

1 **THE CHALLENGES OF CERTIFYING TROPICAL COMMUNITY FORESTS: A**
2 **CASE STUDY FROM HONDURAS**

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6 **Mari Bieri^{1*}, Anja Nygren²**
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10 ¹ Corresponding author: Environmental Sciences, University of Helsinki, Box 27, 00014
11 Helsinki, Finland, email: mari.kukkonen@helsinki.fi, tel. +358 9 191 57903, Fax +358 9 191
12 58462

13 ² Institute of Development Studies, University of Helsinki, Box 59, 00014 Helsinki, Finland,
14 email: anja.nygren@helsinki.fi

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29 **THE CHALLENGES OF CERTIFYING TROPICAL COMMUNITY FORESTS: A**
30 **CASE STUDY FROM HONDURAS**

31
32 *Abstract*

33
34 This article examines the challenges involved in certifying tropical community forestry
35 operations, by drawing on a case study of FSC certified community forest management in
36 Honduras. We identify social, economic, and environmental factors that require increased
37 attention to improve certification as an instrument for sustainable community forest
38 management, and discuss the linkages between these factors. The complexity of resource
39 rights, the heterogeneity of forest users, and the difficulty of small Southern producers in
40 competing in certified forest markets would need specific attention concerning certified
41 community forestry operations. Concerning environmental sustainability, the focus in
42 fragmented community forests under low-intensive logging should be directed towards
43 landscape connectivity and forest restoration instead of reducing mechanical logging damage.
44 Finally, without changes to the position of small Southern producers in the global trade
45 networks, the ability of certifications to create sustainable livelihoods is limited.

46
47 **Keywords:** community forestry, environmental governance, forest certification, Forest
48 Stewardship Council, Honduras, social and environmental sustainability

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Biographical Sketch

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53 Mari Bieri is a PhD student at the Department of Environmental Sciences at the University of
54 Helsinki. Her research focuses on the ecological impacts of forest certification in tropical
55 community-based forest operations.

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57 Anja Nygren is a Senior Lecturer at the Institute of Development Studies and an Adjunct
58 Professor of Environmental Policy at the University of Helsinki. She has long-term research
59 experience in Costa Rica, Nicaragua and Honduras. Nygren's areas of interest include forest
60 certifications, fair trade, environmental governance, decentralization, local livelihoods, and
61 environmental movements.

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64 **THE CHALLENGES OF CERTIFYING TROPICAL COMMUNITY FORESTS: A CASE**

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65 **STUDY FROM HONDURAS**

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67

67 *Introduction*

68

69 Forest certifications emerged in the early 1990s as new, market-based mechanisms of
70 environmental governance to tackle tropical deforestation. Third-party certifications have
71 been considered as promising alternatives of environmental governance in a situation where
72 conventional forms of governmental regulation have been criticized as inadequate and too
73 slow (Cashore, Gale, Meidinger & Newsom, 2006). Another impetus for the proliferation of
74 forest certifications has been the growing environmental awareness and public advocacy of
75 sustainable forestry (Taylor, 2005a; Tollefson, Gale & Haley, 2008).

76

76 The first certification scheme, the Forest Stewardship Council (FSC), was created
77 in 1993 by international environmental NGOs, together with human rights groups and
78 industry representatives. By the end of the decade, a range of different certification schemes,
79 such as the Pan-European Forest Certification (PEFC) and Sustainable Forestry Initiative
80 (SFI), had been established (Klooster, 2005; Pattberg, 2005). By mid-2010, about 355 million
81 hectares of the world's forestland, representing 9% of the global forest estate, had been
82 certified. About 56% of these forests were situated in North America, 24% were in Western
83 Europe, while 8% were in Latin America, Asia, and Africa (ITTO, 2010; UNECE/FAO,
84 2010). These figures indicate that most of the growth in certification has occurred in the
85 boreal and temperate forests rather than in the tropical forests whose sustainable use the
86 certifications were initially intended to support.

87

87 In parallel with this trend, most of the certificates have been awarded to industrial
88 operators, while only 1% of community forests worldwide have been certified (Molnar et al.,

89 2004). This is despite the fact that 22% of the forest estate in the 18 most forested developing
90 countries is currently owned or managed by local communities, and this share is estimated to
91 rise in the future as a result of decentralization and the devolution of forest resources to local
92 communities (White & Martin, 2002, p. 5). In much of the discussion on certification, the
93 focus has been on Northern countries with significant records of industrial wood production,
94 while less attention has been paid to certified community forestry operators in the South.
95 However, sustainable forestry is much more challenging in many tropical developing
96 countries, which are characterized by weak forest governance, unsupportive socio-economic
97 structures, diverse forest ecosystems, and multifaceted interests towards forest resources
98 (Ebeling & Yasué, 2009).

99 In this article, we examine the challenges of FSC certification in supporting
100 sustainable forest management in tropical forest ecosystems and communities, by drawing on
101 a case study of certified community forestry in Río Cangrejal, Honduras. FSC has the most
102 rigorous standards among the existing forest certifications, and it is the most prevalent
103 certification scheme in the Southern hemisphere (Klooster, 2006; Pattberg, 2005). To
104 promote environmentally responsible, socially beneficial and economically viable forest
105 management, FSC has elaborated a set of ten principles and their criteria as a framework for
106 evaluating the sustainability of forest management (FSC, 2002). Although some national and
107 area-specific indicators are currently under elaboration in many countries, these principles act
108 as important generic guidelines for FSC certified forest management.

109 The first section of this article describes the study area and the methods used in this
110 research. The second section analyzes each FSC principle in relation to the certified
111 community forest operations in Río Cangrejal, by identifying the main socio-economic and
112 environmental factors that affect the potential of the FSC principles to promote sustainable
113 community forestry in the tropics. The third section discusses the interlinkages between the

114 environmental and socio-economic aspects of certified forest management, while the final
115 section presents conclusions and policy implications concerning tropical certifications and
116 local livelihoods.

117

118 *Context and Methods*

119

120 The study area is located in Río Cangrejal, northern Honduras, 10–30 km south of the city of
121 La Ceiba. The territory of Río Cangrejal covers 123 000 ha of land and the population is
122 about 6 300 inhabitants scattered in seven communities. The forest resources in Río Cangrejal
123 are state-owned; however, local community forestry groups manage them under a customary
124 rights agreement. Because of the selective logging of commercially valuable timber species
125 such as *Swietenia macrophylla* and *Cedrela odorata* during the 1970s and 1980s, the
126 populations of these species have declined. Currently, a range of twenty non-traditional
127 timber species are logged for commercial purposes. Illegal logging is a serious problem in
128 Río Cangrejal, as elsewhere in the country; up to 75–85% of the hardwood extracted from
129 broadleaved forests in Honduras is estimated to be illegally logged (Richards, Wells, del
130 Gatto, Contreras-Hermosilla & Pommier, 2003).

131 Our study focused on three certified community forestry groups and three non-
132 certified community forestry operations in Río Cangrejal (Table 1). The certified forestry
133 groups received their first certificate of good forest management in 1991 through the
134 Rainforest Alliance's Smartwood Program, later accredited by the FSC (Markopoulos, 2003).
135 The groups have since then been re-certified various times under the umbrella organization,
136 Cooperative Agroforestal Regional (COATLAHL). As one of the oldest community forestry
137 initiatives certified anywhere in the world, these groups represent an interesting case in
138 analyzing the challenges included in the certification of tropical community forest operations.

139 The socio-economic data related to community forest management in Río
140 Cangrejal were gathered in 2004. In total, 58 thematic interviews were conducted with local
141 households, including members in the certified and non-certified community forestry groups,
142 to gather data on the logging operations, forestry incomes and costs, social organization, and
143 the embedded social rules and cultural practices. These interview data were crosschecked by
144 participant observation. Visits to logging sites, sawmills, and furniture factories offered
145 important insights into prevailing working conditions and ways of doing business, while
146 participation in meetings and social gatherings provided information on the social networks
147 and political power relations involved. In illegal logging, participant observation was the only
148 method to obtain reliable in-depth data.

149 In addition, 30 interviews were conducted in different ministries, municipal offices,
150 development projects, certification firms, and NGOs to examine the institutional context that
151 shapes the community forest activities. These empirical data were supplemented by statistical
152 data, governmental documents, and development reports that were subjected to content
153 analysis. The main aim of the socio-economic analysis was to evaluate the economic
154 feasibility of certified forestry and to understand the socio-political processes that shape the
155 sustainability of the certified community forestry operations in the region.

156 The ecological data related to certified forest management were collected in 2005.
157 The ecological impact of certification was studied by comparing the certified forests to
158 conventionally managed forests, as well as to natural forests of the Pico Bonito National Park
159 that borders the area (Table 1). The main focus in the assessment of the ecological impact
160 was on the regeneration success of the economically valuable timber tree species and the
161 species composition within the logging gaps. Environmental characteristics of the logging
162 gaps and natural treefall gaps were also compared to evaluate the logging damage that had
163 occurred.

164

165 *FSC Principles in Relation to Tropical Forests and Forest Communities*

166

167 COMPLIANCE WITH LAWS AND FSC PRINCIPLES

168

169 FSC Principle #1 aims to ensure that forest management complies with the applicable
170 national laws and international treaties (Table 2). In many developing countries, the forest
171 laws are, however, unstable and not easily adaptable to the conditions of community forestry
172 (Ribot & Peluso, 2003). According to Honduran legislation, forest management contracts for
173 community forestry groups on state-owned lands are granted for a period of four years at time
174 (Decreto 31-92, 1992). A four-year contract is, however, too short for the planning of forest
175 management. Due to bureaucratic procedures, the renewal of the contract can take 1–2 years,
176 during which time the groups have to reduce their activities. Volatile forest policies make the
177 institutional position of certified community forestry insecure.

178

179 Nevertheless, according to our interview data and the studied ministerial
180 documents, the Honduran community forestry groups with an FSC certificate have received
181 their forest management contracts quicker than the non-certified ones. Certified community
182 forestry operations have also been facilitated in governmental audits, since the FSC
183 certificate has qualified as proof of the groups' good forest management practices. The FSC
184 initiative of Small and Low-Intensity Managed Forests (SLIMF), which aims to streamline
185 the procedures for forest management for small forest operations, has played a crucial role in
186 the promotion of this relief.

186

187 According to Honduran legislation, the community forestry groups can only harvest
188 200 m³ of timber per year (Decreto 31-92, 1992). This legally defined harvesting rate has
189 weak silvicultural justifications, as in many cases it is considerably below the forest's

189 productive potential. In the community of Toncontín, for example, the annual allowable cut
190 according to the forest's silvicultural potential was estimated to be 1829 m³ (AFE-
191 COHDEFOR, 2000). The low logging quotas constrain the community forestry groups'
192 opportunities to earn a feasible income from forestry. This is an issue that the development
193 experts urging the community forestry groups to apply for certification have not taken
194 sufficiently into account.

195 FSC Principle #1 also demands that the certified forests are protected from illegal
196 harvesting, settlement and other unauthorized activities. However, there is no specification in
197 the FSC criteria of whose responsibility it is to protect the forests against unauthorized use.
198 During the structural adjustment policies implemented in Honduras, as in many other
199 developing countries in recent years, the role of governmental institutions in the forest
200 regulation has been reduced. At the same time, non-state mechanisms, including
201 certifications, have been promoted as efficient alternatives of forest governance. However,
202 several questions remain concerning the ability of these non-state mechanisms to fulfil the
203 regulatory tasks of the weakened state institutions (Howlett et al. 2009; Taylor, 2005b).

204 In Honduras, the acceleration of forest certification has led to considerable
205 responsibility for the prevention of illegal logging being placed on local forest managers. In
206 our interviews and discussions, forest authorities repeatedly stated that it is the task of the
207 certified forestry groups to protect the forests under their management against illegal logging.
208 Correspondingly, the Río Cangrejal forestry groups explained to us that they have been
209 obliged to establish a system of voluntary guards of forest vigilance. This task is dangerous,
210 as most of the illegal timber dealers are armed and in the worst cases linked to drug dealing
211 (Richards et al., 2003). The transfer of law enforcement tasks from state institutions to local
212 voluntary groups can have questionable consequences for human rights. Although
213 certifications can have an important role in supporting public regulation, they can hardly

214 replace the governmental responsibilities of forest regulation and law enforcement
215 (Tahkokallio & Nygren, 2008).

216

217 TENURE AND USE RIGHTS AND RESPONSIBILITIES

218

219 FSC has demonstrated a strong commitment to community forest certifications. This effort is
220 evident in FSC Principle #2, which emphasizes the necessity for the legal establishment of
221 local resource rights. In Río Cangrejal, FSC certification has improved people's awareness of
222 their resource rights and helped the community forestry groups to receive better
223 governmental recognition of their customary rights. This especially concerns the efforts of
224 local forestry groups to defend their resource rights in relation to large-scale cattle raisers and
225 land speculators (Field data, 2004–2005; SmartWood, 2003).

226 On the other hand, the FSC requirement that the local communities' long-term use
227 rights need to be clearly documented and legally established does not fully recognize the
228 existing legal pluralism in many developing countries. Because of the lack of formal
229 documentation, customary rights can be difficult to legitimate along with formal standards of
230 legality. The move from a focus on legally established resource rights towards a broader
231 access approach that recognizes the role of both *de jure* and *de facto* rights in shaping the
232 access to productive resources (Ribot & Peluso, 2003) could provide a more appropriate
233 approach to the conditions under which many Southern community forestry groups, including
234 those of Río Cangrejal, operate.

235

236 INDIGENOUS PEOPLES' RIGHTS

237

238 FSC Principle #3 aims to protect the legal and customary rights of indigenous peoples. This

239 principle does not apply in Río Cangrejal, as most of the local inhabitants are mestizo-
240 ladinos.

241

242 COMMUNITY RELATIONS AND WORKER'S RIGHTS

243

244 FSC Principle #4 aims to ensure that forest management maintains or enhances the long-term
245 social and economic well-being of local communities and forest workers. In the evaluations
246 in Río Cangrejal, FSC-accredited certifiers have applied this principle by requiring that the
247 certified forestry groups establish mechanisms for efficient integration of the wider
248 community into the decision-making on forest management and the distribution of forestry
249 income (SmartWood, 1996, 1998, 2003).

250 The inclusion of a wide range of community members as direct beneficiaries of
251 forest operations is, however, a complicated task. First, this requirement fails to acknowledge
252 that in management contracts, the legal responsibility for forest management is assigned to
253 the forestry groups, who thus bear the risks and costs involved. As cutting quotas are
254 restricted, it may be difficult to channel the economic benefits from timber production to a
255 wide range of community members. Second, the requirement that forest operations should
256 cater for the needs of all community members relies on a conventional view of forest
257 communities as socially cohesive units, where the resources are collectively managed and the
258 benefits are equitably shared. Such a view underestimates the heterogeneity of actors
259 prevalent in Southern communities, and the power relations through which access to forest
260 resources is mediated (Cleaver, 2002; Nygren, 2005). Our analysis of the socio-economic
261 profile of Río Cangrejal revealed marked variation between local households in the degree to
262 which they incorporated forestry into their livelihoods (Nygren & Myatt-Hirvonen, 2009). As
263 timber harvesting is physically demanding, persons engaged with forestry were usually young

264 males. Women did not have direct control over the forestry income, although they had an
265 important role in the gathering of non-timber forest products, such as orchids, as well as in
266 managing the household budget. Some powerful economic and political operators were eager
267 to take advantage of the opportunities provided by forest certification, with certain risks of
268 the 'elite capture'.

269 This does not mean that the communities of Río Cangrejal had not benefitted from
270 certified forestry. The forestry groups employed many villagers in timber hauling and a great
271 number of local inhabitants had participated in the training courses organized by development
272 projects, supporting certified forestry in the region. Through multiplier effects on local
273 income and employment, certified forestry can have an important role in the mitigation of
274 rural poverty. Such indirect benefits also include social learning, whereby local communities
275 can gain expertise in environmentally and socially responsible forest management.

276 Certification as a mechanism of social learning can, however, also be questioned.
277 This especially concerns the cases where certification has largely been organized by foreign
278 donors. In our interviews and discussions with the forestry group members in Río Cangrejal,
279 most of them demonstrated limited understanding of the principles of FSC. This situation
280 raises questions concerning the ability of FSC to provide a feasible channel for Southern
281 producers to promote alternative values of environmental sustainability and social justice to
282 challenge the existing inequalities in global wood production and trade (Taylor, 2005b).

283 Concerning worker's rights, FSC Principle #4 requires that national laws and
284 international conventions related to occupational health and safety are met, although these
285 requirements are applied less rigorously in community forest management. According to our
286 participant-observation data, the conditions of employment were better in the certified
287 community forest operations in Río Cangrejal, although not significantly different from the
288 informal working conditions in Honduras, where social security benefits, such as vacations,

289 pensions, or paid sick leaves, are widely absent. The certified forestry groups aimed to pay
290 the Honduran minimal salary for hired workers, such as timber haulers and mule transporters,
291 and to distribute the forestry incomes within the forestry groups in an accountable and fair
292 way. However, as the profits gained from forestry were limited, the groups could not afford
293 the costs related to workers' health coverage and accident insurance (Field data, 2004–2005;
294 SmartWood, 2003, pp. 26–28).

295 Part of the timber produced by the Río Cangrejal forestry groups is processed in the
296 workshop of the cooperative COATLAHL and sold as certified furniture and kitchenware to
297 European furnishing retailers. In these operations, the standards of the Honduran labour laws
298 are followed. Another part of the timber is sold to conventional sawmills and furniture
299 factories, many of which operate in Honduran free trade zones. The Honduran government's
300 opportunities to control the working conditions in these free trade zones are limited, and the
301 FSC requirements of workers' rights do not apply to these operators, either. Interestingly, the
302 FSC principles of workers' rights largely rely on the same conventions of the International
303 Labour Organization (ILO) that Honduras has ratified in its labour laws. The limited rights of
304 poor workers do not thus stem from a lack of appropriate legislation; rather, the problem lies
305 in the weak implementation of existing laws. FSC as a voluntary mechanism has limited
306 opportunities to require the effective enforcement of labour laws.

307

308 BENEFITS FROM THE FOREST

309

310 *Socio-economic viability*

311

312 FSC Principle #5 aims to ensure that forest management is economically viable and provides
313 a wide range of environmental and social benefits. Concerning socio-economic viability, one

314 of the motives in the creation of FSC certification was the idea that it would help forest
315 managers to gain a price premium and access to value-added markets. Despite high
316 expectations, the price premiums for certified timber producers have at best been modest
317 (Klooster, 2006; Pattberg 2005). Unlike certifications by the Fair Trade Labelling
318 Organizations International (FLO) for agricultural products such as coffee, cocoa and
319 bananas, where minimum prices are guaranteed for Southern producers, in forest
320 certifications the prices are largely left up to the workings of the market (Raynolds, Murray &
321 Wilkinson, 2007; Taylor, 2005a; Valkila & Nygren, 2010). Many forest markets do not,
322 however, demand certified products, nor are the end consumers willing to pay a premium for
323 products sourced from certified forests (UNECE/FAO, 2010).

324 Although FSC Principle # 5 emphasizes the economic viability of forest
325 management, relatively little attention is paid to the factors that affect the economic
326 feasibility of certified forestry. Our analysis of Río Cangrejal revealed that forestry plays a
327 complicated role in the local livelihoods. Almost every household had at least one person
328 working in forestry in the certified forest communities, and the share of forest incomes in the
329 household income portfolio frequently exceeded that of agriculture (Nygren & Myatt-
330 Hirvonen, 2009). Forestry incomes also compared favourably to the earnings in alternative
331 labour markets. According to our analysis, in terms of gross income, an average logger could
332 earn 6.6 times the daily wage of an agricultural worker and 2.8 times that of a construction
333 worker. However, despite being a lucrative activity, people's engagement in forestry was
334 sporadic. Poor infrastructure, high transportation costs, and competition with illegal loggers
335 made it difficult for the forestry groups to gain a profitable market niche, even when
336 producing certified timber.

337 The forestry groups' incomes were also constrained by the hierarchical patterns of
338 timber trade. Owing to the lack of collateral, the groups depended on informal credit

339 bargains, whereby urban timber dealers advanced them money on the condition that the
340 timber would be delivered to the dealer who financed the operation. Such personalized debt-
341 credit relations easily placed the forestry groups in a dependent relationship with the buyers,
342 with limited opportunities to negotiate the terms of trade. According to our socio-economic
343 study, the unequal relations between producers, intermediaries and processors largely
344 remained in place even in certified wood production.

345 Another constraint was the high costs of certification, which in Río Cangrejal had
346 reached USD 12,000 on average in various re-certifications. As the forestry groups could not
347 afford to cover such costs by themselves, the costs had been largely subsidized by
348 international donors. This can make forest communities highly dependent on donors. Even
349 though FSC's group certifications and SLIMF initiatives demonstrate that significant efforts
350 exist within FSC to reduce the certification costs faced by small Southern operators, there is
351 an urgent need to find new ways to improve the economic viability of certified community
352 forestry operations.

353 In recent years, several development projects have worked hard to help the
354 community forestry operators in Río Cangrejal, as elsewhere in the tropics, to enhance the
355 quality of their products and to improve the markets for certified products. Nevertheless, the
356 enhancement of community forest producers' access to certified markets faces several
357 challenges. First, the domestic markets for certified products are limited in many developing
358 countries (UNECE/FAO, 2010). Second, most of the community forestry operators are
359 unlikely to be competitive in conventional global wood markets, which require large
360 volumes, cheap supply, and high product consistency. These markets are also increasingly
361 linked to low-cost wood supply from forest plantations and illegal logging. Because of the
362 limited demand from end-consumers, the majority of the conventional wood products are
363 marketed without any reference to certification (Ebeling & Yasué, 2009).

364 At the same time, public advocacy has increased the sensitivity of global wood and
365 furniture companies to ENGO pressure for environmental and social responsibility. It is here
366 in environmentally and socially sensitive markets that certified community forestry groups
367 may have a potential for improving their market access (Morris & Dunne, 2004). Our socio-
368 economic analysis revealed that certain international companies, seeking to establish their
369 reputation as environmentally and socially responsible suppliers, are recognizing the need to
370 build partnerships with community forest producers. This especially concerns the segments of
371 woodcrafts, small furniture, and home improvement products, where the global demand is
372 diversifying into high-quality hardwoods, and thus brands from tropical forests and
373 community forest producers may be preferred. An additional advantage may be that
374 community forest operators are often able to harvest timber in small and inaccessible areas
375 where the difficulty of the terrain and the low density of valuable timber species makes
376 logging too costly for industrial operators.

377 Nevertheless, community forest operators often have difficulties in meeting the
378 standards of quality, reliability, and product styling that certified markets require. Currently,
379 relevant eco-sensitive markets exist in Western Europe; elsewhere, the supply of certified
380 products exceeds the market demand (Ebeling & Yasué, 2009). In Río Cangrejal, the certified
381 forestry groups are producing small volumes of kitchenware and furniture for Danish niche
382 markets through contacts with particular retailers. However, because the timber is sawn into
383 cants with chain saws and much of the timber suffers from fungal infestation due to open air
384 drying, it is difficult to meet the quality required. In Honduras, the main buyers of certified
385 timber are some furniture processors who sell their products to US markets. These buyers,
386 however, focus on a few high-quality hardwoods and they do not pay a price premium for
387 certified timber. Until efficient regional processing and marketing structures are created, few
388 of the community forest operators seem to have the financial and managerial resources to

389 generate the quality of products demanded by global markets for certified products.

390 Despite these factors, FSC Principle #5 focuses on the local-level processes of
391 forest management, with limited consideration of the wider political economy, such as eco-
392 sensitive markets or institutional structures that shape the opportunities of community forest
393 producers to benefit from certified forestry. No requirements for environmental and social
394 responsibility are set for traders dealing with products sourced from forests with a forest
395 management certificate, nor are such traders' operations audited by FSC. This raises concerns
396 over the opportunities of the FSC to challenge the existing power relations in the global forest
397 markets and to promote fairer trade in forest products (Klooster, 2006; Taylor, 2005b). In this
398 respect, FSC certification differs significantly from FLO certification for agricultural
399 products, where the companies trading Fair Trade products must pay the Fair Trade minimum
400 price and the premium for social development for the producers, and sign contracts that allow
401 for long-term planning and production practices (FLO, 2010a).

402

403 *Sustained yield of forest products*

404

405 The long-term economic viability of forest management also requires the guaranteeing of
406 sustainable timber resources. Because of the lack of financial resources, compensatory
407 planting of timber tree species is not carried out in a systematic way in Río Cangrejal. The
408 maintenance of a sustained yield thus relies on natural regeneration, which is enhanced by
409 reduced-impact logging (RIL) techniques, including the designation of seed trees, planning of
410 transport routes, practicing of directional felling and cutting of lianas before felling to
411 minimize the damage to surrounding trees. The fulfilment of the requirements related to RIL,
412 implicitly included in the FSC criteria, has not demanded major changes in the forest
413 management system in Río Cangrejal. No heavy machinery is used in the logging operations,

414 and the construction of forest roads is rare. According to the Honduran forest regulation, all
415 forest operations, whether certified or not, need to have a management plan.

416 The underlying idea in the certifiers' recommendations to limit the logging to
417 certain areas is to guarantee sufficient seed dispersal, while mechanical logging damage is
418 reduced to protect the juvenile timber trees. These activities may be effective in guaranteeing
419 the regeneration of the logged species, if the forest structure and species composition are in a
420 natural state. However, such conditions may not exist in Río Cangrejal. According to our
421 analysis, the regeneration of timber species in logging gaps was significantly lower in
422 certified forests than in conventionally managed ones, even though the environmental
423 conditions indicated reduced logging damage in the certified forests. This may indicate that
424 past uncontrolled loggings have reduced the populations of timber species more in the
425 certified forests. This assumption was supported by the finding that the only timber species
426 with a higher regeneration rate in the certified forests were light-demanding species, which
427 typically benefit from improved light availability caused by logging. Felled timber trees were
428 also smaller in diameter in certified forests compared to conventionally managed forests and
429 protected forests, indicating that the relative abundance of trees below the commercial size
430 had increased (Kukkonen, Rita, Hohnwald & Nygren, 2008).

431 Another factor that may limit the regeneration of timber species in Río Cangrejal is
432 forest fragmentation, i.e. the splitting of a continuous forest area into isolated fragments.
433 When the abundance of commercially valuable trees is reduced as a result of logging, the
434 recovery of the harvested species is largely dependent on the connectivity with surrounding
435 forests (Chazdon, 2003). Such connectivity may be limited in Río Cangrejal, where the
436 lowlands have largely been converted to agriculture and pasture, and the remaining forests on
437 the hillsides are fragmented. We found typical secondary forest and fallow species in high
438 numbers in the logging gaps of the certified forests, which suggests that these species may be

439 replacing primary forest tree species (Kukkonen & Hohnwald, 2009). Fragmentation may
440 also affect regeneration through the limited habitat connectivity of animals that act as
441 pollinators and seed-dispersal agents. Invertebrate pollinators typically have limited
442 movement across agropastoral areas, and many of the dominant seed-dispersing animals,
443 such as birds, bats and primates, are sensitive to forest fragmentation (Cordeiro & Howe,
444 2001). Despite these facts, limited attention has been paid to forest fragmentation in the FSC
445 criteria on forest regeneration.

446 In addition, timber tree regeneration may be limited by the distribution of suitable
447 sites for seed germination and tree growth. In Río Cangrejal, valuable timber species include
448 light-demanding species, such as *Terminalia amazonia* and *Cordia alliodora*, as well as
449 shade-tolerants, such as *Virola koschnyi* and *Guarea grandifolia*. The FSC criteria place
450 considerable emphasis on minimizing the mechanical impacts of logging and creating small,
451 single-treefall gaps, which may in the long term improve the regeneration of those timber
452 species that do well in shaded conditions, while constraining the regeneration of the light-
453 demanders.

454 The current demand for Río Cangrejal timber is focused on the few most valuable
455 timber species, whereas the most frequent, non-traditional timber species are rarely logged to
456 the limit of the allowable cut. Although the development projects operating in Río Cangrejal
457 have worked hard to find markets for non-traditional timber species, many of them are
458 difficult to sell to international buyers who are often only familiar with the most popular
459 tropical hardwoods. In 2003, the species with highest volumes extracted in Río Cangrejal was
460 *Magnolia yoroconte* (AFE-COHDEFOR, 2004). In our study, the regeneration of *M.*
461 *yoroconte* was found to be poor, indicating unsustainable harvesting rates of this light-
462 demanding timber species.

463 FSC Principle #5 also encourages the efficient use of non-timber forest products

464 (NTFPs). On this basis, the certified forestry groups of Río Cangrejal are expected to
465 incorporate a range of NTFPs into their management plans. The economic viability of NTFP
466 extraction in tropical forest ecosystems with a relatively low abundance of commercially
467 valuable species per hectare is, however, a demanding task (Sunderlin et al., 2005). Since the
468 1990s, a group of Río Cangrejal women have been trying to develop a small business based
469 on orchids extracted from the certified forests, but with limited market success.

470

471 ENVIRONMENTAL IMPACTS

472

473 FSC Principle #6 lists conditions that environmentally sound forest management should
474 secure. The focus is on the maintenance of forest integrity, i.e. natural forest species
475 composition, structure, dynamics and functions. Compared to intensive mechanical
476 harvesting, the environmental impact of the harvesting system employed in Río Cangrejal is
477 low. Manual harvesting and the use of mules and human labour in transportation cause
478 relatively little damage to residual forest stands. Harvest intensities are low, varying between
479 2.2 and 6.5 trees per ha in the logged segments (AFE-COHDEFOR, 2004).

480 Nevertheless, our ecological study established that the similarity in species
481 composition between the logging gaps of certified and protected forests was lower than
482 between the logging gaps of conventionally managed forests and protected forests. This may
483 be partly because pre-certification loggings have changed the species composition in certified
484 forests more than in conventionally managed forests. Our study also indicated that some
485 fallow species were replacing forest species in the logging gaps of certified forests
486 (Kukkonen & Hohnwald, 2009). These findings suggest that actions to improve the
487 connectivity between forests and restore the degraded species may be of more importance to
488 the ecological integrity than the reduction of mechanical logging damage.

489 FSC Principle #6 also requires the establishment of conservation areas and
490 preservation of the habitats of rare and threatened species. In each of the certified forests of
491 Río Cangrejal, about 10% of the forest area is reserved for protection. In the evaluations of
492 species conservation, the certifiers have used the Convention on International Trade in
493 Endangered Species of Wild Fauna and Flora (CITES) appendices as a baseline (SmartWood,
494 1998; 2003). However, due to their biases towards the species that are in demand in
495 international trade, the best-known taxonomic groups and largest organisms, such lists may
496 form a problematic basis for species conservation (Possingham et al., 2002).

497

498 MANAGEMENT PLAN

499

500 FSC Principle #7 sets the requirement for elaborating a management plan that integrates
501 socio-economic and environmental information on the local conditions. Although certain
502 rules for management planning are included in Honduran forest legislation, the FSC
503 requirement for management plans has led to better-defined management standards in the
504 community forestry operations of Río Cangrejal (Field data, 2004–2005; Markopoulos,
505 2003).

506 Pre-logging inventories are conducted in certified forest operations in Río
507 Cangrejal to define the allowable cut and the minimum diameter of the trees to be harvested.
508 The problem in such inventories is that they fail to take into account that the regeneration
509 ability of timber species may have been affected by past loggings. Furthermore, a 30-year
510 cutting cycle has been implemented in the certified operations. However, recent studies
511 indicate that such a cycle may be too short to guarantee the successful regeneration of many
512 of the neotropical timber species, especially when systematic post-harvest silvicultural
513 treatments, such as the planting of seedlings of the logged tree species and removal of

514 competing vegetation, are not employed (Schulze, Grogan & Vidal, 2008).

515

516 MONITORING AND ASSESSMENT

517

518 FSC Principle #8 emphasizes the need for monitoring the environmental and the socio-
519 economic impacts of forest management. Although it allows less rigorous monitoring in low-
520 impact community forest operations, it also underlines the need for careful monitoring in
521 potentially fragile ecosystems, such as the tropical moist forests in Río Cangrejal.

522 Due to spatiotemporal differences in the patterns of seed dispersal and seedling
523 establishment, the monitoring of post-logging regeneration is complicated when a variety of
524 timber tree species are logged. Furthermore, tropical tree species often have clumped
525 distributions, which means that recording their regeneration would require larger areas than
526 the 10-20 ha fragments logged in Río Cangrejal. Principle #8 also demands that the impacts
527 of logging on local flora and fauna are assessed. However, the lack of indicator groups that
528 reliably represent changes in the forest ecosystems make such assessments difficult to
529 conduct in the tropics (Lawton et al., 1998).

530 Monitoring the socio-economic impacts of forestry is an equally complicated task.
531 The economic costs of forest management are difficult to assess because of the high informal
532 transaction costs. Interestingly, it is here that the term ‘chain of custody’ is mentioned for the
533 first time in the FSC principles. According to Principle #8, “documentation shall be provided
534 by the forest manager to enable monitoring and certifying organizations to trace each forest
535 product from its origin, a process known as the chain of custody” (FSC, 2002, p. 8).
536 However, in the case of a certificate of good forest management, such as that of Río
537 Cangrejal, this requirement only demands that the forest managers provide information on
538 where the wood comes from within their forest operations. No documentation is required on

539 the products' itinerary along the value chain, once they are treated by processors, traders, or
540 other actors, until end consumption.

541 On the other hand, the FSC requirement for monitoring the socio-economic impacts
542 of forest management has provided important tools for Río Cangrejal community forestry
543 groups to improve their administrative procedures. Such monitoring has also facilitated the
544 governmental approval of the groups' management contracts, and simplified the state
545 auditing of their forest operations. At best, careful monitoring can serve as documented
546 evidence of the forestry groups' environmentally and socially responsible forest management.
547 According to certification evaluations carried out in Honduras, illegal forest clearing has
548 decreased in those regions with certified community forest management (SmartWood, 2003).
549 This issue was confirmed by the Río Cangrejal forestry groups, according to whom the
550 forests of Río Cangrejal would already have been cleared for cattle raising if the groups had
551 not practiced certified forestry in them.

552 The FSC multiple-stakeholder consultations related to the national certification
553 standards have also increased the participation of Río Cangrejal community forestry groups
554 in policy-making. According to our interview and participant-observation data, the improved
555 monitoring capacities have promoted several spin-off effects, whereby the certified Río
556 Cangrejal forestry groups have begun to pressure state authorities to eliminate corruption and
557 improve the control over the illegal timber trade. At the same time, the forestry groups have
558 gained important indirect benefits, such as increased self-esteem, social prestige, and political
559 bargaining power in different arenas of forest governance.

560

561 MAINTENANCE OF HIGH CONSERVATION VALUE FORESTS

562

563 FSC Principle #9 deals with the maintenance of high conservation value forests. In temperate

564 regions, indicators of old-growth forests are commonly used to distinguish areas of high
565 conservation value. In selectively logged tropical forests, clear indicators of high
566 conservation value forest are, however, difficult to establish. In Río Cangrejal, the areas
567 assigned by the certifiers as having a high conservation value include forest areas bordering
568 streams and rivers, and forest tracts surrounding the protected areas (SmartWood, 1998).

569 In Honduras, as in many other developing countries, rural poverty and high
570 conservation value forests tend to share an overlapping space (Sunderlin et al., 2005). The
571 rugged terrain and vulnerability to soil erosion make these lands ecologically best suited for
572 forest activities. Simultaneously, difficult access and poor infrastructure limit the economic
573 benefits derived from forestry. New initiatives would be needed to make forest certification
574 more affordable for community forestry groups that manage the high conservation value
575 forests, whose size and inaccessibility do not allow the generation of a substantial income
576 from forestry.

577

578 *Interlinkages between Environmental and Socio-Economic Factors*

579

580 According to our analysis, several environmental and socio-economic factors affect the
581 ability of tropical community forestry operators to fully benefit from FSC certification (Table
582 3). In the following, we discuss four issues where the links between environmental and socio-
583 economic factors are highly relevant, and which would need more attention from the
584 perspective of community forestry: 1) the heterogeneity in local forest ecosystems and
585 communities, 2) complex land-use histories, 3) forestry as part of the eco-social landscape,
586 and 4) the links between certified forestry and the wider political economy of timber trade.

587

588 **THE HETEROGENEITY OF FOREST ECOSYSTEMS AND COMMUNITIES**

589

590 The logging of a range of tree species with differing ecologies sets special demands for the
591 planning of forest management. The minimization of environmental damage, although
592 essential for the maintenance of natural forest composition and functions, may favour the
593 shade-tolerant timber species over the light-demanding ones. On the other hand, attempts to
594 improve the regeneration of the light-demanding species may lead to intensified competition
595 from secondary species; in our ecological study, we found agropastoral species to colonize
596 many logging gaps of the certified forests in Río Cangrejal.

597 Another issue related to the environmental impacts of certified forest management
598 is that because the main threats to the maintenance of forest integrity in many community
599 forests are more likely to be related to forest fragmentation than to the current low-impact
600 loggings, shifting the attention towards landscape-level connectivity and structural
601 heterogeneity could provide a more appropriate approach to environmental conservation in
602 such areas (Lindenmayer, Franklin & Fischer, 2006).

603 The same issue concerns the social heterogeneity of forest-based communities. The
604 livelihood strategies in many tropical forest communities, including those of Río Cangrejal,
605 depend on an array of activities and income sources, such as agriculture, forestry, cattle
606 husbandry, casual wage work, informal trading, and migration work (Nygren & Myatt-
607 Hirvonen, 2009; Sunderlin et al., 2005). Within this plurality of livelihood strategies,
608 community forestry often plays an important, although sporadic role. The limited attention in
609 the FSC principles to the existing socio-economic heterogeneity may lead to an inaccurate
610 assumption that all the community members are participating in certified forestry and sharing
611 the benefits and risks involved.

612 Any approach to certified community forestry should also recognize the social
613 differentiation and institutional complexity within which the productive resources are used,

614 managed and controlled. Well-targeted principles for certified community forestry would
615 require increased attention towards different resource users and resource interests. A
616 framework that carefully considers the role of forestry within an array of livelihood strategies
617 and land-use practices could provide a more appropriate approach for economically and
618 socially sustainable forestry in tropical developing countries.

619

620 THE HISTORY OF FOREST USE

621

622 Our findings from Río Cangrejal indicate that selective logging in previous decades may have
623 negatively affected the populations of many timber species. A similar situation may be found
624 in many tropical community forests, because of intensive periods of selective logging and
625 illegal forest exploitation at times when local resource rights were poorly legitimated (Taylor,
626 2005b). The forest certification principles should focus more attention on the constraints set
627 by past uncontrolled loggings on environmental soundness and economic feasibility in
628 certified community forestry operations.

629 On the other hand, many tropical forest communities have a long history of low-
630 intensity forest management, including small-scale timber and NTFP extraction. These
631 traditional forest-use practices have often been scarcely utilized in the planning of certified
632 forest management. As Leach & Fairhead (2000) note, small-scale forest management by
633 local inhabitants has influenced forest biodiversity in many parts of the tropics for decades.
634 Better incorporation of traditional environmental knowledge in the FSC forest management
635 planning criteria would be highly recommended.

636

637 FOREST ACTIVITIES AS PART OF THE ECO-SOCIAL LANDSCAPE

638

639 The scope of FSC certification is the forest management unit level; consequently,
640 SmartWood audits have largely concentrated on the direct physical impacts of logging.
641 However, the maintenance of forest integrity in fragmented community-forest landscapes
642 would require actions that focus beyond the management unit level. In particular, these
643 include improving the quality of agropastoral areas as migration pathways for forest
644 organisms and the connectivity of the managed forests to protected forests. Recent
645 discussions on tropical forest landscapes suggest integrated land-use management such as
646 agroforestry systems, where high-value timber trees are grown on agropastoral lands (Harvey
647 et al., 2008), the protection of gallery forests along farmland waterways (Tabarelli & Gascon,
648 2005), or the planting of animal-dispersed forest trees on abandoned pasturelands (Martínez-
649 Garza & Howe, 2003). However, with the existing insecurity of resource rights in many
650 tropical forest communities, the willingness of smallholders to plant trees on agropastoral
651 lands where their resource rights are unstable cannot be guaranteed.

652 While the debate on the role of managed forests in biodiversity conservation
653 continues, various scholars have suggested that well-managed forests could potentially
654 enhance the conservation value of the adjacent protected forests (Azevedo-Ramos et al.,
655 2006; Putz, Blate, Redford, Fimberl & Robinson, 2001). In Río Cangrejal, the protected
656 forests of Pico Bonito act as important refuges for plant and animal species unique to this
657 region (House, Cerrato & Vreugdenhil, 2002). Efforts to design a network of certified forests
658 around the protected areas could have a significant role in the conservation of biodiversity.

659 Concerning the socio-economic landscapes, although the careful documentation of
660 local resource rights is laudably recognized in the FSC principles, it would be important that
661 the FSC criteria explicitly state the need for governmental authorities to ensure more secure
662 resource rights for community forestry groups. A broader access approach that recognizes the
663 plurality of formal and customary resource rights could provide a more appropriate

664 framework to acknowledge the socio-legal and cultural heterogeneity in tropical forest
665 communities.

666 Similarly, it would be important to better consider the role of FSC as a voluntary
667 form of forest governance within the wider socio-political perspective. Through the spread of
668 certification as a market-based mechanism of forest governance, the role of state institutions
669 in forest regulation has been reduced (Taylor, 2005b). This has encouraged the Honduran
670 forest authorities to increasingly push the control of illegal logging onto the shoulders of
671 certified forestry groups, with limited institutional support. Since law enforcement is largely
672 the responsibility of state authorities, it would be highly recommendable to make it more
673 explicit in the FSC criteria whose responsibility it is to control illegal logging and what are
674 the roles and responsibilities of different stakeholders involved in forest governance.

675

676 LINKS TO THE WIDER POLITICAL ECONOMY

677

678 Improving the socio-economic viability of certified community forestry would require better
679 consideration of the wider political-economic conditions that shape the income opportunities
680 of certified community forestry groups. Our analysis indicated that certification has not
681 considerably changed the power relations that shape the community forestry producers'
682 access to markets. By focusing on community-level conditions, the FSC principles pay
683 limited attention to the wider dynamics of certified timber trade and the power relations
684 involved.

685 It would be important to formulate the FSC principles in a way that they better
686 capture the benefits and constraints faced by Southern community forestry operators in the
687 certified forest markets. Community forestry operators with little experience of global
688 markets, and with scarce resources to significantly intensify their production, have limited

689 opportunities to guarantee the volume, quality and timely delivery that global timber and
690 furniture buyers demand (Klooster, 2006). More focus would be needed in the FSC principles
691 on the certifications of chain of custody in relation to community forestry. Such certifications
692 could promote new partnerships between certified community forestry groups and the timber
693 and furniture companies that are interested in improving their reputation as environmentally
694 and socially responsible suppliers of tropical forest products. These partnerships could also
695 help to distribute the costs of certification more evenly, and to enhance the opportunities for
696 certified community forestry operators to compete with those practising illegal timber trade.

697

698 *Conclusions and Policy Implications*

699

700 Our analysis of the FSC certification principles in relation to tropical community forest
701 management demonstrated that certification has provided several benefits for the studied
702 community forestry groups of Río Cangrejal. These benefits include increased recognition of
703 the customary resource rights, growing awareness among the local people of the value of
704 their forests, and improved control over unauthorized forest clearing and illegal logging.
705 Certification has also enhanced the forestry groups' participation in forest policies, facilitated
706 governmental approval of the management contracts, and served as documented evidence of
707 the forestry groups' environmentally and socially responsible forest management.

708 At the same time, several factors limit the ability of certification to benefit the local
709 operators and improve the environmental sustainability of community forestry. The eco-
710 social landscapes in tropical developing countries are shaped by complex land-use histories,
711 multifaceted resource rights, and heterogeneous forest users with differentiated interests
712 toward forest resources. The high costs of certification and the financial dependency on
713 donors also constrain the opportunities of community forestry operators. Poor knowledge of

714 tropical ecosystems and the different ecological requirements of the logged timber tree
715 species pose additional challenges. These factors are insufficiently recognized in the FSC
716 certification principles.

717 It would also be important to consider that many of the processes critical to
718 sustainable forestry reach beyond the current scope of FSC. From the ecological perspective,
719 actions taken at the level of the forest management unit may be insufficient to maintain forest
720 integrity and sustain timber tree populations in ecosystems affected by forest fragmentation
721 and degradation. Instead of concentrating the attention to the reduction of mechanical logging
722 damage, the quality of the agricultural areas between forests as pathways for seed-dispersing
723 animals would need attention in the low-impact community forest management systems.
724 From the socio-economic point of view, FSC's focus on local-level forest management treats
725 the forest communities as somewhat isolated from the wider political-economic context.
726 Increased attention should be focused on improving the position of certified community
727 forest operators in the global forest markets.

728 In this respect, FSC should further pursue several critical reforms. First, instead of
729 the current formalistic approaches that require the careful documentation of customary
730 resource rights along with formal standards of legality, FSC could pursue more creative and
731 context-sensitive approaches to customary resource rights concerning tropical community
732 forests. At the same time, FSC should strive for better governmental recognition of the
733 communities' traditional resource rights (Ribot & Peluso, 2003; Tollefson et al., 2008).

734 Second, increased attention should be paid to the broader context of legality and
735 legitimacy. Because of the complexity of laws and their instability over time, Southern
736 smallholders are sometimes forced into criminalized forest activities. Besides, the drivers
737 behind illegal timber trade are largely global. Concerning the monitoring of illegal timber
738 trade, it might not be fair to expect certified community forestry groups to control illegal

739 forest activities in the areas under their operation. Instead, strategies that better combine the
740 voluntary, market-based instruments of forest governance with the mechanisms of efficient
741 law enforcement and legally-binding forest regulation could be worth consideration (Cashore,
742 Auld & Newsom, 2004; Howlett et al., 2009).

743 Third, the new initiatives for a joint labelling project by FSC and FLO, whereby
744 those forest sources that are already FSC certified could be labelled by Fair Trade Standards
745 for timber (FLO, 2010b), would significantly widen FSC's current focus on the conditions of
746 forest management. Regarding Fair Trade's commitment to modifying the conventional
747 global value chains by promoting alternative trade relations between Northern consumers and
748 Southern producers, FSC might improve its credibility as a socially responsible trade
749 network. However, the fact that the payment of minimum prices could not be guaranteed for
750 certified forest products, even within this joint FLO/Fairtrade standard, raises certain doubts
751 over the innovativeness of this project. According to the current plans, given the variety of
752 forest products, it would be impossible to set minimum prices for certified forest products
753 similarly to those that apply for many Fair Trade agricultural products, such as coffee or
754 banana. A single premium percentage for social development would be equally difficult to
755 set, since the value of the forest products is added at diverse levels of processing and thus
756 makes the value chains of forest products more complex than those of tropical agricultural
757 products (FLO, 2010b; Taylor, 2005 b).

758 Fourth, as market-based mechanisms of environmental governance, certifications
759 alone may be unable to create long-term alternatives to environmentally sustainable and
760 socially responsible development in the global South. In fact, many of the problems faced by
761 FSC are common to most of the certification schemes seeking to certify Southern small
762 producers. Fair Trade certified coffee, for example, represents about 1% of global coffee
763 production, and the supply highly exceeds the demand (Valkila & Nygren, 2010). Viable

764 strategies for diminishing the vulnerabilities of Southern small producers in maintaining their
765 livelihoods through engagement in rapidly changing global niche markets would be worth
766 careful consideration in all certification systems operating in the tropics (Auld, 2010).

767 Finally, general principles and criteria are crucial for accountable certification
768 systems. The risk in such generic principles is, however, that they easily conceal the many
769 different ‘realities’ that constitute the global networks of production and consumption, and
770 thus may lead to unintended negative consequences (Goodman, 2008; Pattberg, 2005).

771 Deeper understanding of diverse local circumstances and their complex linkages to wider
772 political-economic conditions is needed to develop strategies that carefully combine the goals
773 of responsible forest management, sustainable livelihoods, and socially fair and economically
774 viable trading networks.

775

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Table Captions

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909 Table 1. Description of the studied forest communities and forest areas.

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911 Table 2. The FSC principles applied in certified community forest management (Source:
912 FSC, 2002).

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914 Table 3. The main socio-economic and environmental factors affecting the feasibility of the
915 FSC certification principles in relation to community forest management in Río Cangrejal.

916 **Table 1.**

Name of community/ forest area	Number of households	Forest type	Size of production forest (ha)	Altitude (m, above sea level)	Name of forestry group	Number of members (2004)
Río Viejo	79	Certified	618	930	Peralta y asociados	14
Toncontín	133		1061	900	Reyes y Asociados	28
Yaruca	104		625	650	Tinoco y Asociados	12
El Naranjo	61	Conventionally managed	1682	250	Marciano Lobo y Asociados	13
El Pital	40		N/A	500	N/A	N/A
El Urraco	53		1709	950	Castellano y Asociados	16
Las Mangas	-	Protected	-	850	-	-
La Primavera	-		-	200	-	-
Pico Bonito	-		-	200	-	-

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919 **Table 2.**
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Principle	Main requirements
#1: Compliance with laws and FSC Principles	· Forest management shall respect all national and local laws, relevant international treaties and agreements, and comply with all FSC principles and criteria.
#2: Tenure and use rights and responsibilities	· Long-term tenure and use rights to the land and forest resources shall be clearly defined, documented and legally established
#3: Indigenous people's rights	· The legal and customary rights of indigenous peoples to own, use and manage their lands, territories, and resources shall be recognized and respected.
#4: Community relations and workers' rights	· Forest management operations shall maintain or enhance the long-term social and economic well-being of forest workers and local communities.
#5: Benefits from the forest	· Forest management operations shall encourage the efficient use of the forest's multiple products and services to ensure economic viability and a wide range of environmental and social benefits.
#6: Environmental impacts	· Forest management shall conserve biological diversity and its associational values, water resources, soils, and unique and fragile ecosystems and landscapes, and by so doing maintain the ecological functions and the integrity of the forest.
#7: Management plan	· A management plan – appropriate to the scale and intensity of the operations – shall be prepared, implemented, and kept up to date. The long-term objectives of management, and the means of achieving them, shall be clearly stated.
#8: Monitoring and assessment	· Monitoring shall be conducted – appropriate to the scale and intensity of forest management – to assess the condition of the forest, yields of forest products, chain of custody, management activities and their social and environmental impacts.
#9: Maintenance of high conservation value forests	· Management activities in high conservation value forests shall maintain or enhance the attributes that define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach.

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923 **Table 3.**
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	Socio-economic factors	Environmental factors
#1: Compliance with laws and FSC Principles	<ul style="list-style-type: none"> - Forest laws and regulations are complex and contradictory - Prevention of illegal logging involves high risks 	<ul style="list-style-type: none"> - Governmental quotas restrict appropriate use of the silvicultural potential
#2: Tenure and use rights and responsibilities	<ul style="list-style-type: none"> - Customary rights and local resource use practices may be difficult to legitimate 	<ul style="list-style-type: none"> - Insecure resource rights make it difficult for smallholders to commit themselves to coordinated efforts for improving the forest connectivity
#3: Indigenous people's rights	N/A	
#4: Community relations and workers' rights	<ul style="list-style-type: none"> - Community members have varying levels of involvement in forestry - Low profits from forestry do not enable investment in workers' health and insurance. 	<ul style="list-style-type: none"> - Manual logging on hillsides is a physically demanding task, which limits engagement in forestry
#5: Benefits from the forest	<ul style="list-style-type: none"> - Lack of price premium for certified products reduces profitability - Diverse income sources limit the ability to focus on certified forestry - Scarce resources for long-term business strategies constrains market access - High costs of certification increase dependency on external donors - Hierarchical patterns have not been changed in certified timber trade. - Community producers have poor bargaining power in certified forest value chains 	<ul style="list-style-type: none"> - Past loggings have reduced the populations of timber tree species - Forest fragmentation limits the post-logging recovery of forests - RIL may constrain the regeneration of light-demanding timber tree species - Logging pressure is highest for the most degraded timber species - Low abundance of valuable NTFPs limits profitability - Lack of resources for compensatory planting limits timber tree regeneration
#6: Environmental impacts		<ul style="list-style-type: none"> - Assessment of environmental impacts is highly demanding in tropical forest ecosystems - Pre-certification loggings and forest fragmentation may affect biodiversity more than current loggings - Forest conservation is based on CITES lists instead of area-specific information
#7: Management plan	<ul style="list-style-type: none"> - Limited attention to the socio-economic conditions of forest management 	<ul style="list-style-type: none"> - Past logging has an impact on the current populations of timber tree species - A 30-year rotation period is too short for the productivity of many timber species
#8: Monitoring and assessment	<ul style="list-style-type: none"> - Lack of resources to implement careful monitoring - Control of illegal logging increasingly laid on the shoulders of local forestry groups 	<ul style="list-style-type: none"> - Spatio-temporal variability in the regeneration patterns of timber species makes monitoring difficult - Lack of well-known indicator groups to monitor changes in flora and fauna
#9: Maintenance of high conservation value forests	<ul style="list-style-type: none"> - Limited attention to links between forest conservation and local livelihoods 	<ul style="list-style-type: none"> - Lack of indicators for defining high conservation value forests