected forest, ICDP progress, and results of two surveys conducted in Loma Alta and a nearby community. The surveys provided a sample of opinions about, and participation in forest conservation facilitated by an NGO external to the community. The paper ends with a summary of the key factors leading to the successful establishment of the Loma Alta

* I thank the community of Loma Alta and the Ministry of the Environment of Ecuador for permission to study and participate in forest conservation at Loma Alta. Earthwatch Institute has provided the bulk of funding for this effort via volunteer participation in the Ecuador Cloud Forest program. I thank PAN directors and Earthwatch volunteers for conducting the first survey, and Ana Agreda and Celso Tomala for completing the second. Mike Katzer compiled data from the first survey. Linda Richter, Elinor Ostrom, Mark Hollingsworth, Paul Thornburg, and many anonymous reviewers offered constructive advice and editorial improvements on the manuscript. Final revision accepted: 26 September 2002.

66 Ecological Reserve and what may be required
67 to sustain the protected area.

2. METHODS

(a) *Loma Alta, Ecuador: an attractive site for an ICDP*

71 Rural communities in coastal Ecuador have
72 been managing watersheds for several millennia
73 (McEwan, 1989). In the early 1900s, descen-
74 dents of Manta Indians moved inland from
75 coastal areas to farm and claim watersheds
76 draining the western slopes of the Colonche
77 Cordillera (Figure 1). These extended family
78 groups planted a variety of crops and devised
79 norms of land allocation that were and still are
80 adaptive to the microhabitats on the slopes of
81 the watershed. Lowlands were and still are used
82 for settlements. Valley bottoms are now used
83 for irrigating fruit and vegetable crops to meet
84 the high demand for these items in Guayaquil,
85 Ecuador's major port. Lowland dry forest has
86 been almost completely destroyed by charcoal
87 making, overgrazing, and firewood collection.
88 In contrast, forested highlands remain lightly
89 inhabited, and have been used for harvesting
90 timber and game, and for growing Panama hat
91 fiber (Becker, field notes). In 1936, Ecuador

92 passed the Law of the *Comunas* making tradi-
93 tional tenure arrangements of rural peasant
94 communities legal. Currently, about 3,000
95 people live in and share legal property rights to
96 Loma Alta, a 6,842 ha watershed containing
97 the headwaters of the Valdivia River (Figure 2).

98 In 1994, People Allied for Nature (PAN), a
99 small (annual budget < \$30,000, no full-time
100 employees) NGO based in the United States,
101 formed to protect wildlife in tropical forests of
102 Ecuador. A professional botanist in Guayaquil
103 introduced PAN's four co-directors to com-
104 munity leaders in Loma Alta. At this time, the
105 author was a PAN co-director and a scientist
106 with Earthwatch Institute,¹ another US non-
107 profit organization funding research and field-
108 ing volunteers for ICDPs around the world. In
109 1995, Hilgert and Andrade (1995) published
110 maps showing that very few patches of mature
111 moist forest remained in the Colonche Hills,
112 and that Loma Alta had one of the largest
113 patches, over 1,000 ha. Conservation Interna-
114 tional had completed a rapid assessment of
115 biodiversity in forest fragments in the Colonche
116 Hills (Parker & Carr, 1992), and the Nature
117 Conservancy had been funding efforts to re-
118 store dry forest in the area. The Tumbesian
119 region of southwestern Ecuador, in which the
120 Colonche Hills are located, had just been
121 identified as a center of "endemism" for bird

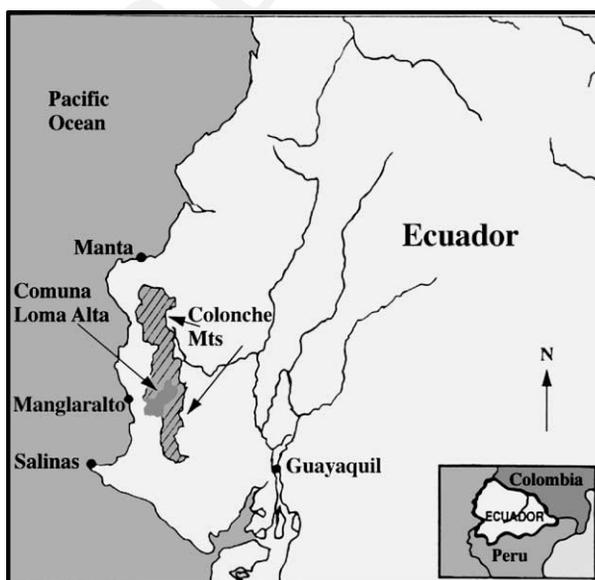


Figure 1. Map of western Ecuador showing the Colonche Hills and location of the Loma Alta watershed. Note that the highland forests of the watershed receive fog from the Pacific Ocean.

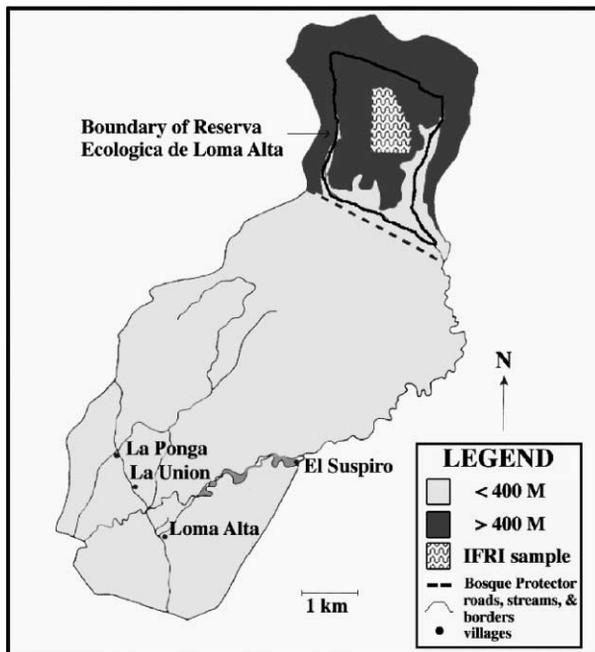


Figure 2. Map of the Loma Alta watershed showing location of settlements, boundaries of the community's forest reserve, elevation, and the boundary of nationally designated protective forest. Loma Alta's southern boundary borders the Valdivia river (Rio California on some maps).

122 species (Best, 1992; Best & Kessler, 1995).
 123 Thus, in June of 1995, when PAN began its
 124 ICDP effort, conservationists had identified the
 125 coastal moist forests as threatened areas with
 126 important biodiversity. Local communities in
 127 the Colonche Hills were just beginning to in-
 128 teract with organizations implementing ICDPs.
 129 It was in this social setting, that only 14 months
 130 later in August of 1996, the community of
 131 Loma Alta established its ecological reserve.

132 Loma Alta has three fundamental preconditions
 133 for sustainable natural resource manage-
 134 ment. They have secure property rights
 135 favoring a long-term outlook toward common
 136 property (McKean, 1996; Schlager & Ostrom,
 137 1993). Second, they share a long history of local
 138 decision-making about land allocation (Brom-
 139 ley *et al.*, 1992; Ostrom, 1990), and thus have
 140 the capacity to make rules to regulate forest
 141 exploitation. Third, forest resources have eco-
 142 nomic value, so incentives exist for individual
 143 stakeholders to make rules that manage forest
 144 resources in a sustainable manner (Gibson &
 145 Becker, 2000).

146 To determine if people-forest relationships
 147 and local governance of natural resources in
 148 Loma Alta were sustainable, PAN collaborated

with the International Forestry Resources and
 Institutions (IFRI) research program, based at
 Indiana University (Ostrom, 1998). IFRI was/is
 attempting to explain deforestation at the mi-
 cro-level around the world by using standard-
 ized methods to collect data on a common set
 of biophysical, socioeconomic, and institu-
 tional variables relating forests and forest user
 groups (Gibson, McKean, & Ostrom, 2000).
 After discussing the aims of the study and the
 goals of PAN at several village meetings, vil-
 lagers came to a consensus that they would
 participate in the IFRI study, and embark on
 an institutional relationship with PAN.

(b) Surveys about local knowledge and attitudes

To learn more about local attitudes about
 forest conservation and PAN, two studies were
 conducted after the communal forest reserve
 had been established. The first study employed
 a simple questionnaire (see Appendix A) de-
 signed to compare knowledge and attitudes of
 people at Loma Alta to people at Rio Blanco, a
 similar community that had not been influ-
 enced by ICDP activities. During July and
 August 1997, interviews were conducted at El

174 Suspiro, a settlement of 60 households in the
175 Loma Alta watershed where most of the local
176 forest users lived. Rio Blanco was a smaller
177 settlement of 28 households using highland
178 forest in a watershed about 20 km north of
179 Loma Alta. Earthwatch teams interviewed all
180 available adult decision-makers by visiting all
181 of the households in each community.

182 A second survey was completed in December
183 1999 at Loma Alta, more than three years after
184 the forest reserve was officially established, demar-
185 cated, and under patrol by village guards.
186 Although the community council maintained
187 written records of their agreements with PAN,
188 it was not clear how local citizens felt about the
189 relationship with the foreign NGO or whether
190 people knew the new reserve's rules very well
191 and abided by them. The second survey tried to
192 answer the following questions:

(i) To what extent are local community mem-
bers familiar with the rules for forest use estab-
lished via agreements between the community
and PAN?

(ii) Given that all villagers lived in the low-
lands, and many, especially women, rarely vis-
ited the highland forest, did individuals know
the real size of the reserve and exactly where
the reserve was located?

(iii) What role did local people expect PAN to
take in making rules for the reserve?

(iv) Did the extent of participation in PAN
projects make people more knowledgeable
about wildlife and forest ecology?

(v) Did the extent of participation in PAN pro-
jects more positive toward outsiders?

209 As a variable, participation was measured
210 according to the extent to which individuals
211 attended PAN workshops, attended village
212 meetings focused on reserve management, and/
213 or helped with demarcation and guarding of the
214 reserve.

215 Adult villagers were randomly selected from
216 numbered houses in four settlements in the
217 Loma Alta watershed. A peer who had received
218 training in conducting the surveys interviewed
219 them. Participation in the survey was voluntary.

3. RESULTS AND APPLICATION OF IFRI STUDY

222 At Loma Alta, robust micro-institutions,
223 secure land tenure, and economic value for
224 forest resources were not sufficient to cause
225 villagers to design rules to sustain their high-
226 land forest (details in Gibson & Becker, 2000).

227 Instead, the 1,650 ha of highland moist forest
228 were steadily being cleared and degraded by
229 customary land allocation practices and the
230 community's inability to defend their property
231 from an aggressive ranching family. As of 1995,
232 ranchers had destroyed about 200 ha through
233 conversion.

234 Land allocation in the highlands was democ-
235 ratic and egalitarian. Plot sizes were restricted
236 to 10–30 ha, creating a patchwork of forest and
237 crops. Deforestation and fragmentation were
238 increasing as young families were being allo-
239 cated land in the highland forest commons
240 (details in Gibson & Becker, 2000). Each family
241 typically clears between three and 10 ha for
242 crops. Eventually, fragmentation and total loss
243 of forest habitat would lead to an extirpation of
244 local forest wildlife (Lovejoy *et al.*, 1986). There
245 were also no rules constraining hunting by
246 community members, although people did say
247 that game animals were used more when fam-
248 ilies lacked money to buy meat. Individuals
249 were unanimously opposed to market hunting
250 by anyone.

(a) Stakeholder analysis

252 In addition to determining current sustain-
253 ability of forest relationships at Loma Alta, the
254 IFRI data contributed to a stakeholder analysis
255 by:

(i) Identifying people, groups, and institutions
that would influence PAN's ICDP initiative (ei-
ther positively or negatively).

(ii) Anticipating the kind of influence, positive
or negative, these groups would have on PAN's
ICDP goals.

(iii) Helping PAN develop strategies to get the
most effective support possible and to reduce
obstacles to successful implementation of a
protected area for wildlife in the Colonche Hills
of Loma Alta.

267 Rules for forest protection had not been
268 crafted partially due to conflicting needs of
269 forest stakeholders (Gibson & Becker, 2000)
270 and the fact that they did not perceive a value
271 for indirect ecosystem services or option values
272 provided by the forest (Becker, 1999). One
273 major stakeholder, Panama hat fiber growers,
274 replaced patches of forest with a sustainable
275 crop. They obtained use rights to a forest par-
276 cel, cleared 1–5 ha, and planted Panama hat
277 fiber, *Carludovica palmata*, locally called *paja*
278 *toquilla*. They aimed to expand their fields and
279 would not promote rules restricting forest
280 clearing for their crop. In contrast, woodcut-

281 ters, as a second stakeholder group, had an
282 incentive to protect large blocks of forest, but
283 did not make a strong case for controlling ac-
284 tivities on parcels because timber harvesting
285 was no longer very profitable. Most of the
286 primary forest trees had been harvested during
287 the 1960s and 1970s.

288 The most important stakeholders, from a
289 strategic point of view for conservation and
290 development, were not even aware of their
291 linkage with the highland forest. Most families
292 in Loma Alta make a living by irrigating crops
293 in the lowlands. The water they use is partially
294 derived from fog captured by the highland
295 forest. While fog capture was physically obvi-
296 ous to researchers working in the highlands,
297 people living in the lowlands did not under-
298 stand this ecosystem service (Becker, 1999). No
299 one, including the scientists, knew the quantity
300 of fog and mist intercepted by highland vege-
301 tation during the six-month *garúa* season until
302 Earthwatch teams and villagers collected data
303 on this phenomenon (Becker, 1996).

304 There was also an illegal user group (stake-
305 holder) invading the community forest. About
306 600 ha of mature forest remained in remote
307 parts of the community owned watershed be-
308 cause few people wanted to travel more than
309 three hours from home to cultivate hat fiber or
310 cut timber. With little human presence, nearly
311 one-third of the forest commons was in the
312 process of being converted to pasture by
313 ranchers from Manabi, a more Mestizo, less
314 indigenous, ethnic group. Although leaders and
315 members of Loma Alta had obtained military
316 assistance to evict ranchers from their property,
317 the ranchers returned.

(b) *From stakeholder analysis to ICDP strategy*

319 By identifying forest user groups, IFRI re-
320 sults helped PAN to predict the impacts that
321 forest conservation would have on each stake-
322 holder and what sort of support for forest
323 protection they might get from each group.
324 Panama hat fiber growers would have to be
325 convinced not to expand their fields in the
326 highlands.² Woodcutters would need to be
327 convinced to regulate or stop timber harvests in
328 the highlands, and ranchers would need to re-
329 spect community property rights and leave. A
330 conservation strategy for PAN became clear. If
331 and when lowland farmers, the majority of the
332 community, made the connection between the
333 distant forests and their water supply they

might become a persuasive majority in support 334
of forest preservation. 335

336 As members of a legally recognized commu-
337 nity and owners of a watershed, farmers,
338 woodcutters, and fiber growers all negotiate
339 land use on their shared property. Individuals
340 express their concerns, desires, opinions, and
341 proposals at monthly community meetings.
342 Men and women over 18 years old, who have
343 paid a small annual fee to be a community
344 member, elect a five-member council of leaders
345 annually. The President and other council
346 members represent the community to external
347 organizations, negotiate contracts with outside
348 institutions, and listen to and resolve problems
349 within the community.

350 Early in 1996, PAN began an urgent cam-
351 paign to convince farmers that a forest reserve
352 would help secure water resources in the low-
353 lands. Measurements of fog capture (Becker,
354 1999) indicated that in the 1996 fog season
355 (June–November), the community lost an av-
356 erage of two million L of water per hectare
357 wherever forest was converted to pasture on
358 windward slopes above 500 m. PAN hired an
359 Ecuadorian environmental educator to work in
360 the community coordinating an adult Ecology
361 Club where this information was conveyed and
362 the benefits of a protected area were discussed.

363 During June to August 1996, PAN and
364 Earthwatch research teams presented data, a
365 video about fog capture, and a map detailing
366 an appropriate size and location for a forest
367 reserve to protect water resources at commu-
368 nity meetings. After six special meetings, con-
369 sensus was derived through rigorous debate
370 (for more detail see Becker, 1996, 1999). At
371 the end of August, 1996, the voting adults of Loma
372 Alta unanimously declared about, 1,000 ha in
373 the highlands (450–800 m) as the *Reserva*
374 *Ecológica de Loma Alta* (Figure 2). The whole
375 process had only taken 14 months from concept
376 to consensus.

(c) *Institutional co-evolution during the early
ICDP phase*

379 The first normative change the community
380 decided upon was that common property in the
381 highlands would not be further divided and
382 that use on allocated plots would be held con-
383 stant or reduced. Families losing use rights
384 were few (three) and were headed by the young
385 men intending to harvest trees. They readily
386 accepted the offer to work as guards for the new
387 reserve instead of cutting trees.

Table 1. *Chronology and types of PAN projects completed in the Comuna of Loma Alta after the establishment of the Loma Alta Ecological Reserve*

Date	Project	Type
September 1996	Salaries for four reserve guards	Conservation
September 1996	Pan matches funds raised by parents to hire additional teacher in a village	Development
December 1996	Two week forest guard/guide course	Conservation
June 1996	Tagua Jewelry Training	Development
January 1997	Teacher and Remedial Education	Development
March 1997	Salaries for four reserve guards	Conservation
April 1997	Conflict resolution with ranchers	Integrated
April 1997	Electricity for La Ponga School	Development
1998	Reforestation	Integrated
1999–2001	Maintain teachers and guards	Integrated

388 With the foundation of the ecological reserve, collaborative management of the refuge
 389 by PAN and the community became a reality.
 390 Shared management was made official by a
 391 written document called the Agreement of
 392 Mutual Help. According to this document, a
 393 conservation benefit valued by PAN was to be
 394 accompanied or followed by a development
 395 benefit desired by the community. As shown in
 396 Table 1, this “tit-for-tat” arrangement lead to
 397 village-level improvements (development), for-
 398 est protection and reforestation (conservation),
 399 and employment and training related to forest
 400 protection and tourism (integrated conserva-
 401 tion and development).
 402

403 Initially, community leaders favored social
 404 projects and expressed little interest in conser-
 405 vation projects (unless they involved direct
 406 payments for work, such as planting trees).
 407 This attitude had been cultivated during rela-
 408 tionships with large donors who paid locals to
 409 plant trees in the arid lowlands. Community
 410 leaders were adept at getting PAN to commit to
 411 long-lasting community development projects
 412 in exchange for minor efforts at forest conser-
 413 vation (with the exception of planting trees for
 414 which they were paid). A review of resolutions
 415 and annual reports from 1994 to 99 indicate
 416 that PAN’s activities and aims diverged from
 417 wildlife conservation, becoming more oriented
 418 toward capacity building (training) and com-
 419 munity development (Table 2). For example,
 420 PAN provided funds for one village teacher in
 421 1996, three teachers in 1997, and five as of
 422 November 1999 to augment the government
 423 teaching staff in the schools.

424 With time, requests the community made of
 425 PAN became more sensitive to conservation.
 426 Early in the relationship, villagers requested
 427 funds for the Saint’s Day Fiesta, a large party
 428 featuring a band and substantial quantities of

Table 2. *Responses to the question: are highland forests important?*

Response	% Rio Blanco (n = 18)	% El Suspiro (n = 32)
No	5.6	0
Yes, lumber	11.0	0
Yes, food	5.6	3.1
Yes, protection	0	6.3
Yes, farming	61.1	31.3
Yes, water	5.6	41.0
Yes, beauty	0	15.6
Other	11.0	3.1

If yes, what is the main reason?

429 food and drink. After three years working with
 430 PAN, villagers requested a workshop to make
 431 value-added crafts from forest products: Pan-
 432 ama hat fiber and vegetable ivory. Several
 433 community members stated “these activities
 434 will reduce the need to expand fields and save
 435 the forest.”

436 By inviting ranchers and leaders of Loma
 437 Alta to a conflict resolution meeting in
 438 Guayaquil, PAN ended clearing for pasture in
 439 the highlands. The president of PAN, a lawyer,
 440 explained to the ranchers that they were
 441 breaking the law by invading the highlands
 442 owned by Loma Alta. The ranchers were also
 443 made aware that their activities reduced the
 444 water available in Loma Alta, and that they
 445 might be asked to pay for the value of the lost
 446 water (~\$128,000 at 1996 values). When it was
 447 also made clear that PAN and the community
 448 planned to train guards to patrol the communal
 449 boundaries of the reserve, the ranchers agreed
 450 to leave the highlands (and did). One rancher
 451 justified his presence stating, “I thought no one
 452 was using the land.”

453 Today, PAN continues to pay for reserve
 454 guards. These men generate and sustain en-

455 thusiasm for the reserve in lowlanders who
456 rarely see the forest, its orchids, monkeys and
457 birds. One guard bragged, "...we are special in
458 Loma Alta...we are the only community with
459 such a wonderful forest."

4. RESULTS OF SURVEYS

461 Half the households in El Suspiro ($n = 32$)
462 and 64% of the households ($n = 18$) in Rio
463 Blanco were represented in the first survey.
464 Although 95% of the respondents said they
465 valued highland forests and used the highlands
466 for similar reasons, people from Rio Blanco
467 gave more utilitarian reasons for valuing the
468 forest than villagers from El Suspiro (Table 2,
469 $P < 0.05$). Compared with the diverse set of
470 values for forests given by people from El Su-
471 spiro, respondents from Rio Blanco had a
472 narrower set. The majority said the forests were
473 most important for farming. Respondents from
474 El Suspiro emphasized the importance of eco-
475 system services, specifically water conservation,
476 more so than respondents from Rio Blanco
477 (Table 2; Chi-square = 15.9, d.f. = 1, $P <$
478 0.05). While no one from Rio Blanco indicated
479 that beauty was the most important aspect of
480 the forest, five respondents from El Suspiro did
481 ($P < 0.05$), showing that they had aesthetic
482 appreciation or "existence value" (Pearce &
483 Moran, 1995) for the forest.

484 Respondents from both communities com-
485 piled similar lists of local wildlife suggesting
486 that traditional knowledge and awareness
487 about the biological diversity in the forest was
488 the same. Snakes and big cats were most fre-
489 quently listed as species the villagers wished
490 were less abundant, because they were danger-
491 ous to people and killed domestic fowl. Some
492 respondents also desired fewer monkeys, par-
493rots, squirrels, raccoons, and skunks because
494 they damaged crops. The majority of respon-
495 dents wished that deer, rabbits, wild pigs, and
496 forest rodents, the favorite local game meat
497 sources, were all more abundant. Thus, despite
498 environmental education aimed at generating
499 existence value for wildlife, utilitarian values
500 about wildlife prevailed in both communities.

501 Although, Earthwatch research teams, PAN
502 leaders, and environmental educators had spent
503 two years describing the concept of ecotou-
504 rism³ and using the term around villagers at
505 Loma Alta, only four respondents from El
506 Suspiro recalled the term and could adequately
507 explain the concept. These four either worked

as research assistants on Earthwatch projects or
508 were married to someone who worked as a re-
509 search assistant. No one in Rio Blanco was
510 familiar with the term or the concept. Despite
511 their lack of definitional capacity with "eco-
512 tourism," 63% of the respondents from El Su-
513 spiro were in support of promoting it at Loma
514 Alta. In contrast, only three respondents from
515 Rio Blanco (16%) were in support of having
516 outsiders visit their forests. 517

(a) *Local knowledge, attitudes, and perceptions about the Loma Alta Ecological Reserve*

520 Sixty-one household decision-makers (10
521 women, 51 men) completed the second survey
522 aimed at determining opinion and knowledge
523 about the Loma Alta Ecological Reserve. Just
524 under half (49%) came from El Suspiro, the
525 settlement with the most users of the highland
526 forest. The remainder represented the lowland
527 settlements of Loma Alta, La Ponga and La
528 Union where people had more interest in irri-
529 gation and market crops.

530 All respondents knew when the reserve was
531 established (August 1996) and where the re-
532 serve was located (highlands), but only 42%
533 knew its correct size. One person said it was an
534 order of magnitude larger, but the majority,
535 57%, thought the reserve was an order of
536 magnitude smaller (100 ha rather than 1,000
537 ha). Proximity to the reserve did not influence
538 knowledge of the reserve's correct size (Chi-
539 square 2.26, d.f. = 2, $P = 0.32$), but participa-
540 tion in demarcation of the reserve did. Of the
541 30 respondents who had helped demarcate the
542 reserve, 76% of them knew its correct size,
543 whereas only 10% of non-participants knew the
544 reserve's true size (Chi-square = 27.3, d.f. = 2,
545 $P < 0.001$).

546 In reply to two open-ended questions about
547 the purpose of the reserve, 57% of the respon-
548 dents emphasized preservation of biodiversity,
549 38% listed ecosystem services (water and soil
550 conservation), and the remaining three re-
551 spondents listed, tourism, science, and defense
552 of property rights. When asked to rank the
553 most important benefits of the reserve, the
554 majority (65% of the respondents) indicated
555 that water conservation, employment, and land
556 security were all equally important and de-
557 serving of "first place." Water conservation
558 was ranked uniquely as the most important
559 benefit by 28% of respondents. Employment
560 and land security were ranked as uniquely first
561 by less than 5% of the respondents.

(b) *Local knowledge about new rules in the reserve*

564 Hunting wildlife and cutting trees are not
565 permitted in the reserve and this information is
566 posted at all major entry points to the reserve.
567 Other restrictions are known by forest guards
568 and are listed in management documents kept
569 at the community office. Local knowledge of
570 rules was evaluated by asking respondents to
571 indicate if nine activities were either "permitted"
572 or "not permitted" in the forest reserve.
573 Thus, a perfect score was 9. Respondents averaged
574 6 correct answers ± 2 , equivalent to
575 knowing about 70% of the rules.

576 The fact that hunting was not allowed was
577 the best-known rule. Only four of 61 respondents
578 claimed that hunting of wildlife was
579 permitted. But, when presented with "hunt
580 butterflies" as a choice, 12 people said this activity
581 was permitted, showing a lack of consistency
582 in interpretation of the general rule
583 forbidding hunting of wildlife. Seven respondents
584 stated that the harvesting of trees was
585 permitted, although it is not.

586 A multiple regression of six factors likely to
587 influence knowledge of rules (Table 3) show that
588 a person's age, attendance at PAN workshops,
589 or time spent on PAN projects were not significant.
590 Family size and participation in establishing
591 the reserve were negatively correlated
592 with knowledge of rules (Table 3). The only
593 significant positive correlation with knowledge
594 of rules was the number of visits to the reserve
595 ($P = 0.02$). Still, the six-factor model explained
596 41.2% of the variation in knowledge about rules
597 (ANOVA, d.f. = 6, 52, $F = 6$, $P < 0.0001$).

(c) *Local attitudes toward rules and collaborative management of the reserve*

600 All of the respondents stated that they supported
601 having rules of use in the reserve, but

Table 3. Multiple regression to determine which variables had predictive value for variation in knowledge of rules pertaining to activities in the Loma Alta Ecological Reserve

Dependent variables	Coefficient	T-value	P-value
Workshop participation	0.149	1.02	0.31
Contribution score	-0.248	-1.4	0.16
Age	0.034	1.45	0.15
Family size	-0.193	-2.4	0.02
Visits to reserve	0.140	2.4	0.02
Establishment score	-0.518	-3.4	0.00

Analysis of variance d.f. = 6, 52; $F = 6.1$, $P < 0.0001$.

the concept of who made the rules varied. One person said they did not know who made the rules, 49% said that the President of the community made the rules, 40.6% said the community made the rules, and 8.4% said that PAN made the rules. Respondents from the three lowland communities, closest to where community meetings take place and to where the president lives, were more likely to say that the president made the rules. In contrast, respondents from the more remote village of El Suspiro were more likely to say that the community and/or PAN made the rules. Of the respondents from El Suspiro, 67% said the community and/or PAN made the rules, compared with 42% of respondents living near the seat of local government (Chi-square = 6.7, d.f. = 3, $P = 0.08$).

Seven respondents (11%) stated that they were initially opposed to making the reserve. By the time a vote was taken on the issue, four of these had decided to support the reserve. Only 38% of the respondents voted "for" the reserve at a community meeting (many respondents had not been at the meeting). Distance from the voting center did not influence participation in that particular vote (Chi-square, $P < 0.79$), nor did attitude (for or against) towards forming the reserve ($P < 0.77$).

A surprising result was that many villagers who participated in demarcation of the reserve were not in support of making the reserve (Figure 3). While 52% of respondents favored making a reserve, only a quarter of this group joined the effort to demarcate the reserve. In contrast 41% of respondents were ambivalent or opposed to the reserve, and 80% of this group helped mark the boundaries of the reserve (Chi-square = 17.3, d.f. = 3, $P < 0.001$).

When asked who should manage the reserve, the majority (62%) supported collaborative management by the community and PAN. One person said that only PAN should manage the reserve, while 37% said only the *Comuna* should manage the reserve. Those who viewed the president of the *Comuna* as the rule maker showed less support for collaborative management than people who viewed rule making as a community effort (Chi-square = 41.2, d.f. = 6, $P < 0.01$; Figure 4).

5. DISCUSSION

The Loma Alta Ecological Reserve protects a subspecies of mantled howling monkey (*Alou-*

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GRASSROOTS TO GRASSROOTS

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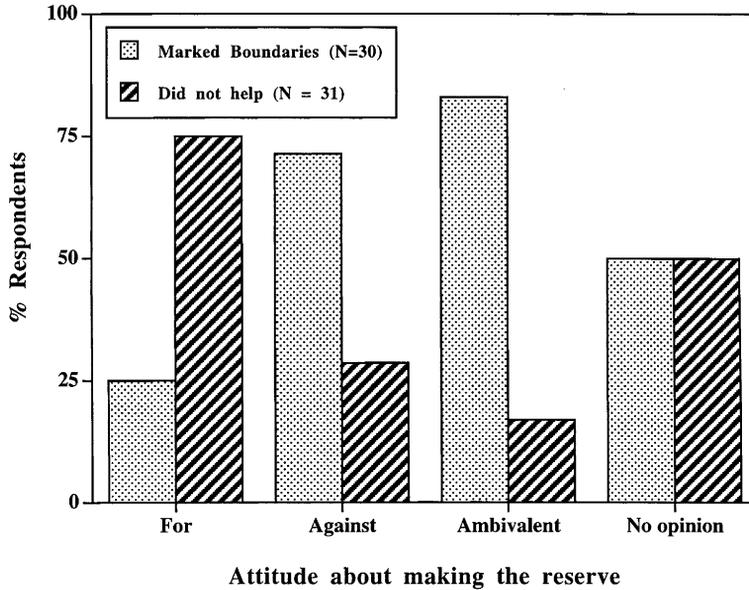


Figure 3. Community members participating in demarcation were more opposed to the reserve than respondents who did not help mark boundaries of the reserve ($\chi^2 = 17.3$, $d.f. = 3$, $P < 0.01$).

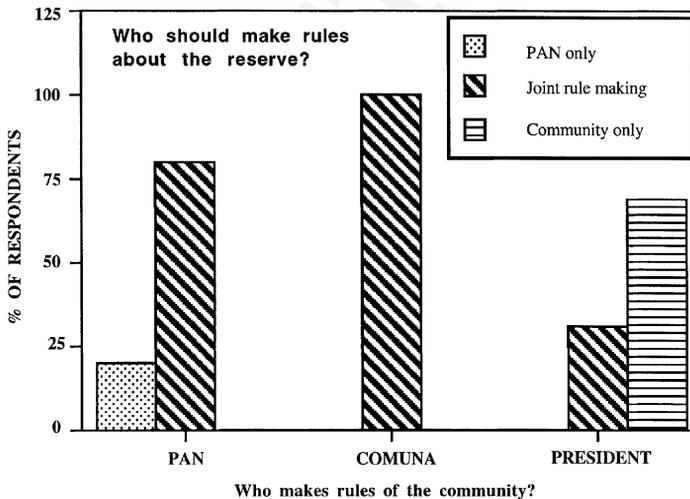


Figure 4. Respondents who stated that the communal president was the main rule maker ($N = 29$) were more likely to support community management of the reserve, exclusive of PAN rather than collaborative management. Respondents who viewed the community (themselves) as rule makers ($N = 28$) were more supportive of collaborative management ($\chi^2 = 41.2$, $d.f. = 6$, $P < 0.01$).

655 *atta palliata*) and at least 14 other species of
 656 mammals, and over 200 bird species, including
 657 12 species of conservation concern (Becker &
 658 Lopez Lanus, 1997). During dry seasons in the
 659 reserve, *Psychotria* shrubs bloom and attract
 660 thousands of hummingbirds representing some

25 different species, including endangered Little
 and Esmeralda's Woodstars (*Chaetocercus*
bombus & *C. berlepschi*). Most importantly, for
 local farmers, the highland forest traps millions
 of gallons of fog each year providing wells and

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666 rivers in the arid lowlands with water year
667 round.

668 While there are many potential discussion
669 points, I focus on the following: why the reserve
670 established so quickly, the effect of external
671 organizations on local institutions, the people
672 most involved in marking the reserve bound-
673 aries, why participation in PAN educational
674 projects failed to improve knowledge about
675 rules of use in the reserve, and lessons ICDP
676 professionals provided by this case.

(a) *Why was the reserve established so quickly?*

678 Larson (2002) states that three key factors
679 are needed for local governments to be good
680 resource managers: capacity, incentive, and
681 long-term commitment. Loma Alta's town
682 council was strong on long-term commitment
683 and capacity but lacked sufficient incentive. In
684 this case, an external organization and new
685 information was required to create incentives
686 and justify forest preservation.

687 Loma Alta's system of self-governance was a
688 key element in establishing the community
689 forest reserve. Without a local institution rep-
690 resenting the community, and without a col-
691 lective tradition of decision-making, consensus
692 and support for a forest reserve from the many
693 different families and forest users would have
694 been difficult to achieve. Collectivism stands
695 out as a major cultural reason that the reserve
696 was established so quickly.

697 Individual opposition to the reserve was
698 predictable from an economic standpoint as it
699 threatened perceived future benefits. Those
700 who had the most to gain financially and di-
701 rectly by destroying the forest, Panama hat fi-
702 ber growers, were the most opposed. In an
703 individualistic culture, such as the United
704 States, "victims" with individual losses would
705 not only slow decision-making for the common
706 good, they might be compassionately sup-
707 ported in their quest for compensation. In a
708 collective culture, individual benefits are not a
709 justifiable reason for sacrificing the common
710 good (Gudykunst, 2000). At Loma Alta, com-
711 munity members quickly convinced hat fiber
712 growers to do what was customary in many
713 indigenous cultures: do what is best for the
714 good of the group (Kluckhohn & Strodtbeck,
715 1961).

716 Evaluation of opportunity costs may also
717 have played a role in favoring forest protection
718 over continued allocation and open access.
719 Timber value of the forest was low, the cost

effective areas for plantations of Panama hat 720
fiber were in use, and an outside organization 721
was willing to pay for forest preservation in- 722
cluding ridding the community of invading 723
ranchers and finding employment for new 724
families requesting plots. Collaborative man- 725
agement promised to solve the land security 726
problem with ranchers that had plagued the 727
community for decades. 728

Villagers we spoke with during the IFRI 729
study in 1995 did not understand the term 730
"protective" as defined by the 1981 Law of 731
Forests establishing "protective forests" 732
through out Ecuador. This term refers to the 733
fact that forest cover sustains the ecological 734
integrity of watersheds by reducing soil erosion 735
and by maintaining water quality and quantity. 736
Given the history of boundary disputes, it is 737
understandable that many villagers thought 738
"protective" referred to protecting their tenure 739
rights. In fact, when the three men intending to 740
harvest trees in the remote commons were 741
asked to be guards, one said, "Fine, that is a 742
good way to protect our land and I would like 743
to do that for the community." 744

According to Hofstede and Bond (1984), se- 745
curity is a value that is strongly shared by in- 746
dividual and collective cultures. Community 747
and PAN members valued tenure security so 748
using their institutions to assure Loma Alta's 749
property rights seemed like the right thing to 750
do. In addition, members of the individualistic, 751
goal-oriented culture representing PAN and 752
Earthwatch derived great satisfaction from ac- 753
complishing goals. This cultural synergism can 754
be viewed as another factor favoring rapid 755
success. 756

(b) *The value of small scale ICDPs for local
community institutions*

Although some indigenous peoples have 759
norms that conserve and enhance tropical for- 760
ests (Becker & Leon, 2000; Chernala, 1989), 761
many of these ecologically sensitive cultural 762
systems have been severely eroded by national 763
and international development policies (Barb- 764
osa, 1996; Pinkerton, 1981). According to Ed- 765
wards (1999), making a difference to livelihoods 766
and capacities of local people depends on fos- 767
tering autonomous grassroots institutions, and 768
on linking them with markets and political 769
structures at higher levels. Participation by 770
PAN and Earthwatch at community meetings 771
reinforced local and traditional institutions 772
where informed consent maintains local control 773

774 over land use in a communally-owned water- 827
 775 shed (McIntosh, 1999). Currently, leaders at 828
 776 Loma Alta negotiate with outside research and 829
 777 tour groups wanting to study and visit their 830
 778 reserve. Local service providers enjoy addi- 831
 779 tional income by providing visitors with food, 832
 780 transportation and guidance during visits to the 833
 781 forest. As of June 2002, however, Loma Alta 834
 782 still had no consistent entrance fee, nor had
 783 they posted any rules beyond those at bound-
 784 aries of the reserve.

785 Establishment of the protected area was fast,
 786 but sustaining it will take time, and whether the
 787 community will ever be able to steward the
 788 reserve without external funding is question-
 789 able. Currently, between \$6,000 and \$16,000
 790 per year has been spent maintaining the reserve
 791 and doing community development. These
 792 costs are low given the number of endemic and
 793 endangered species in the reserve, and the
 794 amount of money spent by nongrassroots de-
 795 velopment organizations.

796 In 2001, Ecuador shifted from Sucre to US
 797 dollars and this led to a collapse in the local
 798 market for Panama hat fiber. In 2002, March
 799 floods destroyed vegetable market crops. Out
 800 of desperation, these events made nature tour-
 801 ism more attractive to local leaders and com-
 802 munity members. Coastal tourism is being
 803 emphasized in regional development plans, so
 804 the community imagines a role for its forest
 805 within that framework, but no one in the
 806 community has any risk capital. Most families
 807 survive on \$50–\$100 per month. Perhaps a
 808 corporate partnership would improve the
 809 community's capacity to develop ecotourism. A
 810 partnership between indigenous people and a
 811 nature tour organization has sustained both
 812 forest and local institutions in the southern
 813 Amazonian region of Peru (Stronza, 1999).

(c) *Why were most participants in boundary marking opposed to the reserve?*

816 When marking the boundaries, PAN direc-
 817 tors thought a supportive crowd accompanied
 818 them sharing their goal of making a protected
 819 area. Instead, survey results suggest that help-
 820 ers consisted of people most distrustful of the
 821 outsiders and most concerned about losing
 822 their land-use rights in the highland forest.
 823 Participants wanted to see where the reserve
 824 boundaries were in relationship to their parcels.
 825 Since the collective culture had defended the
 826 common good at their personal loss, they might

as well monitor the potential impacts by as- 827
 511 sisting with marking the boundaries. 828

512 This is not a minor detail, because a misun- 829
 513 derstanding about motivation could lead to 830
 514 inappropriate expectations by the ICDP orga- 831
 515 nization. Had PAN expected the boundary 832
 516 markers to help with reserve management, they 833
 517 would have noted a lack of enthusiasm. 834

(d) *PAN educational projects did not improve knowledge about rules of use in the reserve, nor change traditional attitudes toward wildlife species*

518 Working with PAN to mark and manage the 839
 519 reserve did not enhance a person's knowledge 840
 520 of reserve rules. This result seems counterintu- 841
 521 tive, but since rules were still being debated 842
 522 during the establishment phase, participation 843
 523 may have led to confusion about the rules. 844
 524 Moreover, since many of the early participants 845
 525 (boundary markers) were opposed to the re- 846
 526 serve, they may have preferred not to know the 847
 527 rules. 848

528 Cultural orientation may also explain the 849
 529 poor knowledge of codified expectations. On 850
 530 several different occasions after the reserve had 851
 531 been in existence for several years, individuals 852
 532 came before the community council requesting 853
 533 permission to cut trees in the reserve, a clear 854
 534 breach of the rules. Such behavior seemed 855
 535 baffling to me, but in the cultural framework 856
 536 discussed by Hofstede and Bond (1984), it 857
 537 makes sense. In collective cultures, individuals 858
 538 perceive themselves through interdependent 859
 539 relationships, not by following a list of rules. 860
 540 Actively going to the reserve, having repeated 861
 541 interactions with guards, and contesting rules 862
 542 at the community meetings reinforce knowl- 863
 543 edge of rules and the degree to which the rules 864
 544 truly apply in the community. Thus signs and 865
 545 codes that work in Western parks may not 866
 546 work in all cultures, yet they are often a priority 867
 547 of Western-oriented ICDPs. The rules posted 868
 548 on the reserve boundaries have stopped ex- 869
 549 ploitation of deer by commercial hunters from 870
 550 Guayaquil and are respected by foreign tour- 871
 551 ists. 872

552 Because the survey comparing attitudes toward 873
 553 wildlife was made only one year after the 874
 554 reserve was established, there had not been 875
 555 much time for development of nonutilitarian 876
 556 values for wildlife. Now that villagers in Loma 877
 557 Alta have been educated about endemic birds 878
 558 and have benefited from tourists they would 879
 559 probably have more value for nonutilitarian 880

881 forest resources than a "control" group such as
882 Rio Blanco.

(e) *Implications for integrated conservation
and development projects*

885 PAN's institutional capacity was appropri-
886 ately matched for the scale of self-governance
887 at Loma Alta. ICDP organizations need to
888 consider the institutional scale of their work.
889 Regional and national governments in less-de-
890 veloped countries may readily accept and ab-
891 sorb large donations, but they may override
892 local authorities and the local "common good"
893 in the process of working for what is perceived
894 as being best for the region or nation. Since
895 international donors tend to work with gov-
896 ernments at a national scale, their projects may
897 threaten local institutions simply by failing to
898 recognize and use them.

899 PAN reached the establishment phase of its
900 conservation goal quickly by:

(i) Assessing the capacity and design of local
institutions.

(ii) Fostering the local institutions that existed
rather than trying to create new ones.

(iii) Designing the conservation strategy to suit
values of local stakeholders.

907 There are numerous social science tools used
908 to evaluate communities prior to initiation of
909 conservation and development projects. With
910 the exception of IFRI, few standardized re-
911 search instruments focus specifically on the
912 rules and institutions created by local people
913 and their effects on forest condition. IFRI
914 combines participatory rural appraisal, insti-
915 tutional analysis, and measurements of the
916 forest to reveal historical and current rules of
917 use and consequent forest condition (biomass,
918 diversity, structure, etc.). An easily overlooked
919 asset of IFRI is that it provides an objective
920 framework for doing a stakeholder analysis.
921 While additional anthropological and socio-
922 logical approaches are desirable to triangulate
923 and achieve reliable interpretation of social
924 contexts, IFRI provides an integrated approach
925 bringing natural and social scientists in contact
926 with local people where all share a focus on
927 forest management.

928 We learned that at Loma Alta it was best to
929 negotiate and communicate openly at the
930 community level. Personal negotiations gener-
931 ated jealousy and reprimands from leaders as
932 they were seen as seeds of inequality in the
933 collective society. Community members in re-
934 mote villages were the most self-governing and

had more of an entrepreneurial attitude about
ICDP efforts.

McKean (1996) states that privatization of
common pool resources may promote biologi-
cal collapse because privatization leads to
fragmentation. She also suggests that one fea-
sible solution to this problem may be commu-
nal management of large resources with rules to
share benefit flows from the intact resource.
Private allocation of use rights within a com-
munal framework was fragmenting the forest at
Loma Alta. It was justified as a means of
maintaining equality among individuals.
Achieving McKean's hypothetical solution at
Loma Alta required interactions with outsiders
who valued intact forests and could communi-
cate a "common good" that justified stopping
plot allocation, fog capture. Thus, while self-
governance can lead to conservation of natural
resources (Ostrom, 1990) and economic sus-
tainability at a local level (Dunsmore, 1998),
rural communities in less developed countries
do not consistently have the ecological knowl-
edge or the economic capital to achieve stew-
ardship of large natural resources such as intact
forests (Wainwright & Wehrmeyer, 1998). For
many years to come, external institutions will
required to finance and reveal pathways for
conservation. Local institutions can play a key
role in speedy support or rejection of outside
ideas, thereby maintaining cultural integrity. In
this case, members of an urban-industrial,
global, and goal-oriented culture achieved their
conservation aims quickly largely because in-
digenous institutions in a subsistence-oriented,
collective culture embraced an enterprise that
optimized the common good.

6. CONCLUSIONS

Accomplishing sustainable development and
natural resource conservation through decen-
tralization is a dynamic and dual challenge.
Not only must national governments and in-
ternational donor organizations decentralize
the allocation of funds and projects, but local
communities who may be accustomed to ex-
ternal control of natural resources (Pinkerton,
1992) must establish or revive self-governance
and cope with new institutional relationships
(Becker & Ostrom, 1995; Eccleston, 1996;
Wainwright & Wehrmeyer, 1998). The Loma
Alta case suggests that ICDPs may be most
successful where local people have a strong
system of self-governance and communal ten-

988 ure of natural resources, and when ICDP or-
989 ganizations are flexible enough to set goals that
990 are compatible with local values.

991 Many strategies are needed to protect bi-
992 odiversity and to reduce inequality among
993 people. Given the history of displacements of
994 indigenous peoples by governments and colo-
995 nialists (McLaren, 1999), PAN decided to col-
996 laborate with local people to protect a forest
997 rather than invest in buying land. It remains to
998 be seen whether the people of Loma Alta will

take ownership of the preservation concept. 999
For now, the forest stands, fog is collected, 1000
wildlife is protected, and with NGO invest- 1001
ments of around \$10,000 per year, the com- 1002
munity seems serious about keeping it that way. 1003

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NOTES

1008 1. Earthwatch Institute (www.earthwatch.org) pro-
1009 motes sustainable conservation of natural resources
1010 and cultural heritage by creating partnerships between
1011 scientists, educators, and the general public.

1012 2. When PAN proposed a protected area, growers of
1013 panama hat fiber (*paja toquilla* or *paja*) were most
1014 opposed. They were persuaded, however, to support the
1015 reserve by lowland farmers, but only under the condition

that they could retain *paja* fields at the level of 1996 1016
coverage. Since 1999, the price for *paja toquilla* has 1017
declined to the extent that some families have aban- 1018
doned their mountain plots. 1019

3. Ecotourism, as defined by the Ecotourism Society, is 1020
responsible travel to natural areas that conserves the 1021
environment and sustains the well-being of local people 1022
(Wood, 1999). 1023

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- APPENDIX A. SURVEY I. OPINIONS 1170
 ABOUT WILDLIFE AND HILL FORESTS
 IN WESTERN ECUADOR
- During June-August of 1997, interviews 1173
 were conducted in two rural villages of south- 1174
 western Ecuador. First respondents were asked 1175
 to recount their personal history and talk about 1176
 local social life. Next the interviewers asked 1177
 questions (below). Finally, personal informa- 1178
 tion about the informant was requested: name, 1179
 profession, education, age, sex, community 1180
 membership. 1181
Survey questions: 1182
1. Are the highland forests important to you? If 1183
 yes, Why? 1184
 2. How much time do you spend in the highland 1185
 forests of the Comuna? What do you do there? 1186
 3. What is the most important wild animal in the 1187
 forest? Why? What is the next most important 1188
 wild animal and why? 1189
 4. Name up to 10 wild birds that live in this area. 1190
 Which ones do like the most? Why? Which one 1191
 do you dislike the most? Why? 1192
 5. What wild birds and mammals from this area 1193
 have you or members of your family eaten dur- 1194
 ing the past 5 years? Has this changed from 1195
 what you did 20 years ago? If it has changed, 1196
 why? 1197
 6. What wild animals do you wish were more 1198
 abundant? less abundant? Why? 1199
 7. What is ecotourism? 1200
 8. Should ecotourism be promoted in your com- 1201
 munity? Why or why not? 1202