OF TURTLES AND TACTICS

CONSERVATION AND SUSTAINABLE COMMUNITY DEVELOPMENT IN SAN FRANCISCO, COSTA RICA

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Conservation and sustainable community development in San Francisco, Costa Rica

Major Research Paper submitted to the Faculty of Environmental Studies in partial fulfilment of the requirements for the degree of Master in Environment Studies, York University Ontario, Canada.

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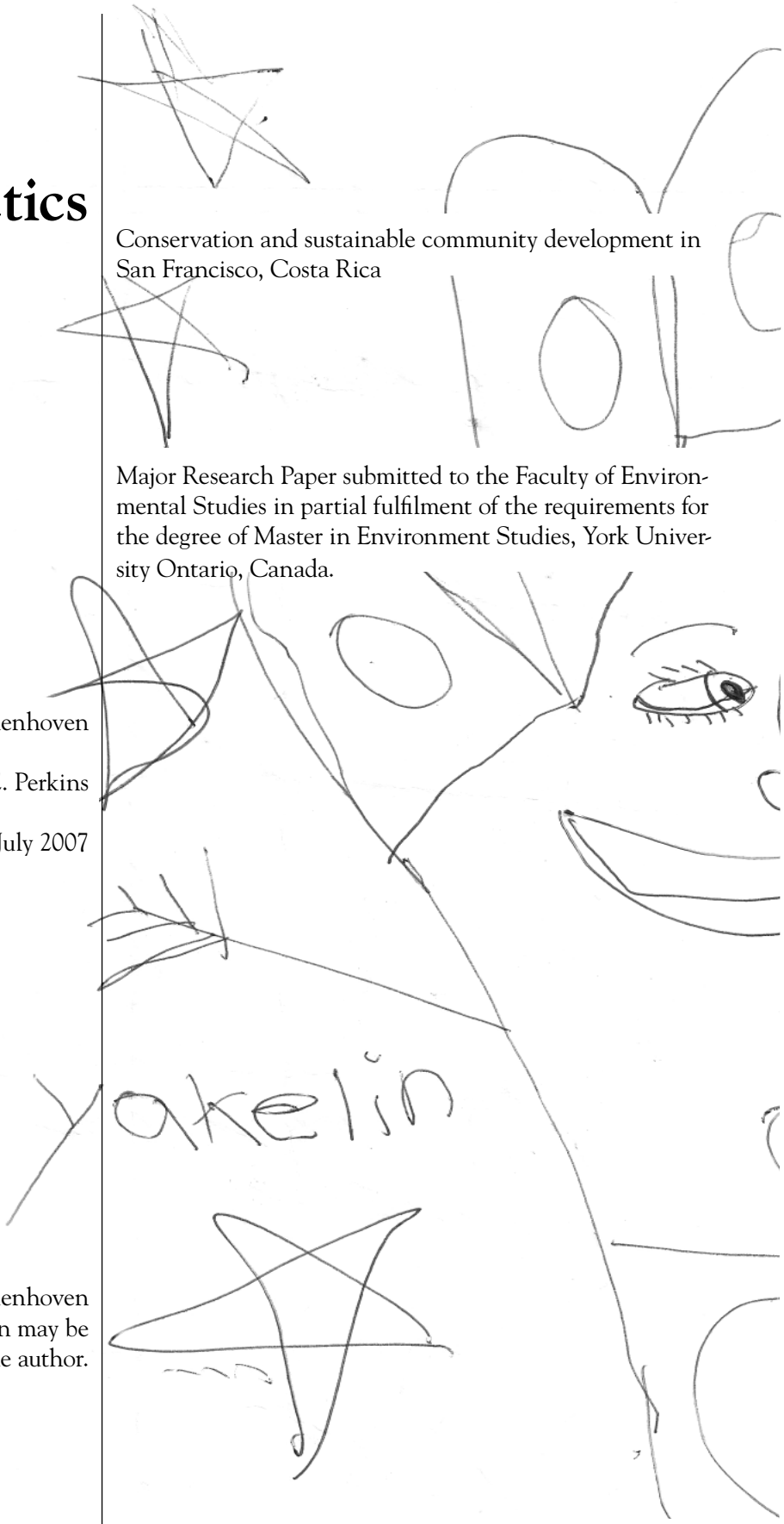
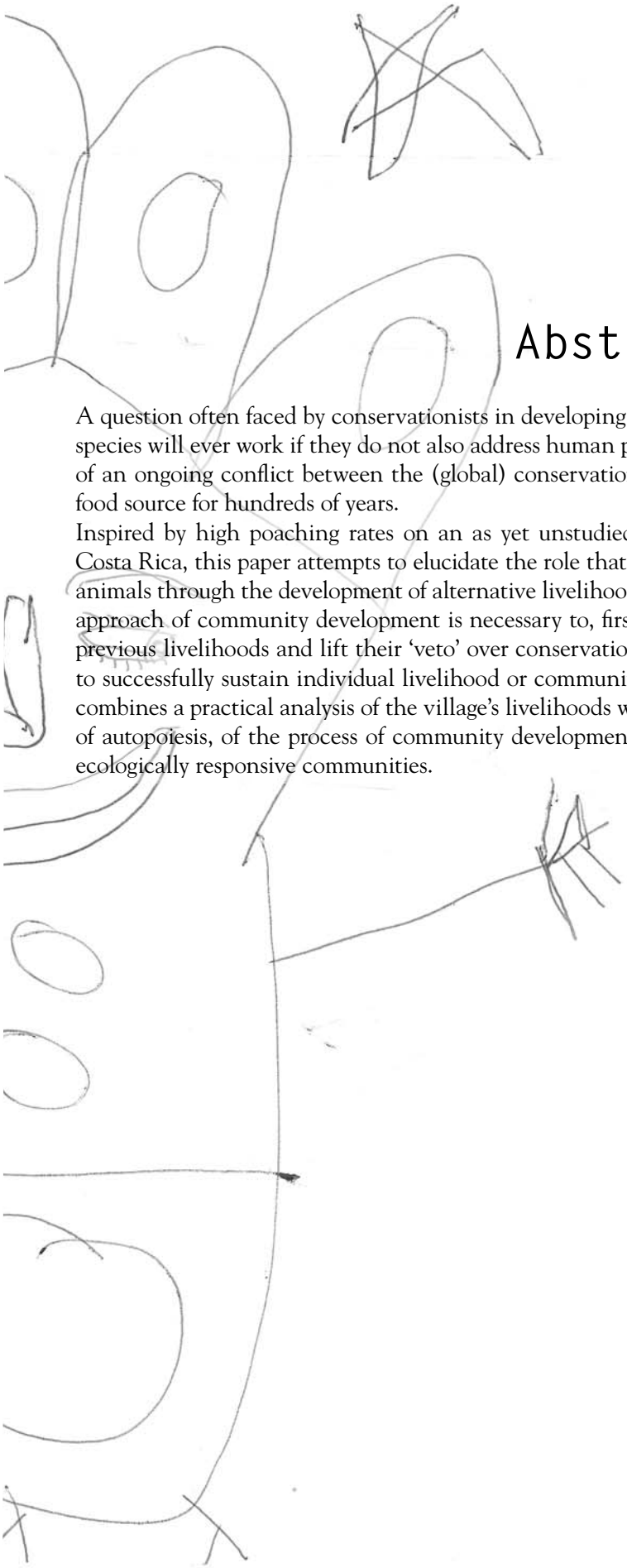


Portrait of the author
by Yakelin - San Francisco primary school



Abstract

A question often faced by conservationists in developing countries is whether their efforts to protect endangered species will ever work if they do not also address human poverty. Sea turtles are a classic example, and the source of an ongoing conflict between the (global) conservation movement and people who have relied on them as a food source for hundreds of years.

Inspired by high poaching rates on an as yet unstudied sea turtle nesting beach on the Caribbean Coast of Costa Rica, this paper attempts to elucidate the role that conservation agencies can play in the protection of the animals through the development of alternative livelihoods for poachers in the nearby village. It is argued that an approach of community development is necessary to, firstly, ensure that poachers benefit from renouncing their previous livelihoods and lift their 'veto' over conservation efforts and, secondly, create the social fabric required to successfully sustain individual livelihood or community-based conservation projects in the future. The paper combines a practical analysis of the village's livelihoods with a more conceptual exploration, based on the theory of autopoiesis, of the process of community development and how that process may be 'manipulated' to create ecologically responsive communities.

Ackowledgements

I dedicate this work to the 274 people that live in San Francisco. I thank them for the way in which they welcomed me, housed me, worked with me, fed me (even though I haven't been able to eat rice and beans since) and broke my rib. They taught me much about life and even more about how to really speak Spanish. I still have hopes that one day, if I speak the language enough, I will get rid of your terrible accent.
I also hope that the work we did together will bear many fruits.

Three months after I had left San Francisco I received the sad news that Breidy Escorcía, a wonderful young boy that wanted to be an astronaut, had been killed by a crocodile. I dedicate this work to him and to the wellbeing of his family.

Deepest appreciation goes out to COTERC and GVI and all their wonderful people. Greg, Tom, Mario Rasta, Jana, James (for the tripod…), Rebeca, everybody: you have given me an incredible learning experience and have supported me during the entire research process, not in the least by letting me stay at the field station which is such a magical place. I hope that my work will prove useful to the station and its conservation efforts in the future.
I am also very grateful for the financial support I received for this research from the Fisher Fund for Neotropical Conservation.

During my time at FES I have been surrounded by a few fantastic friends and mentors. Ellie, who, despite my terrible planning and profound desperation, took me on and somehow, with an optimism that to me seemed rather at odds with the laws of this universe, saw me through to the end of this journey. Bill, you are a very great teacher – thank you for all your help, for listening to all my complaining, and for reopening my eyes to the joys of African beer. Gail and Laurence, your wonderful friendship, generosity, cooking skills and printer saved my life, several times.
Ginititica…gracias por su (!) ayuda y amistad…
Many more people and their organisations have helped me with this research, through sharing their knowledge, their time and efforts, or providing feedback on sections of this paper: Carlos Calvo, (MINAE), Don Sergio, DINADECO, Royner Solano, INFOCOOP, Didiher Chacón, Emma Harrison, the CCC, Sebastian Troëng, Roger Zuniga, Howard Daugherty, Rebeca Chaverri, Rob Macdonald and Justin Podur…thank you all so much.

The joy of writing the very last page of this paper would have been far far away were it not for the support and (sometimes) gentle encouragement of my lovely parents. Then again, if it weren't for them I wouldn't have had to suffer the pain of writing the other 72 pages either. But that is a different story… Dank jullie wel!

Foreword

This Major Paper and the work on which it is based were undertaken in partial fulfilment of the requirements for the degree of Master in Environmental Studies. The area of concentration of this degree is titled "Ecodevelopment and Sustainable Livelihoods in the Developing World" and reflects an interest in understanding the often conflicting objectives of human (economic) development and securing ecological integrity, and the roles that communities, NGO's and individuals (I) can play in their resolution. If asked to summarise my past two years of educational experience, I would answer that it was a process (and in many ways a struggle) of making sense about the messy field of international development and of the way in which I, as an outsider and a Westerner, can play a meaningful role in it. I think this paper reflects that struggle.
The fieldwork in Costa Rica and reflecting on it in this paper were instrumental in fulfilling the learning objectives outlined in the Plan of Study: to a] further my understanding of ecology (sea turtle ecology and conservation, second chapter); b, c] learn about strategies for achieving sustainable livelihoods and how these are embedded in the cultural, political and economic system of a country (the sustainable livelihoods analysis described in chapter 1); and d] acquire the practical skills required to work in the field, with communities and people of a different culture (Spanish language, participatory development techniques and survey/interview skills).

Views expressed in this paper are the author's alone and may not reflect those of the organisations for which this study was conducted.

Note: unless otherwise noted, all appendices, photographs, maps and other graphics were written and/or produced by the author. Appendices, if not attached to this paper, may be requested through fledelik@yahoo.fr

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The future of San Francisco…¡Si señor!

Introduction

The day on which I started writing the first words for this introduction, the Toronto Star reported, in one single issue, that: the crew meals for the Oscars were served on biodegradable dishes, that Arnold Schwarzenegger "flexed his muscles on emissions", and that Prime Minister Stephen Harper stressed the importance of "community involvement" in Afghanistan[1]. While none of these topics are very relevant to the subject of this paper, they all bear witness, in a sadly ironical way, to a common theme in current mainstream environmental practice: to talk (a lot), indulge in the rhetoric of all things 'environmental', and to feel altogether very satisfied with doing little more than 'rearranging the deck chairs on the Titanic'.

In a similar vein, biodiversity conservation and community participation and development[2], topics which this paper *is* about, are being hollowed out, corporatised and co-opted by conservation and international development organisations alike and risk losing much of their original meaning and intention (Brosius and Russell 2001; Cooke and Kothari 2001). The aim of this paper is not so much to criticise the present-day uses of these concepts—many others have done that in many different ways—but to instead pull them down from the obscuring clouds of theory back to the grassroots-level expressions they once were. I intend to do that by offering a straightforward and honest account of an equally straightforward and honest attempt at initiating the processes of conservation and community development in a small village on the Caribbean coast of Costa Rica. It is difficult to find first-hand, practical reports in the academic literature (Tyler 2006) and I hope that especially beginning practitioners may find this paper helpful in their preparations for conducting fieldwork (in San Francisco or elsewhere).

The foundations of this study were laid four years ago, when, together with York University, the Canadian Organisation for Tropical Education and Rainforest Conservation (COTERC) initiated a sea turtle monitoring project on the beach neighbouring its biological field station in the Tortuguero area in Costa Rica. Currently, Global Vision International (GVI), a UK-based volunteer organisation using the field station as its basis, has taken over most of the project's tasks and responsibilities. I worked on this project in the summer of 2006 and was asked to write a feasibility study[3] (appendix 1) investigating whether and how project activities should be continued in the future. Sea turtles nesting on the *Playa norte* (North beach), as the beach is called, had never been systematically studied and neither nesting numbers (and whether they were high enough to warrant beach protection) nor the impact of poaching from the nearby village of San Francisco were known. While the feasibility study offered some answers, it also raised an important question: whether our solutions to the conservation of sea turtles, and wildlife in general, will ever work if they are not also solutions to human poverty.

In an area such as Tortuguero, where many people depend on their environment for their livelihoods, the answer is, of course, no.

The question stayed on my mind and eventually made me return to San Francisco to do the work described in this paper. Based on the premise that, in this specific case, addressing livelihoods is an integral part of biodiversity conservation and that achieving conservation goals must entail cooperation between COTERC/GVI and the people of San Francisco, I have tried to bring together their seemingly conflicting objectives: development and conservation. This paper is written specifically for COTERC and GVI, with the aim of offering them a better understanding of the village, its people and their skills and aspirations, and the livelihoods in which they are engaged. I hope it will facilitate meaningful interaction with the village and ensure that the development activities in which the two organisations will assist the village are inspired and driven by the people themselves.

This paper has two parts, one more applied and practical (the first two chapters), the other general and more theoretical (the last chapter). While the chapters can be read separately, they are strongly interrelated and add to each others' meaning.

The first chapter describes San Francisco and the circumstances—local, regional and (inter)national—that gave rise to the village as it is today. It uses a Sustainable Livelihoods Approach (SLA) to arrange information and pays specific attention to 'livelihood assets', how their use is moderated by policies and institutions and how, accord-

[1] Toronto Star, Tuesday, February 27, 2007. Articles referred to are: *Harper goes soft on mission*; *The answers please: a dozen questions about the Oscars* and *Flexing muscles on emissions*.

[2] In this paper '**development**' is defined as '**good change**' (after Helmore and Singh 2001).

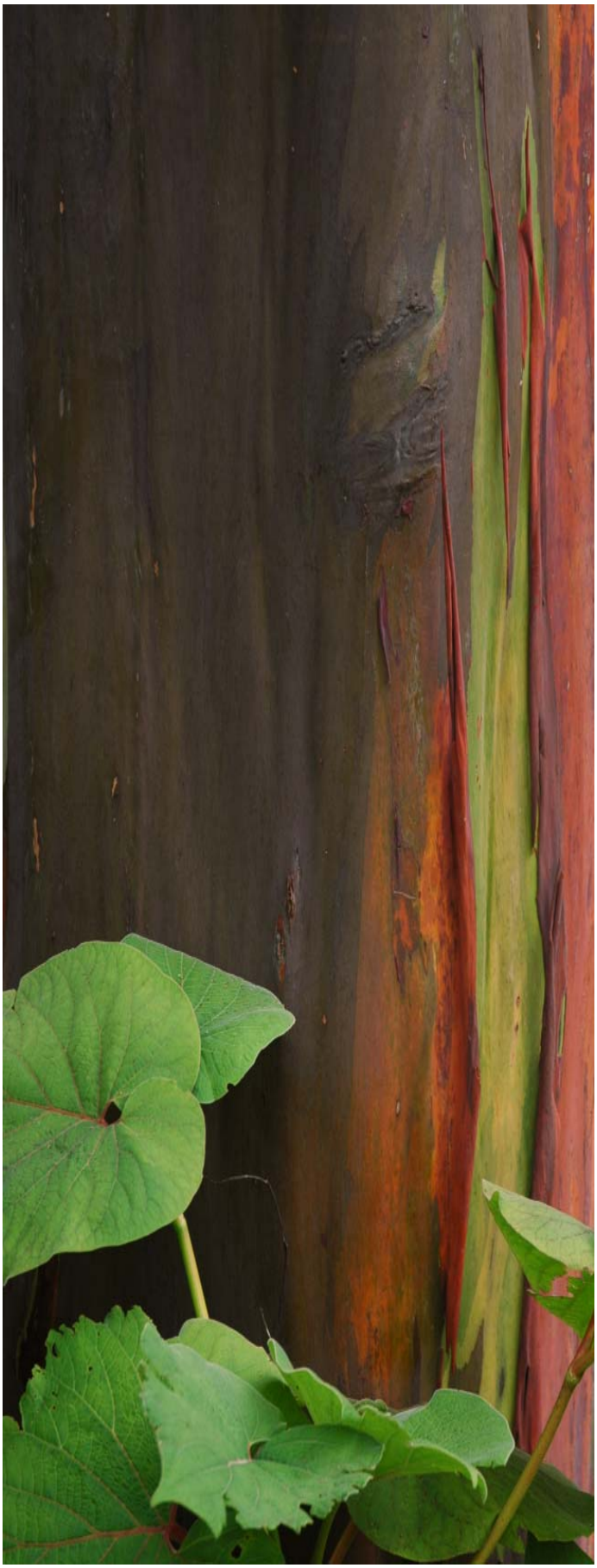
[3] The study can also be downloaded from COTERC's website at <http://www.coterc.org/marine.html>

ing to villagers, these assets and the access to them may be strengthened in the future. Because getting to know a village is a long process, this chapter is quite elaborate; for those who find it too long, the graphs on pages 29 and 34 summarise many of its findings.

Sea turtles are a particularly illustrative example of a highly contested livelihood asset. Their importance to livelihoods on one hand and conservation on the other causes a standoff between some villagers and conservationists. But while turtles are indeed a source of conflict between the two parties, they can also be instrumental in uniting them. The second chapter, partly as a follow-up and conclusion to the feasibility study, describes some of the rationale for community-based sea turtle conservation in San Francisco.

The third chapter represents the theoretical part of this paper. It builds on the findings of the livelihoods analysis and discussion of turtle conservation in the first two chapters to show what role outsiders and outside agencies may play in engendering autonomous community development and steering it in a direction that is accordant with conservation goals. This question is addressed using the idea of *autopoiesis*, a systems theory that proves particularly appropriate to a setting of community development and community-based conservation (CBC).

If, at times, my tone of writing seems slightly cynical, or the discussion of 'livelihood assets' a bit distant and impersonal, I apologise: I find it difficult to capture the feelings (good and bad) that inevitably arise when doing community work in scientific jargon or an academic style of writing. The photographs and occasional personal anecdotes in this paper are intended as compensation. They are there to show both my vulnerability as an outsider in a 'difficult' village and the respect, appreciation and friendship I developed for the people and natural beauty of San Francisco.



Eucalyptus tree

Methodology

The case study described in this paper is based on two periods of field research conducted between May and September 2006 and December 2006 to February 2007. The first period concerned mostly sea turtle research[4] (the results of which are described in the second chapter) and was based at COTERC's biological field station; the second period was spent in the village of San Francisco and involved a livelihoods analysis of the village (described in the first chapter) and an initial effort at community organisation and development.

Five principal methods (qualitative as well as quantitative) for gathering information were used: direct observation, a village census, informal and structured interviews, village meetings, and literature research.
While research activities overlapped, they more or less occurred in the order mentioned above: personal observation and informal conversations were necessary to shape my initial image of the village and provide the basic information necessary to draft the census questionnaire, and the results from the census provided the input for subsequent village meetings.
Personal observation was facilitated by living with a few different families in San Francisco for a period of two months; it was by far the most rewarding and effective 'tool' for understanding the village and its internal dynamics.
The **census** (questionnaire attached in appendix 2, in Spanish) was completed for 76 of the village's 81 households (the remaining 5 families do not live there permanently), and had several purposes: to yield basic demographic information (no official data were available for the village), to give an overview of the village's livelihoods, people's problems and hopes, and to provide a rudimentary measure of social capital. The information obtained through it was later used to construct a resource calendar (page 29), write the *diagnostico communal* (community 'diagnosis', appendix 3, in Spanish) required for the establishment of a village association, and to apply for a crèche (the government must know how many young children a village has before it provides support for a crèche). Where qualitative concepts (e.g. perceptions, feelings) were used quantitatively (e.g. when measuring social capital), answers were coded and assigned a score to allow for meaningful comparison.
Because many villagers are illiterate and, as I soon discovered, some of the questions on the census required explanation and some further prodding, I decided to administer the census myself. I am aware of the disadvantages of this approach: even though confidentiality was guaranteed, people might not have been as candid as they would have been without my presence (e.g. concerning hunting, poaching or drug trafficking) and I sometimes noticed that people tried to answer what they thought I wanted to hear. In general, however, people were open and clearly appreciated being asked and enjoyed talking about their lives. Often whole families (and their neighbours) would gather to contribute to the conversation and in many cases a lively discussion resulted, teaching me much more than the simple answers to a questionnaire. The disadvantages of being present while questionnaires were filled out were thus far outweighed by the advantages: beside the benefit of a high (100 percent) response rate, the fact that people became engaged and started to reflect on problems and solutions created the momentum required for the meetings that were organised after. It also enabled me to find the people that knew more about certain subjects, such as the history of the village, turtle poaching, or fishing, and approach them for more in-depth **interviews**. A total of 57 relatively short (mostly following the discussion of the questionnaire) and 14 in-depth interviews were conducted. The latter ones were recorded and some were transcribed. Of these interviews, 35 were held with men and 36 with women.
A total of two **village meetings** (between 28 and 36 people attended) and 4 **workgroup meetings** (for 5 to 8 people) were organised with the primary aims of discussing census results and ideas and strategies for future developments in San Francisco.

Validity of the research

During the two months stay in San Francisco my role as researcher slowly changed into that of community developer and, in many cases, as a friend and someone working together with people. I was very much implicated in the context I was trying to understand and have, for that reason, not tried to deliver an impartial account free of personal opinion. Rather, to offer the reader an understanding of my position in this research and the information it has generated, I have included personal reflections and short narratives in this paper—most of

4 For the methods used I refer to the project's research protocol (COTERC and GVI 2006). It was originally written by Lydia Chaparro (project biologist) and Jana d'Aigle (project coordinator) and later revised by Susie Byrne (researcher) and myself.

these are excerpts from the field diary I kept while doing the research.

To ensure the validity of the information presented in this paper I have adhered to a number of principles commonly used for participatory field research (Vernooy and McDougall 2003):

1. Researcher and participants must have a common agenda (understanding and improving the current situation) – achieved through prolonged and intensive engagement with villagers.
2. The research contributes to concerted planning for the future and social change – knowing that this research may be used by COTERC and GVI as a basis for their future interaction with the village, I have been careful to report information as truthfully as possible.
3. Triangulation – where possible, multiple methods (quantitative and qualitative research methods, in combination with literature research) and sources were used to obtain and verify information. In some cases it was difficult to triangulate information, as only very few people knew about specific topics or were willing to discuss them (this is especially true for turtle poaching). In these cases I have tried to pose the same questions in different ways and on different occasions.
4. The research is based on iterative learning and feedback loops – I have tried as much as possible to make the learning experience two-directional, discussing ideas and observations with host families, other villagers, and during village meetings (this is often referred to as 'member checking'). A reflexive journal served to understand my own position within the research and revise hypotheses on a regular basis.

As the findings presented in this paper (especially the first two chapters) concern a specific case study, their reliability, or 'generalisability' is small. To nonetheless allow for the meaningful use of these findings to different circumstances in other communities, the local situation was described as 'thickly' as possible, clearly demarcating the context and applicability of findings.

Chapter 1: Life and Livelihoods in San Francisco, Costa Rica

1.1 Bananas, SAPs and turtles – a historical perspective

Entrenched behind monopolistic concessions, holding in the same hand control of transportation facilities and banana production, being able to a large extent to dictate terms to planters and labourers, having greater income, influence and power than many governments, the United Fruit Company is able to amass larger profits than it could were it operating under either genuine competition or governmental regulation.

Charles David Kepner, 1936 (quoted in Jermyn 1995, p. 57)

By some, San Francisco is referred to as 'the village that should have never been there'. A squatter community that causes more trouble than good. Although only a small settlement, its origins mostly local, some of the forces shaping its growth and development originate at the regional and global level. To provide that wider context and understanding to the more localised livelihoods analysis later in this chapter, I will begin here with a brief discussion of Costa Rica and the wider Tortuguero area (in which San Francisco is situated).

Costa Rica is often touted as a model democracy. It is an ecological paradise; Latin America's success story of development, a country with more teachers than soldiers (the country abolished its army in 1948). There is truth to all of these assertions, but for anyone staying in Costa Rica beyond the nine-day ecotourism zip line rafting-adventure it soon becomes clear that it is also a country plagued by corruption, that 'development' has come at a tremendous price and that ecotourism is just tourism, the green conservationist image a bit of a farce.

Costa Rica is seen by many (including a number of Costa Ricans I met throughout my stay in the country) as a peon of the United States. 'Gringafication' is perhaps most apparent on the Pacific coast, but the Century 21 real estate signs posted on every desirable piece of ocean front are but a current manifestation of what is a much more deeply entrenched, historical dominance by US economic and political interests[5]. The real economic colonisation of the country started in 1899, on the Atlantic coast, with the Boston-based United Fruit Company (UFC) investing in and taking absolute control over the export of bananas (Seligson 1977). Before that time, the Costa Rican coffee industry had provided the main product for export and bananas were cultivated on occasion only as a subsistence crop (ibid). Today, Costa Rica remains the world's second largest exporter of bananas with three US-based companies controlling 95% of production (Edelman and Kenen 1988).

Parallel to the development of the banana industry, and in part propelled by it, the government began to play an increasingly large (and for that time, remarkable) role in public life. It invested heavily in infrastructure—roads, hospitals, schools—and later extended its spending to social security and socially beneficial enterprises (Villasuso 1992). But with the state becoming larger (and increasingly inefficient), so did its debts, for all development was financed by borrowing—from the US, the UK, and to a lesser degree from Canada and The Netherlands. Its dependence on the export of coffee and banana for hard currency and imported products (including food) left Costa Rica so vulnerable to the volatility of the international economy that any drop in market prices meant either a drop in imports or a greater trade deficit (Biesanz et. 1999). The tripling of its debt (to almost the highest per capita in the developing world [Daling 1998]) to international lenders as a result of the 1980's world economic crisis forced Costa Rica to turn to the World Bank and the IMF for help and thus unleashed upon the country the lethal cocktail of structural adjustment policies (SAPs)—reduced public spending, privatisation of state agencies, reduction of taxes and tariffs, increased exports, currency devaluation, etc. While Costa Rica's political stability and relatively high living-standards should have made the country a comparatively 'ideal' recipient of SAPs, results, measured both in macro-economic terms and in

5 Despite its professed neutrality, Costa Rica has been a long-time 'ally' of the United States, also during armed conflicts. During the Reagan and Bush administrations and the CIA-led Contra war (1981-1990) in neighbouring Nicaragua, Costa Rica was the second largest recipient of US aid money per capita, topped only by Israel (Edelman and Kenen 1988).

terms of social and equitable development, were mixed at best (Hansen-Kuhn 1993, Rodríguez 1993).

A disturbing corollary of the SAPs was a change in the way in which 'nature' was perceived and managed. In the sixties, the banana plantations and the expansion of cattle farming (supported by World Bank and US loans to satisfy the US fast food market), had already severely polluted and scarred the land (deforestation rates were the highest in Latin America and 4th in the world [Sánchez-Azofeifa et al. 2001; Daling 1998]), but with the SAPs destruction came more insidiously, disguised behind a veil of green intentions. Through financial repayment methods called 'debt-swaps', by which indebted countries hand over ownership over part of their industry, bank assets, or nature, USAID, CIDA, WWF Canada, and The Netherlands came to act as Costa Rica's parallel governments with regards to its environment (Isla 2005).

Under the banner of sustainable development and conservation, 'environment' now truly became a commodity, imbued with the capitalist rhetoric and values required for its new function in capital accumulation and the repayment of the country's debt. USAID decided that new options (resource extraction such as mining and forestry and increased emphasis on (eco)-tourism) needed to be explored in order for the Costa Ricans to enhance their "quality of life" and satisfy their "recreational, aesthetic, and spiritual needs" (ECODES 1989). Several years later, in 1991, WWF-C and CIDA introduced the creation of Conservation Areas for protection, research and bio prospecting (and financed the building of labs for pharmaceutical research). They charged the Ministry of Energy and the Environment (MINAE) with the physical protection of these areas and the National Institute for Biodiversity (INBio – a private institution subject to neither public nor parliamentary control) with the finding of marketable biodiversity and its sale to industries worldwide (Isla 2005).

Local communities, their livelihoods and knowledge now expropriated or commercialised for the sake of biodiversity conservation and sustainable development did not usually benefit; they were relocated outside the boundaries of conservation areas and forbidden entry into them (Weitzner and Borrás 2000). In concert with other SAP-related measures, most notably ecotourism[6] and the mechanisation and intensification of export-oriented agriculture, these 'debt-for-nature' investments thus worked to increase foreign control (and often ownership) of land and natural resources and push the *campesinos*, the smaller landholders, off their lands.

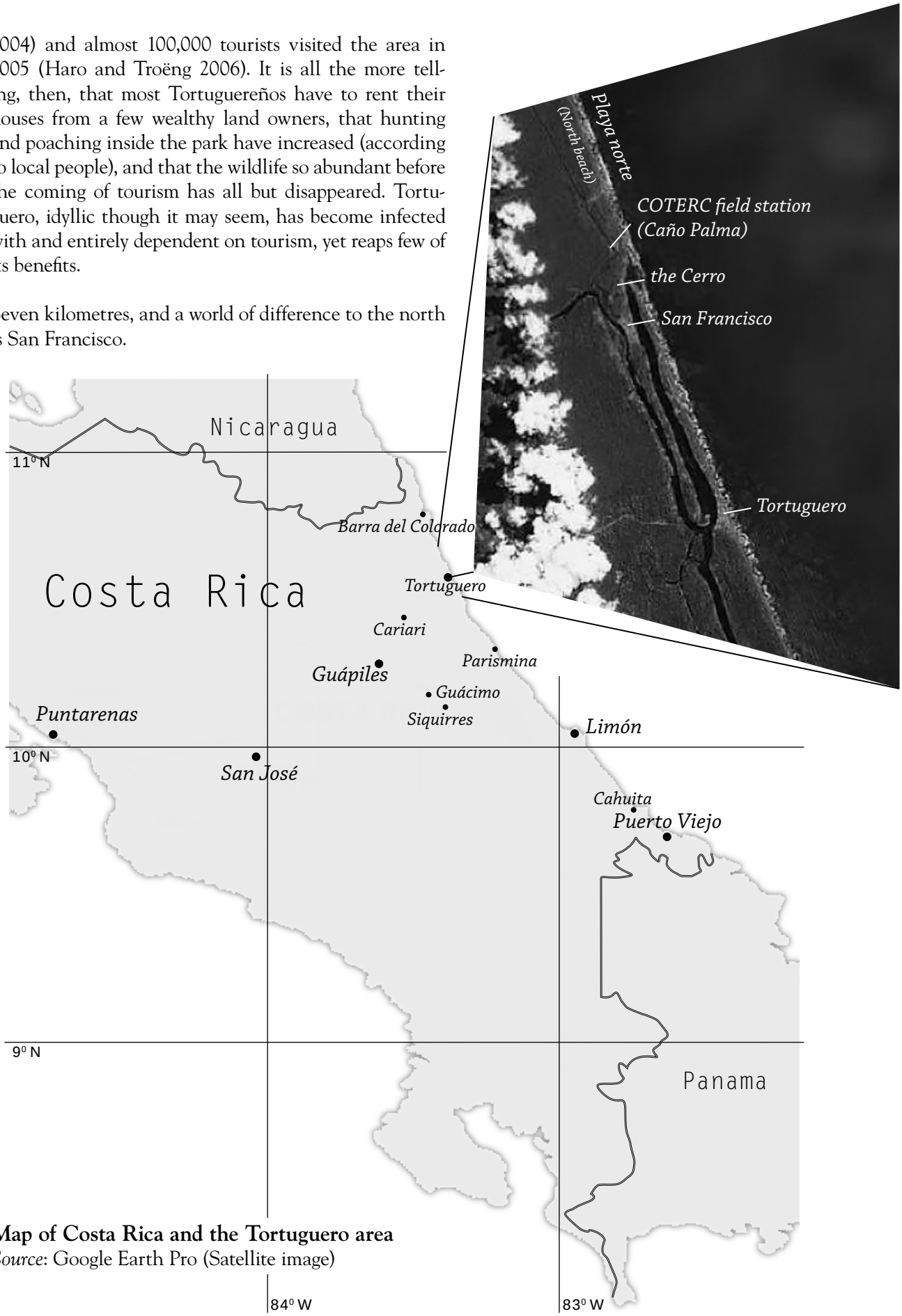
Many of these developments are reflected in the history of Tortuguero, or Turtle Bogue as it used to be called. Although Indians had lived in the area long before Columbus "discovered" it in 1502 (several now raided burial mounds in the Tortuguero national park testify to their past presence), the 'Bogue' was settled only in the beginning of the 20th century, mostly by Afro-Caribbean men who came during the turtle season to catch turtles (see next chapter). The further settlement of the village was an indirect consequence of the banana industry and the construction of the railway facilitating it (Jermyn 1995). Many black people, mostly from Jamaica, were brought to Costa Rica in the 1880s to help build this railroad; they were better able to cope with the ravages of malaria and yellow fever than the Costa Ricans and stayed on to work on the banana plantations of the United Fruit Company afterwards. They were later joined by more Afro-Caribbeans from Panama and, later still, from Nicaragua (Anderson 2005). But, as *Mamita Yunai* (Fallas 1941), one of Costa Rica's most acclaimed literary works, describes so vividly, life on the plantations was difficult, the environment hostile, and many people seeking to escape their slave-like conditions spread out along the Caribbean Coast. Some of them came to Tortuguero.

Beginning in 1944 and continuing for several decades, a number of Costa Rican and North American companies came to the village to plant bananas and to establish saw mills and logging operations (Lefever 1992). Tortuguero's population fluctuated in synchrony with the coming and going of these companies and the annual sea turtle nesting seasons, but remained small overall. The establishment of the Tortuguero National Park, in 1975, and the passing of conservation laws would drastically change village life: the farming, hunting, fishing and turtling that people had done to sustain themselves were forbidden within park boundaries, but no alternatives were offered and so arose the first confrontations between the park (MINAE) and villagers. Over the years, however, the park, its beautiful canals, and the turtles began to attract tourism and hotels sprung up in the area. Tortuguero tripled in size, gross tourist revenue rose to over US$7 million in 2002 (Troëng and Drews

6 (Eco)tourism is now Costa Rica's primary industry, worth US$1.5 billion. An alliance of environmental organisations awarded the tourism minister under the Calderón government (1990-1994) the "devil's prize for ecology" for his "hypocritical eco-tourism". Many Costa Ricans can no longer afford to go on vacation in their country as most of the coastal area has been privatised and hotel prices are too high (Daling 1998).

2004) and almost 100,000 tourists visited the area in 2005 (Haro and Troëng 2006). It is all the more telling, then, that most Tortuguereños have to rent their houses from a few wealthy land owners, that hunting and poaching inside the park have increased (according to local people), and that the wildlife so abundant before the coming of tourism has all but disappeared. Tortuguero, idyllic though it may seem, has become infected with and entirely dependent on tourism, yet reaps few of its benefits.

Seven kilometres, and a world of difference to the north is San Francisco.



Map of Costa Rica and the Tortuguero area
Source: Google Earth Pro (Satellite image)

On a narrow peninsula surrounded by lagoons, and winding around an old eroded volcano, the village is as calm as Tortuguero must have once been, minus the reggaetón music screaming through the open windows of some of its houses. Perhaps somewhat ironic for a village named after the patron saint of animals and nature, San Francisco has contributed significantly to the degradation of the surrounding environment, with some of its inhabitants being the area's best hunters and turtle fishers. Its reputation as a safe-haven for criminals sought by police and the fact that the village was established within the Barra del Colorado wildlife refuge, make for a turbulent relationship with Tortuguero and especially MINAE.

San Francisco was founded in 1989 as a small land squatter community. A few families joined the initial founders, but it was not until 2000 that more people came and most people that live in the village now have lived there for less than 5 years. In those 5 years the village has grown exponentially to almost four times its former size (figure 1.1). Now, 274 people live there (146 men and 128 women), of which 263 permanently.

Note: all information and graphs presented in the following sections are based on interviews and the census conducted for this research.

More than 40 percent of the 76 households I interviewed (the village includes 81 households, 76 of which live there permanently) were employed through the banana or pineapple plantations before coming to San Francisco (all households from Guácimo and Siquirres, and 80% of the households from Cariari came from plantations – see figure 1.2). It is perhaps not surprising, then, that the search for a better life, "*pa' buscar mejor sol*" (literally, "to look for a better sun"), is the second most important reason for people to come to the village: without exception, everybody that had worked at these plantations told me about the hardships of waking up at four in the morning and having to work in an often toxic environment[7] until five or six in the afternoon, often until it was dark. And although salaries are sufficient (before the devaluation of the colón in the 1980s plantation salaries were in fact considered very high), life is isolated and tough on families and relationships.

But the most important reason for people to come to

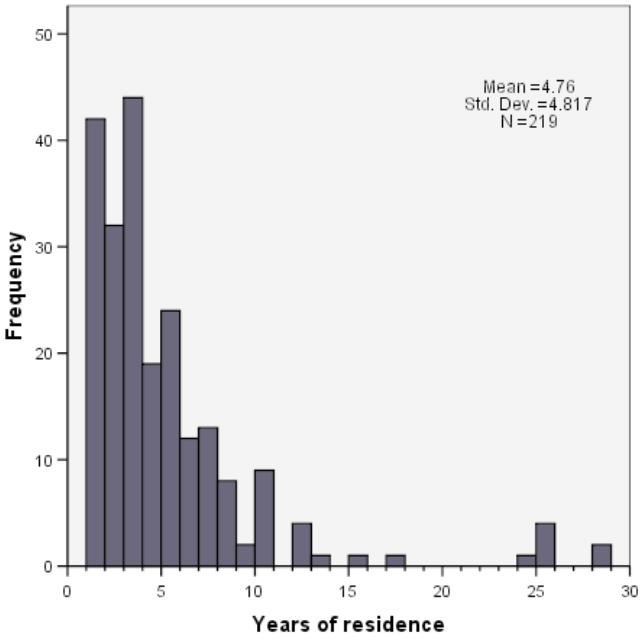


Figure 1.1: Number of people annually joining the community over the past 30 years.

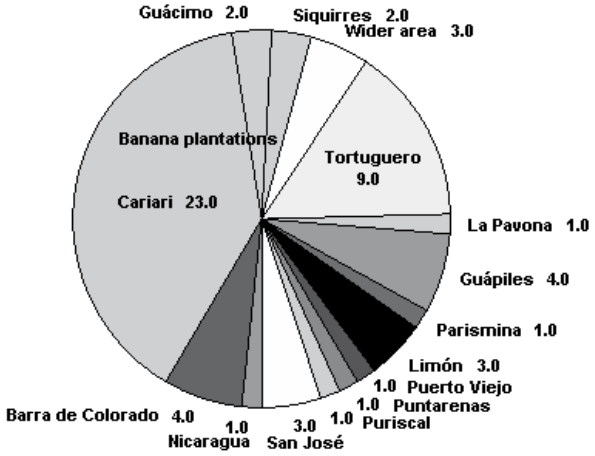


Figure 1.2: former places of residence of San Francisco households (numbers of households indicated)

San Francisco (a reason that overlaps with improving one's life) is work. People are lured by the area's growing tourism industry and its promise of fixed jobs and, even if they cannot find such jobs, decide to stay in the village because life there is so *pura vida* (lit. 'pure life') and *tranquilo* (calm). That calmness, however, is only recent: MINAE, with the same fervour as it has prevented 'land invasions' elsewhere in the country (Isla 2005, Isla n.d., Weitzner and Borrás 2000), has repeatedly tried to chase people off the land by burning people's *ranchos* (huts). The last time that happened in San Francisco was in 2001, after which the 15 families then living in the village gathered some money and sought the help of a

7 In 1998, more than 10,000 Costa Rican workers are represented in legal cases in the U.S. (Daling 1998) They suffer from cancer, impotence and sterility caused by a liberal application of agro-chemicals on plantations (see Monge et al 2006; Ramírez and Cuenca 2002).

lawyer. At the same time, to gain some leverage with the authorities and with MINAE, the village built a school. This is how the village received its name: the main financial contributor to the school (the manager of a nearby hotel) requested the school be named San Francisco. The school already carried the name *Laguna Tortuguero*, so it was decided to give that name to the village instead.

Villagers still have strong feelings about MINAE, claiming it acts only on behalf of the rich and powerful (the Caribbean Conservation Corporation (CCC) was mentioned several times in this context) and has done nothing for the 'small' people except take away their livelihoods. The hypocrisy and corruption of the officials working in Tortuguero are especially loathed. According to several villagers, park rangers are sometimes seen hunting and wealthy individuals, in exchange for *chorizos* (bribes – literally: sausages) are allowed to continue logging and hunting in the Tortuguero Park, while local people are prohibited to even fish there (villagers have had their boat motors confiscated for such an 'offence'). As a consequence, San Francisco remains defiant of MINAE's rule and little happens towards conservation, let alone cooperation.

1.2 ¡Tuannis, mae![8] – culture and demography in San Francisco

Those who, like Biesanz et al (1999), anticipate Ticos[9] to be characterised by a wish to avoid conflict and remain friends, may be taken aback when first coming to San Francisco and participating in one of the *mejengas*, or ad hoc soccer matches (watch your ribs). The village is a less polished, somewhat more abrasive instance of Costa Rican culture, yet still calm enough to allow for a healthy dose of inaction and, as most of the people I interviewed put it, laziness.

Unlike Tortuguero, which until today consists mostly of people from Jamaican (African) descent (Lefever 1992), San Francisco's residents characterise themselves mostly as white (of Hispanic descent, 27%) or mestizo (40%). Relatively few people identify as Indian (3.5%), black (2%) or mulat/trigueño (3%) and the remainder of people said they didn't quite know what to answer and simply ensured me that they saw all people as equal (usually followed by a religious statement involving God and Creation). This attitude prevailed even among those who did identify with a particular race or culture, which explains why the racism so prevalent in many other parts of Costa Rica is, apart from a few incidences, absent in San Francisco. This includes the usual animosity between Ticos and Nicas (Nicaraguans), which make up 80 and 20% of the village, respectively.

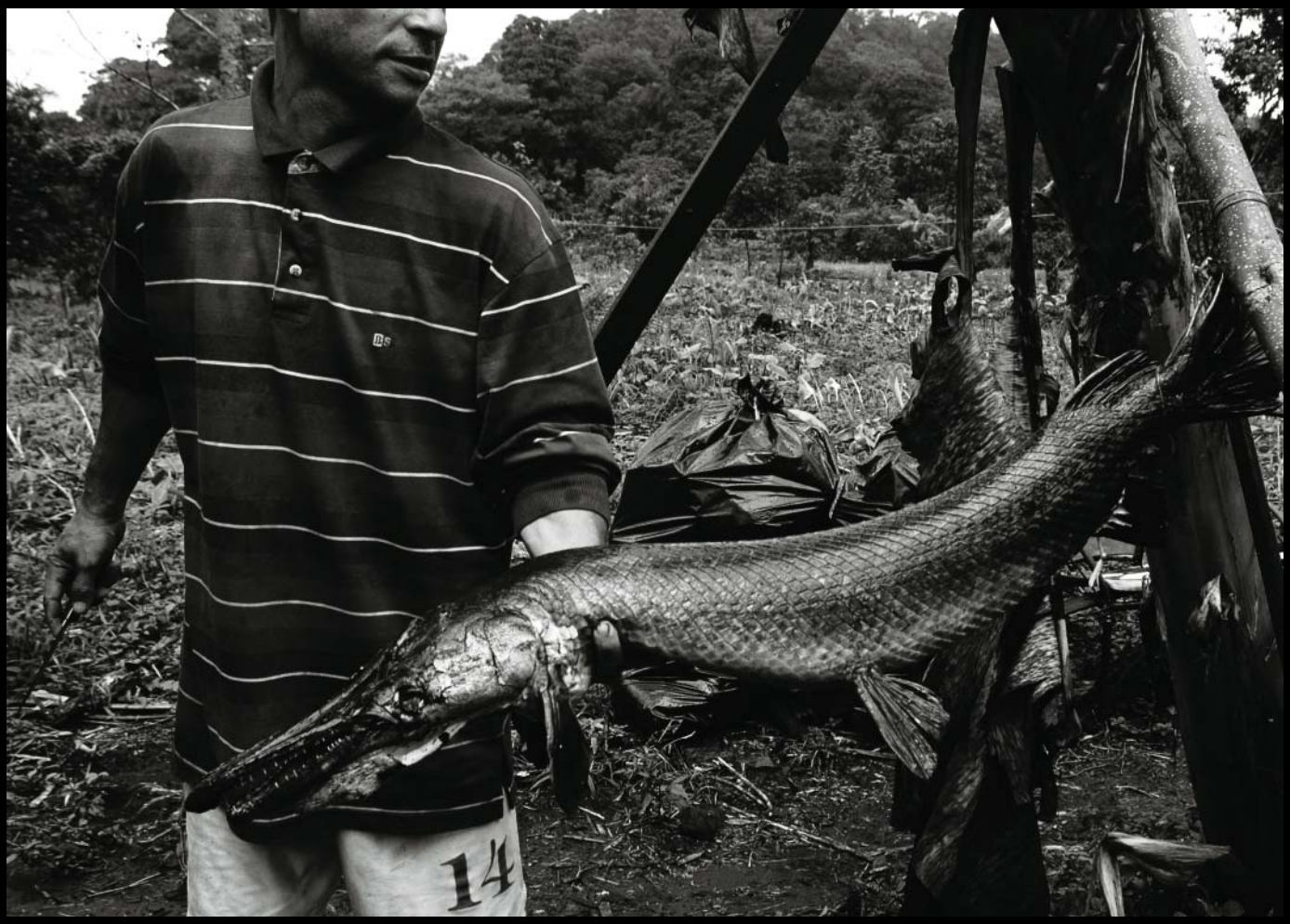
Culture in San Francisco is a curious mixture of modern, US-inspired consumerist values, remnant values of the older agricultural society in which many of the villagers were born, soccer, and reggaetón—a highly sexual dance form perhaps best described as a combination between dancehall and hip hop.

While sound systems and television sets are present in some of the most ramshackle huts in the village, many other villagers cherish their humble pasts as *campesinos* and often shared with me their astounding (but disappearing) knowledge of agriculture, the rainforest and its animals and medicinal plants. At the other end of the cultural spectrum, the popularity of reggaetón and its rather undignified lyrics about women is but one of the things that testify to the relationship between men and women in the village. It reflects the highly macho and patriarchal values that have pervaded Costa Rican culture since the time of the *conquistadores* and the Catholic Church (Fajardo 1997). As Miguel Schyfter, President of the National chamber of Industry, once remarked: "sexual intimidation is part of the culture of our country" (quoted in Daling 1998, p.54). This is true of San Francisco also: infidelity is embraced widely by men, who secretly pride themselves on having several lovers, but women suspected of doing the same are frowned upon and called prostitutes. Domestic violence towards women and children is common and abused children are sometimes taken from their parents by government workers.

The population pyramid in figure 1.3 (p.18) shows a pattern fairly typical for developing countries, with a broad base, fewer middle-aged people, and still fewer old people (usually signifying a relatively low life expectancy). It must be noted, however, that this distribution

8 After *pura vida* (lit. 'pure life'), *Tuannis, mae* is one of the most popular greetings. I have never quite figured out what 'tuannis' means, but 'mae' comes from 'mage' and means something like 'buddy'.

9 Costa Ricans refer to themselves as Ticos. The nickname reflects a national custom of adding the diminutive "tico" to all manner of words. Something small, therefore, is not simply chico (boy, kid) or chiquito (as it would be in other Spanish-speaking countries), but chiquitico, or, in extra tiny cases, chiquitititico.



Man with garfish (*Atractosteus tropicus*)

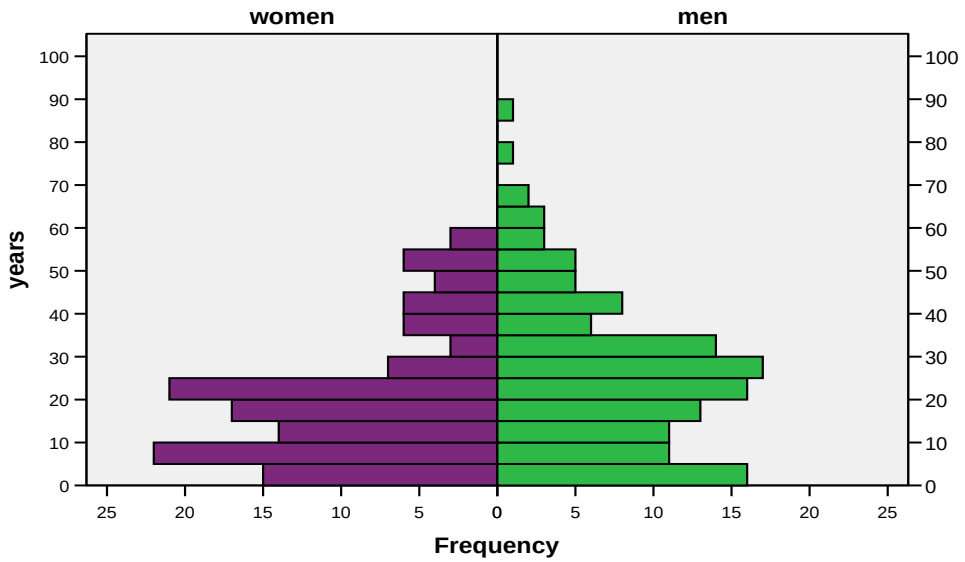
Garfish are considered living fossiles; they have barely evolved since prehistoric times. They are also becoming extremely rare.
This villager caught it in his net by accident: "It's a shame," he said, "it's a beautiful fish...but it gives enough meat for my kids for several days."
Afraid of MINAE, he asked me not to include his face in this photograph.

is not entirely natural and may be skewed by the substantial numbers of working-age immigrants and the very recent establishment of the village

One thing it does show unequivocally is a high number of childbirths in the village: even with such high immigration numbers (figure 1.1), 'natural increase' accounts for over 12 percent of its growth.

An important consequence of this was noticed, in astonishment, by one of the women who attended a village meeting at which I showed this diagram: in five years San Francisco, which already has a large problem with unemployed youth (and, as a consequence, petty crime), will have an even larger pool of young adults that need to find work. In that same meeting it was decided that job creation, in the village itself and independent of the hotels nearby, should be the priority for San Francisco's development. Few people listened when a second person expressed the fear that all the village's remaining vacant 'lots' could soon be occupied as well, and what that would do to the size and feeling of the village.

Figure 1.3: Population pyramid for the village of San Francisco (valid for December 2006)



1.3 Livelihoods Analysis of San Francisco

1.3.1 A short introduction to the Sustainable Livelihoods Approach (SLA)

The SLA is not revolutionary or excessively original, which perhaps explains its popularity with some of the larger development organisations such as the World Bank, FAO, UNDP, etc. (see Hussein 2002). It is a composite of many ideas and interests from different strands in the development debate (Scoones 1998), including rapid and participatory rural appraisal, integrated rural development, and a number of other community-based practices (Solesbury 2003). Amidst the many approaches, frameworks and theories conceived and subsequently butchered on the drawing tables of the international development agencies, the SLA stands out as one that offers a rich conceptualisation of poverty, its causes and potential solutions. This does not mean that the approach, or some of the (participatory) tools and concepts it embraces are free of fault or criticism. There are, indeed, many critiques (see, for example, Toner 2003; Kapoor 2002; Maqueen 2001). Yet as a simple framework for analysis, an aid to understanding how a village functions in its quest for survival, it is very useful.

The logic of the approach (and some of its shortcomings) will become clear through the livelihoods analysis in the following sections of this chapter, but a brief introduction is in place here.

The SLA is very much a response to the one-dimensional views of poverty previously espoused by development practitioners and the highly sectorial approach to development this view led to. It aims to add an awareness of different dimensions and scales to our understanding of poverty and to show how the remedies (i.e. livelihoods) that "the poor" develop against it are achieved in a context of larger economies, political systems, or environmental conditions (Chambers and Conway 1992). These livelihoods, in turn, consist of several building blocks, or assets, which are strategically combined to produce a desirable outcome: wellbeing (DFID 1999). Importantly, the way in which these assets can be combined, and the constraints that people might face in exploiting them are largely determined by institutions such as culture, laws, policies, etc. (Scooness 1998), an understanding of which must therefore be part of any poverty alleviation strategy.

The aim of the following discussion of livelihoods in San Francisco is not to provide accurate quantifications, which, as Maqueen (2001) remarks, would be troublesome and of little use, but rather to understand the relative abundance of 'assets', how they are used and controlled, and where an outside organisation such as COTERC might be able to help to effect positive change.

1.3.2 The Vulnerability Context

The external environment in which people and their communities exist. It includes long-term trends (e.g., in economy, population, ecology), sudden events and shocks (health, conflict, natural events) and seasonality (of resources, health, etc.). In other words, things that are difficult or impossible to influence.

A number of aspects related to economy, history and culture, which have been important in shaping, from the outside, the growth and development of the village were already discussed in the introduction to this chapter. Clearly, its dependence on the tourist industry and hotels for income, the restrictions on resource use imposed by (internationally controlled) conservation agencies and, as we will see in subsequent sections[10], the seasonality of both tourism and natural resources control life in San Francisco. It is not yet possible to speak of autonomous development—the community does not have the means to determine, on its own, its path into the future.

1.3.3 Livelihood Assets

Following the trend of the late nineties to speak about strengths rather than weaknesses, the SLA uses the concept of 'assets' to refer to the various good things people have (Helmore and Singh 2001). Five such assets—human, natural, financial, physical, and social—were initially identified as the bones comprising the livelihood skeleton; I will in this chapter also add a sixth—political—bone to that assembly. The reason for adding so many dimensions to a formerly singular concept is that, especially in the case of very poor communities, individual assets are not usually sufficient for survival. It is the combining of the little contributions of different assets that enables people to create a livelihood. The 'official' SLA framework includes a separate section on 'livelihoods strategies' (on what people actually do with their assets); I have attempted instead to include these strategies in the sections describing the assets, as it seemed artificial to separate the two.

10 See in particular the graph on page 29.

Doña Isabela and her husband Don Genaro were the first people to live in San Francisco. They arrived 28 years ago.

Human capital[11]

Human capital is the knowledge, skills and labour that an individual brings to an activity (Ostrom 1999).

With most households in San Francisco strapped for income, schooling is not generally high on the family agenda. 13 people have completed secondary school and 85 people have a primary education; one girl is trying to go to university. Other skills, such as fishing, hunting, carpentering, boat driving, etc. are valued more, simply because they can provide a direct contribution to household income. Not surprisingly, there is no correlation (R^2 = 0.006, outliers removed) between people's level of education and their salary: in the type of work available to villagers education does not (yet) pay. Yet at the same time, as the work in hotels becomes increasingly exploitative and the rights of the people working there decline, many realise that education may become more important as a 'way out' and are trying to bring a secondary school to the village as well.

When asking people about their abilities, or what work they would be able to do, the typical answers are *de todo* and *lo que salga* ('anything' and 'whatever comes at me'). For men, this means anything from construction, to lawn mowing (for which people seem to have a peculiar fascination), to weeding, cutting down trees, farming, fishing (one person farms fish), carpentering, driving boats, gathering coconuts and, of course, hunting, poaching and drug trafficking. Women, beside taking care of the house, sell food, fish, and make and sell ice cream, jewellery or clothes; some women are very skilled at creating batik art (the *Instituto Nacional de Aprendizaje*[12] (INA) offered a batik course in the village).

The knowledge that some of the hunters and older people have of the sea turtles, the forest and its animals and plants is astounding. It is humbling (for someone with a background in biology) to be taken into the heart of the Tortuguero national park by a hunter and be taught about the significance of so many plants and their intricate beauty. Some efforts are underway to conserve this knowledge (Quesada García, ethnobotanist, *pers. comm.*), but with the changing ways of life it is doubtful whether this will ever be more than mere museum material.

Knowledge in San Francisco means access. Access to money, to power and to employment. A few people in the village, all 'friends', control the little contact the village has with the outside world—government, volunteer organisations and biological field station—and control access to and distribution of the little money it receives. One couple, for example, complained to me that the *bono*, government money intended to support the country's poorest households, is automatically given to the head of the *Junta de Educación* (the school council) to distribute to other families, but that the man that occupies that position only gives it to his friends and family.

Natural capital

This form of capital refers to the stock from which people derive the natural resource flows and services for their livelihoods (DFID 1999).

San Francisco, similar to many other rural areas in the developing world, depends strongly on natural resources for its livelihoods, yet the access to these resources is highly contested. Both resources and land rights will be discussed here.

The Barra del Colorado Wildlife Refuge in which San Francisco is situated stretches from Barra del Colorado in the north to Tortuguero in the South, where it connects to the Tortuguero National Park. The area is an ancient flood plain covered by highly diverse and, with an average annual rainfall in excess of 5000 mm., exceedingly wet lowland Atlantic tropical rainforest. It is considered a wetland of international importance under the Ramsar Convention (SINAC 2007). The predominant ecosystem surrounding the village is the vulnerable, endangered and much understudied *yolillal* (*Raphia tuedigeru* palm) swamp forest, home to tapir, peccary, crocodile, caiman, jaguar and a host of birds, reptiles and amphibians (Glooschenko 1991).

Directly north of the village lies a remarkable hill. Covered in dense forest, with vertical rock faces, this ancient eroded volcano (euphemistically called the *Cerro*, 'hill'), holds some of the only remaining stands of the primary forest that covered the area before logging came to Tortuguero.

11 The choice for the term 'capital' is somewhat unfortunate as not all of the assets included in this framework behave in quite the same way as 'classical capital' does (e.g. unlike natural or financial capital, social capital requires continuous input to maintain a status quo—it wears out with *disuse* rather than with usage [Ostrom 1999]). The intention behind using the term, however, that all these capitals can in some way be a productive resource in the development of human wellbeing, remains valid (Sen 1997).

12 National Institute of Learning

Apart from the Cerro, there is a second reason for which the ground on which San Francisco is built is unique: it does not, like any other place in the area, flood during the rainy season. This, in combination with the productive soil makes it suitable for agriculture and although only little space is available and very few (six) households grow their own food as a substantial component of their livelihood, a large variety of crops is produced[13]. Many of these crops, particularly the main additions to *el basico* (the main diet of rice and beans), yucca and plantain, are harvested independent of season and provide yields throughout the year.

A very important food source for the village is fish[14], caught either at sea or in the lagoon and, to a lesser degree, shrimp and lobster. More than half the village's families depend on fish as a food source, while some eleven families also sell the fish they catch in Tortuguero or to the nearby hotels. The past three years have seen a steady decline in the availability of fish as some people (including the owner of the hotel nearest to the village) have begun to use large nets and long lines, the use of which is forbidden in the area. In addition, when rainfall is extremely high, the pesticides applied to the banana plantations upstream flow into the river system and cause massive die offs among fish populations. It is not known whether fish caught by villagers have contamination levels that are dangerous to human health.

Other resources harvested through hunting[15] include turtle (see next chapter), iguana, paca (tepescuintle) and wari (white-lipped peccary). The Cerro is widely exploited for palm leaves (to make roofs), heart of palm, cuculmeca[16], gravel and tourism. Especially the gravel extraction (mostly for the construction of pathways in hotels) and tourism (up to 400 tourists enter the Cerro each day at the height of the tourist season) cause severe erosion and disturbance.

But the conservation status of the land on which San Francisco is built makes for highly contentious access rights to all these resources. While the ban on sea turtle fishing, although hardly enforced, is perhaps the most extravagant, other regulations are more fundamental to the livelihoods of the village as a whole.

Hunting, logging and, significantly, fishing are 'prohibited' in the area, and fishing villagers are often harassed by park guards. At one of the meetings the oldest man in the village complained that "MINAE allows the rich to exploit the Cerro, but from the poor they take away their boats and motors." Ask MINAE, however, and they will tell you that neither hunting nor fishing is in fact prohibited, but that a permit (US$7) must be bought. Most villagers know this, but, without exception, remain defiant and refuse to comply.

Similarly, land tenure in San Francisco is excitingly complex and convoluted. Ask one of the villagers and she will probably remind you of the old national, Zapatista-like principle that "he who works the land owns it". But although Tortuguero was founded on that principle (Lefever 1992), different rules have come to apply to national park areas and thus to San Francisco. Four different legal principles apply to the village.

Firstly, although land squatter settlements like San Francisco are initially illegal, they obtain 'official' status after ten years—the government then forfeits the right to evict the inhabitants. **Secondly**, MINAE, as the institution charged with the management and protection of both the Tortuguero national park *and* the Barra del Colorado wildlife refuge, has land management rights over the Cerro and the village. This includes the right of eviction, which it used rather liberally until 2002, when it realised that the village had already become too firmly established. In that same year, in a meeting with the village and their ad-hoc lawyer, MINAE officially renounced control over the area (which covers everything from the school in the south to the beginning of the Cerro in the north (the houses north of there, built along the Cerro, are still illegal). **Thirdly**, JAPDEVA[17], the province's port development authority, physically owns the land on which San Francisco is situated. It has, however, offered to give the village a 'title of domain' (*escritura pública* or *escritura catastral*), which would

13 Crops include yucca, plantain, banana, beans, chilli, avocado, bell pepper, corn, lemon, mango, coconut, rice, pineapple, water melon, potato, tiquisque, papaya, star fruit, ginger, oregano, cilantro, sugarcane, and noni (*Morinda citrifolia*, a fruit known for its medicinal properties). Some people also raise chickens.

14 The seasonality of this resource is shown in the graph on page 29. Seasons in sea and in the lagoon complement each other, ensuring a fairly stable stock throughout the year.

15 Hunting has become less important than it used to be. Where 15 years ago most people in the area depended on it for survival, today only about 5 households hunt regularly.

16 Cuculmeca is a vine root often prepared in a delicious chocolate milk-like drink. It is widely used as a cure against anemia and fetches high prices on the national market (a bag of five little pieces goes for US$2).

17 JAPDEVA: *la Junta de Administración Portuaria y de Desarrollo Económico de la Vertiente Atlantica*. A government agency entrusted with port development and the construction and administration of the canals between Tortuguero and Barra del Colorado.

Don Pedro is 75 years old, shares his house with one of the village's poachers and was recently robbed by his neighbour; he is a Jehovah's witness and came to San Francisco in 2003 to convert people. Now he wants to leave, because "people here are inconvertible". On a US$70/month government pension, he grows most of his food and sells chili peppers (above) in the village for 20 colones (4 cents) a piece.
I passed his house almost every day and he would often invite me for what he called his sopa mágica (magic soup), a delicious concoction of things he found in his garden and, on good days, a piece of fish.

hand over the land to San Francisco (interestingly, when villagers sell or purchase land now, the transaction concerns an *escritura de derecho de posesión,* a title of custody, *not* ownership—most villagers, because they have at some point paid money for their land to the original squatters, have such documentation). To further complicate matters, there is yet a **fourth** principle, that of *la milla maritima*, which supersedes all others (but is rarely applied): through this law the government maintains the right to relocate anyone in the country living within 200 meters from the coast or 50 meters from a lagoon (many houses in San Francisco fall within this range) to another location. What all of this means in practice, and both government people and villagers agree on this, is that the village is there to stay.

Physical capital

"Physical capital is the stock of human-made, material resources that can be used to produce a flow of future income" (Ostrom 1999, p.174). Low physical capital, in fact a lack of infrastructure, usually causes an increase in production and transportation costs, thus creating a comparative disadvantage for a community engaged in a market economy (DFID 1999).

Perhaps surprisingly (for an ex-squatter community), San Francisco is serviced with very reliable and fairly affordable electricity and some 25 homes have a telephone connection. Housing ranges from garbage bag-walled and palm thatch-roofed sheds to two-story and beautifully finished wooden and stone houses. Other than electricity, however, public services are sparse: the village has no public telephone, hardly any public lighting (people are afraid to go out at night), no paved walkways and no garbage collection. There is no clean drinking water (and wells are often very close to latrines or garbage piles), no health clinic, police post or public boat dock. (There are no roads in the area and all transport to and from San Francisco happens by boat).
Having a boat in San Francisco contributes in an important way to people's livelihoods. It allows people to get to good fishing spots, to bring merchandise (fish, clothing, or jewellery) to 'the market'—mostly Tortuguero and some of the area's hotels—and to work on occasional jobs outside of the village. But only 30 households have a boat, and for those, mostly poorer, people that do not possess such luxury, the lack of the above advantages—better fishing, marketing and work—generally count heavily: 90 % of the people that do not have a boat and have trouble sustaining themselves depend on fishing for a significant part of their livelihood. The water poses more problems as parents wanting to send their children to secondary school in Tortuguero are deterred by the daily *bus* (ferry) expenses. Getting to Cariari, the nearest city, by public transport costs US$10 (return), a price few villagers are able to afford on a regular basis.

Photograph: A (perhaps not so) typical *rancho* in San Francisco. The owner is the only person in the village that occasionally rents out beds to tourists. Several others are planning to do the same

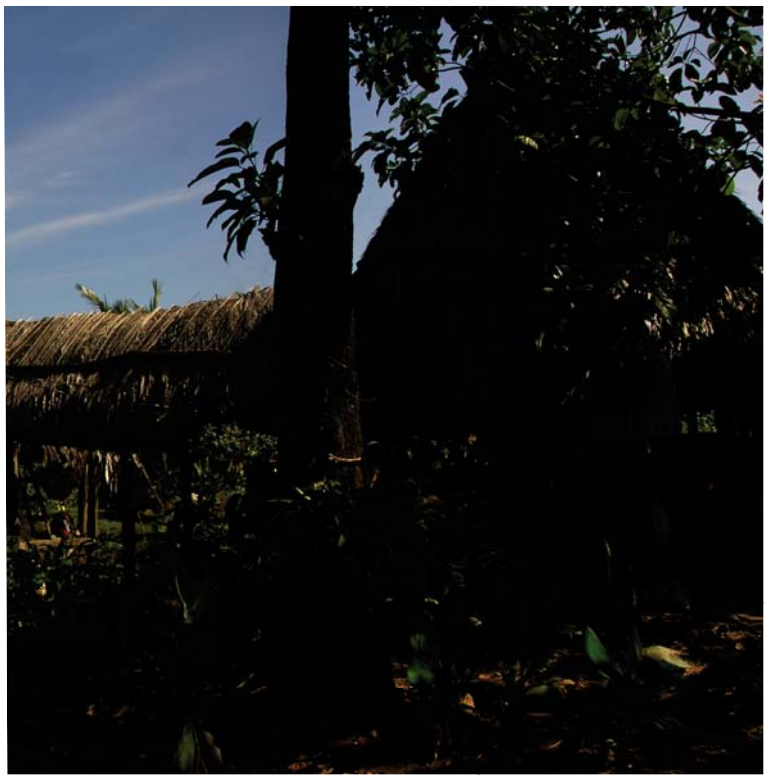
Financial capital

Financial capital refers to money: cash, savings, etc. It is a highly versatile asset that can be transformed into other types of capital or be put directly towards the achievement of livelihood outcomes (e.g. buying food). For most families in San Francisco it is also in short supply.

Although life in San Francisco is strongly influenced by the national and even global economy, economic activities in the village itself take place at the fringes of that system and are, except when cocaine is involved (see page 28), simple and of a very small scale. One villager mused:

When I have no money, I will find some-

thing to do; we can always find something to do. I buy a pig, for example, and I cut it into several pieces and then I sell those pieces for more than what I bought the pig for. And when I have enough money for the day I don't think about the next day. I lie in my hammock and enjoy. And the next day I will find something else.



Theses salaries may seem rather high for a poor rural village in a 'developing' country, yet they are less than half the national per capita income (US$425/month) and appear even lower when considering that most foods and many other household necessities are about twice as expensive as they are in the capital San José. A family with three children can survive (eating *el basico* – rice and beans for breakfast, lunch and dinner) for 7 dollars a day, but adding meat or fresh vegetables to a dish may double that and sending a child to secondary school adds another 30-60 dollars a month for transport and books. Very few people receive additional income (such as remittances or pension), and because people living in San Francisco do not own their property (see 'natural capital' section above) they have no access to bank loans, which require property as a security.

Almost half of the people indicated that, especially during the low-tourism season[18], their income was insufficient to support themselves or their families. Women with newborns or young children are often particularly vulnerable, especially when left alone by the father. One young mother told me that at times, to supplement her income, she has to sell the baby formula she receives from the government[19], but then spends a month in agony about how to feed her baby.

Many villagers live like that (although not usually by choice), they call themselves *chamberos* (from the word *chamba*—job) and do any odd job, usually for a daily salary of around US$10. Many other people also work for themselves or are employed by the hotels. The table below gives an overview of the types of employment people are engaged in and the average salaries.

[18] Some of the hotels fire their personnel during low-tourism season or offer them a salary that is less than a third (approximately US$80) of their usual salary.

[19] Like most developing countries, Costa Rica is dangerously addicted to baby formula. The government 'helps' young families by providing formula for free, thus actively discouraging women from breast feeding.

Table 1.1 Work and income in San Francisco	N° persons	Average income (colones/month)
With a 'stable' job	61	128.046 (US$256)
- Hotels (boat captain, guide, waiter, cook, guard, gardener, etc.)	31	
- self-employed (boat driver/construction, carpenter, shop/bar owner, furniture making)	13	
- Other (boat construction, captain (public boats), tourism, house sitting, farm)	17	
Casual work	48	70.000 (US$140)
- 'Chambero' (weeding, construction, lawn mowing, anything else)	29	
- Other (fishing, contract work, cooking, hunting, poaching, carpentering)	19	
Total	109	**99.714 (US$200)**

White gold

Some things are difficult to understand. For instance, how a 180 dollar/month family income could possibly pay for a flat screen television and an obscenely large stereo set. "Sustainable development," a villager told me, "is impossible here. There is only one way and that is cocaine." You laugh somewhat confused, a bit nervously, and ask what in Jah's name he is talking about.

What he is talking about is that the Costa Rican coast lies along an important drug trafficking route between Colombia, Nicaragua and the United States. When circumstances are 'favourable' (i.e. an engine breaks down or US DEA helicopters appear on the horizon), the 600 horse power boats that transport these drugs have to throw their cargo overboard so as not to be arrested. Sometimes these sacks of cocaine float in on the tides and wash up on the North beach. Whenever such great and exciting news reaches the village (this happened twice when I was there) the entire village spreads out at night and scavenges the beach for packages of the white gold. Whatever is found is sold back to the big drug barons for 1 million colones (US$2000) per kilo. They come from Limón, Barra del Colorado or San José, in big shiny boats that contrast beautifully with the dugout canoes in the canals and they usually look very impressive, with gold hung around their necks.

Three years ago, a boat lost 3000 kilos off the North beach and many people found small packages (some villagers who were willing to talk to me about this estimated that more than half of the village has at some point found and sold cocaine—hence the flat screen TV's and other more useful capital investments that otherwise remain difficult to explain). Of the people that found large quantities (one man found 600 kilos), all have left the village, and most of them are poor again, growing yucca and beans or raising livestock at a farm—they simply did not know how to deal with such amounts of money.

Interestingly, cocaine has been important in the development of a number of Caribbean communities. Down the coast, Tortuguero, Parismina and especially the tourist town of Puerto Viejo[1] have 'benefited', while to the north, in Barra del Colorado and on the miskitu coast of Nicaragua, fishing communities often assist traffickers. There, unlike in San Francisco where most people have stayed away from using the drug, cocaine use has become common, and severely disrupted communities, violence and something quite the opposite of development have generally been the result (Dennis 2003).

[1] Puerto Viejo owes almost all of its wealth and infrastructural development to a few large finds in the 1990's.

Figure 1.4: **Resource calendar of livelihoods in San Francisco (next page)**

This figure shows how the main livelihood assets in San Francisco are embedded in their vulnerability context. The seasonality, availability of resources, periodic expenses and the intensity of the tourist season included in this graph describe approximately two thirds of the village's livelihoods

For the people in San Francisco that live close to subsistence, this calendar outlines the 'best options' for livelihoods throughout the year: during July and August the best opportunities are found in the tourism industry, while July, August and September are the most lucrative months for turtling. The rivers provide fish from October through to January, and January and March are good for sea fishing. Because different equipment is often necessary for engaging in these various livelihood options, very few people are able to benefit from all of them.

The fish shown in the picture is *calva*, a species of snook abundant in the Tortuguero canals in November and December.

Rainfall (ranging from 120 to 600 mm/month)
source: National Weather Services of Costa Rica; Caño Palma weather data

Intensity of underlining denotes relative availability of resource

Social capital

Social capital has been touted, somewhat incorrectly, as "the capital of the poor" (World Bank 2001, p. 129), a form of capital that can be generated through human agency independent of, for example, access to financial means. Woolcock and Narayan (2000, p.226) define it as "the norms and networks that enable people to act collectively", the intangible glue that turns a group of individuals into a community, that make people forego self-interest and pursue a common goal instead. This magic glue has evidently been the subject of many a debate and, because I believe it to be of key importance to understanding the role that outside agencies such as COTERC may play in engendering positive change in conservation and community development in places like San Francisco, it will be discussed more critically in the third chapter of this paper. For now I will use the definition given above.

For all the academic fuzz about the 'subject', and without ever having heard the term, people in San Francisco intuitively understand very well what social capital is and the significance it has for the village: *sin cooperación no hay pueblo* (without cooperation there is no village), someone said after the first village meeting, and everybody agreed. San Francisco is a village, a collection of people that came to one place because, generally speaking, they were looking for a better life. It is *not*, as I will show here, a community.

It is very difficult to measure social capital (e.g., see Onyx and Bullen 2000) and I would have felt uncomfortable basing the above statement on the outcomes of the survey alone. Living in the village has been essential to sensing and understanding the multiple dimensions of this important concept – of the bickering that goes on behind people's backs, the gossip, the mistrust, but also the respect and friendship that people have for each other. I will try to combine these personal (and necessarily subjective) observations with the more objective survey results.

A good way to start is by dividing social capital into different categories: bonding and bridging social capital (after Das 2004; Newman and Dale 2005). Simplified, 'bonding social capital' refers to the usually strong ties connecting family members and close friends, and 'bridging social capital' to the weaker, horizontal (in terms of power, status and means) ties between members of civic organisations.

'Bonding social capital' is perhaps the only form of social capital moderately present in San Francisco. On average, villagers reported 4 other family members living in the village in addition to their own households and more than half of the people that responded positively to the question whether they would receive help in difficult times said it would be from family members. But although it may act as a safety net, bonding social capital, when too strong, also leads to favouritism and nepotism. For example, the distribution of the *bono* and even baby formula is allegedly controlled by one man and those not in his favour do not receive it. Similarly, friendship and family lines running through San Francisco tell much about the distribution of power in the village: a tight network of perhaps five men have their fingers in almost everything taking place in the village and reinforce each other's positions of power by always ensuring that some benefit flows their way. This, and the fact that their actions are adorned with ostensibly altruistic intentions and pro-community rhetoric (taking the wind out of the sails of the people that are critical about the promises made by these five men), makes it extremely difficult to bring about democratic and equitable change.

Except during a few brief periods in the history of the village, 'bridging social capital' has been very weak. Lefever (1992, p.139) quotes a Costa Rican saying that "we Ticos act for ourselves, and very often have no idea what neighbourliness is". But, he continues, Ticos have always been quite cooperative when their interests have coincided: "Costa Rica was built by *turnos*" (village festivals, often organised to raise money for a community project). When San Francisco was under siege by MINAE and established the school, all 15 families then living there dedicated time to building it and hauling wood and materials to the village. In the fall of 2006 a *turno* was organised, again for the school, and with the help of a few hotels 2000 dollars were raised. But such events are exceptions and require enormous energy and efforts. The school and its two committees, the *Junta de Educación* and the *Patronato Escolar*[20] have remained the locus of communal activity. Particularly the first group is active in San Francisco and for lack of an alternative it is also generally considered as the village council and has represented the village to the outside world (and yes, some of its members are part of the 'illustrious five'). Other organisations are the sports committee (which organises

20 For a village to have a school it must buy the land and build the school; the government provides a teacher. The government requires the school be run by these two committees, which are responsible for paying bills and organizing events.

soccer games during the dry seasons), a dormant and rather ineffective 'development committee' (yet another manifestation of the ambitions of those same five men) and a small evangelical protestant church with very few members because most villagers are Catholics.

It is perhaps tempting to blame the lack of cooperation (of which social capital is both a basis and a result) to laziness and self-interest[21]. This is, after all, what most villagers do as well: *todo jala para su saco* (everybody just fills their own pockets). But, despite the fact that people really do offer each other very little help (only 7 percent of the people I interviewed thought others would help them when needed and almost half of the people did not expect help even from their close family), people are quite content living in San Francisco. The large majority feel safe (although not after dark), trust (to various degrees) at least some of the people around them and perceive the 'community' (with which they rarely interact) as 'good', 'home', or *tranquilo*. Why, then, do people not work together? This question (and what may be done about it) will be discussed from a more theoretical perspective in Chapter 3, for now it is enough to understand that, beside self-interest, there are simply more forces to obstruct cooperation than there are to stimulate it:

Firstly, as Das (2004) writes, social capital is costly. One of the villagers explained:

> *It is understandable that people don't really help each other, we can't always afford to. Life here is difficult, especially when you have a family, and helping costs money. But when there is a real emergency, like when they thought a hurricane was coming, a few years ago, the village really unites and everybody does what he can.*

This idea contradicts (at least for San Francisco) the generally accepted claim that the availability of social capital is independent of financial resources (the 'capital of the poor'-idea) presented in the introduction of this section. Social capital is *not* merely the independent variable that explains the dependent variable of poverty—the relationship goes both ways.

A second impediment to developing social capital in San Francisco is its dependence on the tourism industry, which employs many of the village's working people. While these are the people with most resources (table 1.1, page 27, shows the difference in their income as compared to that of other people) and thus with a potentially important role in giving shape to the community, their irregular working hours keep them from attending and participating in community meetings or activities.

Trust is another issue. While in the survey most people said that they trust their neighbours, talking to people in more depth and on a basis of friendship revealed a subtle (but widespread) mistrust between villagers. Not only within the group of village 'leaders' themselves, but also between those that are less powerful and, especially, from the less powerful towards the 'leaders'. The relevance of this distrust to community development should not be underestimated: when certain people participate in or take charge of an activity, others, out of distrust or contempt, will stay away and refuse to cooperate. Thus it debilitates, in a way not necessarily visible to outsiders, any attempt at collective action that does not specifically try to address and work with these rifts.

A source of more overt suspicion is the occasional arrival of *escapados* (criminals fleeing from the police) and the seasonal flow of migrant poachers from Cariari and Guápiles. People of the latter category come to San Francisco during the green turtle nesting season, when they pay the village's main poachers 6 to 8 dollars a night to have access to poaching on the North beach. Most of these people are quite rough, drink too much and usually cause at least some havoc in the village, not in the least by, say the mothers, negatively influencing the already jobless youth.

Lastly, alcohol abuse eats away at and sometimes roundly destroys the "norms and networks" that constitute social capital in San Francisco. Besides beer, *guaro* (a cheap white rum slightly better tasting than methylated spirit) is drunk in large quantities (in Nicaragua the drink is called *ron pleito*, or 'fighting rum'). Like infidelity, drinking behaviour is strongly gendered: most men drink, but women are roundly criticized if they imbibe at all. Not only does (domestic) violence occur after drinking, but at times households are also left without income or food when men spend the available cash on drinking. Most of the people that poach on the North beach for more than subsistence needs do so to finance their drug and alcohol addictions, making it extremely difficult to work directly with them on finding alternatives, let alone conservation.

Social capital, in short, is not abundant in San Francisco, and whatever the village does have of it is of the 'wrong' sort—the 'bonding' social capital that, at the community level, leads to division rather than bonding. Social capi-

21 Putnam (1993, p.178, 163-4), one of social capital's main theorists, suggests that self-interest is the main (if not only) obstacle to collective action.

tal is clearly not an easy concept to measure or describe, but one that is very important to understanding why a place with relatively many natural resources does not thrive the way it could[22]. While this does not mean that building social capital will, alone, solve every problem in the village (social capital should never be considered as separate from the other capitals), it does point at a potentially important opportunity to enhance, through community development, the benefits gained from the other capitals present in the community.

Political capital

The SLA, whilst useful as an analytical framework, does not deal with issues of power or politics (Baumann 2000). It acknowledges, in a "somewhat cleansed, neutral approach" (Ashley and Carney 1999, p.35), that such issues may interfere with project implementation, but does little to change them. This neutrality is apparent in the role a community is to play in influencing the "transforming structures and processes" (see next section) of the SL framework, namely: none. Structures (institutions) and processes (policies), while, unfortunately, they usually "do not work to the benefit of the poor" (DFID 1999, 2.4.1), are considered mostly out of reach for communities and changing them is a job reserved for the development agency.

This view potentially results in two harmful outcomes: by ignoring that some form of (political) struggle is often necessary for change, it effectively depoliticises the development process. Secondly, and most importantly, it muffles away one of the most important tools a community might employ when seeking to develop: political power. While this makes the development process more tractable (and therefore attractive) to an outside agency, it undercuts the foundations of truly sustainable and autonomous development.

Political capital is partly determined by how well a community is able to act as a collective (this is the bridging social capital discussed in the previous section), and partly by the links that individuals or groups of people have with power structures and policy outside the locality (Baumann 2000). Both forms of political capital are as yet virtually absent in San Francisco (from what I learned, political connections in the village are limited to one man's membership in Tortuguero's development association). If, in their attempts at community development, COTERC and GVI can incorporate the strengthening of the village's political assets and thus its ability to deal with the external structures (against which villagers now feel entirely powerless) that govern its livelihoods, it can mean an enormous step in the development of the village[23].

1.3.4 Transforming structures and processes (Institutional context)

Transforming processes can be seen as the 'software' (e.g. culture, policies, legislation) that govern the interactions between people, institutions and their livelihoods, while 'structures' are the institutions and organisations (the 'hardware') that implement these processes (DFID 1999). These elements are integral to the livelihoods framework and the emphasis put on them in the SLA sets the approach apart from many of its contemporaries.

As most of the processes at play in San Francisco (e.g. culture, gender roles, (conservation) laws and agreements, access rights to assets, etc.) have already been discussed in previous sections of this chapter, this section will focus on some of the institutions that constitute the 'system' of which San Francisco is part.

MINAE is perhaps the most important institution to understand, not just because of its history with San Francisco, but because it may (must) be instrumental in future developments in the village. If San Francisco wants to become involved in natural resource management (specifically with regards to the Cerro and the sea turtles) it will have to do so in partnership with MINAE. This would have been impossible only a few years ago, but in recent years the ministry has slowly moved away from its rather dictatorial rule towards a more decentralised 'co-management' of certain resources in which communities take over some of the ministry's responsibilities (Calvo, MINAE, *pers. comm.*, Weitzner and Borrás 2000). In fact, when MINAE officials were invit-

22 Many villages in Costa Rica seek to strengthen their livelihoods through organising, e.g., cooperatives (it is a form of organisation that is strongly supported by the government). Whereas other communities often have difficulties finding a product to develop or a market to sell to (Solano, INFOCOOP, *pers. comm.*), San Francisco has a relatively luxurious range of options and an almost guaranteed market (tourism).

23 This understanding is also important in light of the village's aspirations towards co-management of the Cerro, for which it will have to work together with MINAE and have to convince the ministry to entrust some of its power to the community it once tried to evict.

ed to the village to discuss a proposal for co-management of the Cerro (see appendix 4, in Spanish) their response was extremely positive. Approval of any such proposal for natural resource management is contingent on the final release of a land use plan for the area, to be released, Costa Rica-style, in September last year (see also the "Possible steps in the development of San Francisco" section at the end of this paper).

MINAE, in partnership with various other organisations, has also begun to give support and training to communities wishing to develop environment-related projects such as the installation of biodigestors, raising tepezquintles for meat, farming fish[24] (through INCOPESCA[25]) or starting any small community project (minimum 10 people—through COBIRENAS [acronym unknown]).

Whether it be with or without MINAE, Costa Rican law dictates that in order for a community to work with and benefit from public resources it needs to have a village council, called a 'development association' (Calvo, MINAE, *pers. comm.*). At the community level, Costa Rica is managed by such councils, which are democratically elected, have full legal status, and entitle a village to significant government support. Councils represent their villages in dealings with government agencies and are responsible for most public matters, including electrification, police stations and natural resource management. To use an analogy: if Costa Rica's civil and political arena is a building, having a development association is the key that opens its otherwise tightly locked front door. During my stay I helped the village to take the first few steps towards the establishment of a development association.

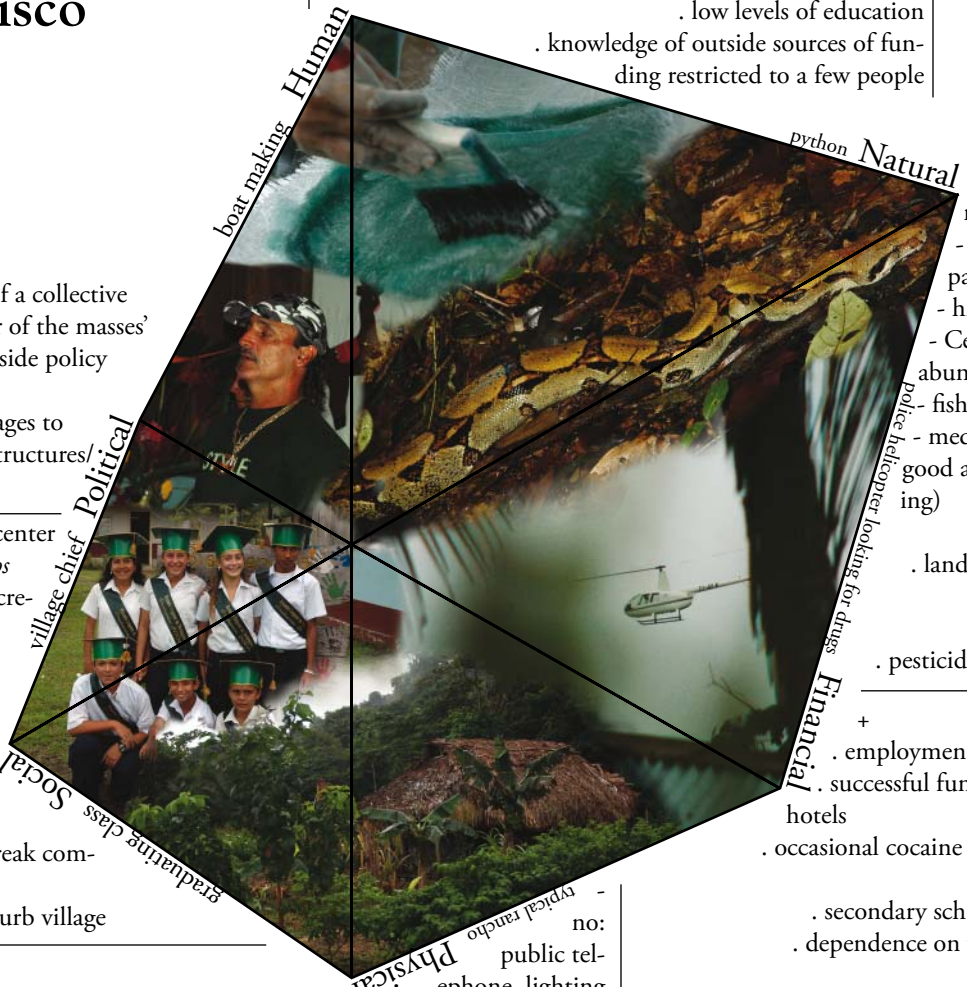
Much of what has been discussed in this chapter is summarised in the diagram, or '**asset hexagon**' on the following page. The lengths of the axes of the hexagon denote the relative availability of the different capitals and thus point at aspects of capitals that can be strengthened. That villagers are inventive and have plenty of ideas about ways of addressing the issues outlined in this chapter is illustrated by the list below the diagram, which I compiled on the basis of suggestions made during village meetings. All these ideas are, in my opinion, feasible, and worthwhile for COTERC and GVI to assist the village with (although some are clearly more appropriate (i.e. related to conservation) than others). Because most ideas are fairly straightforward and must be concretised through discussions with villagers, they will not be discussed further in this paper. I will instead focus on two possible CBC initiatives that may have a potentially larger impact on the village as a whole: sea turtle conservation (in the next chapter) and co-management of the Cerro (in the conclusion).

Fishermen; mouth of the Tortuguero lagoon in front of San Francisco

24 Unfortunately, INCOPESCA mainly supports the farming of the invasive (and highly destructive) tilapia fish.

25 *Instituto Costarricense de Pesca y Acuicultura* (Costa Rican Institute for Fisheries and Aguaculture)

‘Asset hexagon’ for San Francisco



+
. knowledge of natural environment
. young, generally healthy population
. highly diverse practical skills

-
. low levels of education
. knowledge of outside sources of funding restricted to a few people

+
rich natural environment:
- surrounded by national parks and conservation areas
- high biodiversity
- Cerro
abundant resources:
- fish, sea turtles, shrimp
- medicinal plants
good agricultural land (no flooding)

-
. land tenure and access rights to assets contested
. overexploitation of Cerro
. pesticides from banana plantations

+
. employment through tourism
. successful fundraising with help of hotels
. occasional cocaine finds

-
. secondary school/commodities expensive
. dependence on whims of hotel owners and tourist industry

-
. absolute lack of a collective voice, no ‘power of the masses’ to influence outside policy makers
. few or no linkages to outside power structures/people

. school (committee) is center of village activities/*turnos*
. bonding social capital creates social safety net but also favouritism and social rifts

. lack of bridging social capital, cooperation and organisation
. alcoholism, mistrust break community bonds
. strangers/*escapados* disturb village

+
. electricity and private telephone
. generally adequate housing
. public transport (but expensive)

-
no:
public telephone, lighting
paved walkway, health/police post, drinking water
limited boat ownership

Strengthening livelihood assets - the following ideas to improve livelihoods in San Francisco were mentioned by villagers during the community meetings I organised during my stay.

H u m a n C a p i t a l
Bring secondary education to San Francisco (so children don’t have to go to Tortuguero); English language training (for jobs in tourism); request courses INA; organise skill-sharing workshops (if possible with moderator) where villagers share and combine their knowledge (e.g. combine batik and making clothes); use disappearing knowledge by cultivating medicinal plants, (garden can be tourist attraction), hunters can be educated as guides.

N a t u r a l C a p i t a l
Food security could be strentghened by more people cultivating their own crops (there seems to be very little real desire to do so); farm fish/shrimp; cultivate butterflies and medicinal plants (*cuculmeca*) to counteract overexploitation of Cerro and create a marketable product (a potential buyer has already been found); create management and restauration plan for Cerro. ‘Bring San Francisco onto the map’–create development association as official legal entity that can deal with government.

P h y s i c a l C a p i t a l
Improve access to drinking water through clean well or rain receptacles, garbage bins, improvement of walkway and construction of boat dock, police station, clinic, secondary school, public telephone, Catholic church, recreation areas, SEN (crèche), shared boat to bring students to Tortuguero.

F i n a n c i a l C a p i t a l
Support small initiatives (e.g. batik, small bakery and eatery) through small loans or logistical support (lower the initial (financial) barrier).

S o c i a l / P o l i t i c a l C a p i t a l
Creation of village council and eventually cooperative. For COTERC: any activity in San Francisco should be undertaken with the strengthening of these capitals in mind.

Chapter 2: Turtle Conservation in San Francisco

An Act against the killinge of ouer younge Tortoyses

In regard that much waste and abuse…by sudrye lewd and imvident persons…who in their continuall going-es out to sea…snatch & catch up indifferentlye all kinds of tortoises both young & old little and greate of so excellent a fishe…therefore…from hence forward noe manner of pson…shall pesume to kill or cause to be killed…any young Tortoyses that are…eighteen inches in the Breadth or Dyameter.

-quoted in Carr 1967

2.1 Introduction

When I was a child I lived in Gabon, an isolated and beautiful country on the west coast of Africa. One of the strongest images I carry with me from those years is that of an enormous, round, almost barrel-shaped sea turtle heaving her body up the beach and slowly, wisely, digging a hole to deposit her eggs. At the same time I remember it seemed like an odd ritual to me: driven by an instinct far predating the turtle's life itself, in trance-like motion, guided neither by urge nor by emotion. As if she had lost contact with her senses, the turtle would stubbornly continue laying her eggs with a pack of dogs digging out her nest beneath her, or, as Carr (1967. p.13) saw forty years ago, "with drunken Indians drumming on her back". No amount of disturbance seemed to be able to deter her from the task left to her by her ancestors.

I did not know then that Gabon is the world's most important rookery for this magnificent creature, the Leatherback, or *Dermochelys coriacea*, now critically endangered and feared to become extinct in the Pacific Ocean within ten years (Spotila 2000, Sarti et al. 1996; Starratt 2007). For the green sea turtle (*Chelonia mydas*), far more numerous and less in danger of extinction, that honour is reserved for the Tortuguero beach, just south of San Francisco.

Both the green turtle and the leatherback, as well as small numbers of hawksbill (*Eretmochelys imbricata*) and loggerhead (*Caretta caretta*) turtles, use San Francisco's *Playa Norte* (North beach) as a nesting beach. In 2004, COTERC, which manages a biological research station situated behind the beach, initiated a monitoring study to establish whether sufficiently high numbers of turtles nest on the beach for it to warrant protection.

That question, which I will attempt to answer in this chapter, is difficult to resolve: its outcome depends not only on how many turtles nest on the beach, but on economic, cultural and educational factors as well. The structure of this chapter is based on the following reasoning:

Sea turtle conservation has, and can be justified by, different principles: ecological or anthropocentric. The first one, based on ecological reasoning (and their status as charismatic mega-fauna), is to prevent the species from going extinct. This chapter deals mostly with that first principle—by discussing specific aspects of the ecology of sea turtles, their conservation status and nesting numbers at the San Francisco beach I will try to establish whether the beach is of significant importance to the survival of the species. Through this discussion it will become clear that the range of measures required to avert extinction is very broad and that whatever COTERC and GVI may be able to achieve on the North beach and in San Francisco must be considered within a much larger context (and even then, all efforts may eventually be overshadowed by the effects of climate change). An important observation made concerning conservation is that poachers, while not necessarily in power over their own (economic) situation, effectively have a veto over any protection measures taken. It follows that by allow-

ing these people, who are in a position to both harm *and* protect turtles, to benefit from conservation measures a sustainable foundation for conservation can be created.
The second principle, which often underlies the ecological arguments, is a more anthropocentric one: to make best use of the species as a resource for human/economic development. While this objective sounds less 'honourable' then the former, it is often more relevant when considered from a local point of view. It acknowledges, better than global conservation policies propounded by the Global North, the rights and economic realities of the communities in which conservation measures are to be achieved (Campbell 2007). While I do not want to downplay the importance of ecological criteria for conservation, I will argue in this chapter that the current project must seek its legitimacy mostly in terms of the second, anthropocentric, objective. By discussing the turtling industry, the black market that upholds it, and pointing at some of the non-consumptive uses of (live) turtles in San Francisco, I will explain how COTERC and GVI may assist in creating a conservation framework that can be sustained by and is beneficial to the village of San Francisco (the conservation framework is discussed in more detail in the next chapter and in the recommendations at the end of this paper).

2.2 Sea turtle ecology and conservation status

So excellent a Fishe… the quote on the first page of this chapter was taken from what was, in all likelihood, the first conservation law ever enacted in the New World, in Bermuda in the year 1620. The penalty was 15 pounds of tobacco (Safina 2006). Now, almost 400 years later, it is clear that we have not done very well: all species of sea turtles nesting on Costa Rican beaches are either endangered[26], or critically endangered[27] (leatherbacks and hawksbills) (IUCN 2006).
Accounts of the former abundance of especially the green turtle and its dramatic demise abound. Safina (2006, p.189) quotes: "It is affirmed, that vessels, which have lost their latitude in hazy weather, have steered entirely by the noise which these creatures make in swimming," and one of the poachers in San Francisco recalls that only fifteen years ago he was not able to drive his boat through the sea at full speed for the risk of hitting turtles and damaging his motors.
Now, the estimated number of nesting green turtles has decreased by 48% to 67% over the last three generations[28] (Seminoff and MTSG 2004), while the leatherback has declined by 90% over a single generation (Troëng et al. 2004; Safina 2006). The poacher:

> *…well – we used to pick them up like buoys floating in the water, we didn't even need to go very far to fill our boat. Now we have to look for them very far out in the sea* […] *maybe they're afraid: they've swum for 30 years, they come to the beach for the first time…and there is a cabrón* [asshole] *awaiting them to turn them into soup*".

So why is it that an animal that has proved so resilient to change in the past, that has withstood the great Cretaceous extinction, is so vulnerable in today's world? Many factors are to blame, some related to the turtle's peculiar biology, others to human influences, and still others to the potential effects of climate change (Lutz et al. 1996; Hawkes et al. 2007; Baker et al. 2006). I will briefly look at some of these in order to understand where conservation efforts may best be directed. (Because of the scope of this paper this section has to be very limited). For a more detailed discussion, see the 'Conservation Biology' section in appendix 1, Lutz et al. 1996, Bjorndal et al. 1999, or Musick 1999).

Among the many **biological and life history characteristics** of sea turtles that make their conservation so difficult, their very late age of sexual maturity (between 25 years in the Caribbean to 40 years in Australia for green turtles [Hirth 1997]) and long distance migrations are perhaps the most important. Sexually mature turtles are polyandrous (they mate with more than one male) and able to nest several times in one season, which they do every two to four years. However, the time needed by juveniles to reach maturity exposes them to so many dangers (both on land, as eggs or hatchlings, and in the sea) that only one percent to one per mille of all hatchlings is thought to complete the road to adulthood (Lutz et al. 1996). Leatherbacks have relatively faster growth rates and reach maturity at age 10 to 13 (Sarti Martinez 2000) and, unlike all other species of sea turtle, the leatherback, with its relatively high metabolism, is slightly warm-bodied. This allows it to feed in colder waters and have a very wide geographic range, paralleled only by a

26 The IUCN (2006) defines 'endangered' species as one that are at a "very high risk of extinction in the wild"

27 "Facing an extremely high risk of extinction in the wild"

28 Green turtle generation length is usually estimated at 43 years (age to maturity plus one half of the reproductive life span), that of a Leatherback at 22 years.

few of the great whales[29] (Safina 2006). A third important characteristic is the sea turtle's remarkable navigational skills, facilitated by a strong sense of smell, vision and the ability to use the Earth's magnetic field (Lohman et al. 2001). In the green turtle these abilities manifest as a high degree of nest site fidelity: the drive to return, often with astonishing precision, to the exact same nesting beach time after time (Parsons 1962; Spotila 2006). Similarly, the navigational abilities of the leatherbacks and loggerheads facilitate their unusually wide foraging movements—leatherbacks reach as far as the boundaries of the arctic and Antarctic regions and return to the same tropical coast for nesting, while one population of loggerheads nests in Japan and feeds, 12,000 km to the east, in the Baja de California).

'Turtle Mountain'

An old myth told by the people from Tortuguero is that the turtles that come to their beach are guided by a turtle-shaped rock on top of the Cerro. It acts as a beacon and, when the nesting season is about to begin, guides the turtles in from the sea by turning its head towards the shore. Archie Carr and many residents were sceptical, however (Carr 1967); Durham Rankin, one of the earlier (Nicaraguan) residents of Tortuguero, says: "I've been up on that hill several times, and that rock I cannot see. The nearest thing that I can tell you that is like a turtle here, that rock is not up on no hill. That rock is right down there north of the point out in the sea" (photo below), *in front of the Cerro. And, by the way "I'm sure that that size rock can't turn". Recent research, however, suggests that the fable might hold some truth: the Cerro is an old volcano and the magnetic field induced by its solidified magma (which aligned with the Earth's magnetic field at the time of solidification) produces a magnetic anomaly that may serve as a signpost that can be sensed by the turtles (Haro, CCC, pers. comm.,* research not yet published*)]*

29 It was on the basis of this knowledge that Archie Carr, in 1967, predicted that leatherbacks had the "least dreary outlook" in terms of survival – the future proved him wrong: many other threats not compensated for by the species' geographical range (pollution, gillnets, destruction of nesting beaches) now contribute to its endangerment.

Threats to sea turtles are many and include both natural predators (vultures, coyotes, crabs on land, and sharks, barracudas, etc. at sea) and humans. The latter are, however, by far the most important contributing factor to the sea turtle's current decline.
In recent years, for example, some populations of mostly green turtles have become heavily (over 90 percent in Hawaii) infected by *fibropapillomatosis*, a highly infectious immunodeficiency disease causing large tumours that eventually kill the turtle. The expression of this disease appears to be strongly linked to contamination levels in the environment (Herbst 1994). More destructive still are gillnets and longlines, which cause the unintentional deaths of tens of thousands of all species of turtles annually (it is estimated that 5 million baited hooks on 100,000 miles of longline are set each day throughout the world's oceans [Crowder and Myers 2001]). Intentional harvesting of green turtles kills between 11,000 and 35,000 turtles per year in Nicaragua alone[30]. Hawksbills are killed for their shells, which are highly prized on the Japanese and Chinese markets.

But there may be a much more insidious threat to the survival of sea turtles: climate change. Like many reptiles, sex determination in turtles is dependent on the temperature of the sand in which the eggs incubate. Populations of turtles in more southern parts of the United States are already highly female biased and are likely to become "ultra-biased" with as little as 1°C of warming and experience extreme levels of mortality if warming exceeds 3°C (Hawkes et al. 2007). Beach erosion resulting from sea level rise and tropical storms eats away at the turtle's nesting habitat (Chacón, Associación Anai, *pers. comm.*; Baker et al. 2006; Safina 2006), already reduced under the pressure of human development, and turns her ability to return to a formerly suitable beach into an 'ecological trap' (Schlaepfer et al. 2002): the urge to follow magnetic and olfactory clues is so strong and the ability to learn from wrong habitat choices limited (turtles do not spend time with their offspring and have no way of telling whether nesting was successful or not) that she literally becomes trapped by her own evolutionary instincts.

30 Based on population modelling, Campbell and Lagueux (2005) warn of an impending crash in the Caribbean green turtle population due to the harvesting in Nicaragua. I have not been able to find official estimates for turtles killed in Costa Rica; two poachers I talked to estimated that approximately 1200 turtles are illegally killed between Limón and Barra del Colorado each year, and that many hundreds more perish in the nets of fishing trawlers.

Their long evolutionary history shows that sea turtles have been able to adapt to changes in both climate and habitat. But the pace of changes required was never very high and certainly not comparable to that of predicted future developments. The crucial question, then, is perhaps not so much whether, but rather how fast turtles will be able to adapt. While there is some evidence of behavioural change (earlier nesting) in loggerhead turtles in response to changing sea water temperatures (Weishampel et al. 2004), adaptation at the genetic level (which may be required to adjust temperature-determent sex determination or mechanisms of finding nesting beaches) seems unlikely: gene pools of all species of sea turtles have declined drastically and genetic change itself is slow due to turtles' slow metabolism and exceptionally long generation lengths (Avise et al. 1992).

2.3 Sea turtle nesting in San Francisco

Residents of San Francisco that have lived in the area for a long time still recall the large numbers of turtles that nested on their beach only 20 years ago. Although there were never as many turtles as on the Tortuguero beach, people told me that at times the turtles would be crawling over each other in search of nesting space.
Those memories are in stark contrast to the numbers recorded on the North beach now. Table 2.1 (next page) shows the results of the first three years of the COTERC/GVI monitoring project (for a more detailed discussion of these findings and research methods used please refer to Appendix 1 and COTERC and GVI [2006a/b])

The high variability in numbers of nesting green turtles observed in the table makes it very difficult to draw any conclusions concerning population averages or trends —for this, much longer-term data are needed[31].
One conclusion that can be drawn by comparing these numbers to those of the Caribbean Conservation Organisation (CCC) is that the annual trend observed on the

31 The high variability of green turtle nesting as compared to the relatively constant numbers of leatherback and hawksbill nests is most likely explained by their differing trophic statuses (Broderick et al. 2001): unlike leatherbacks, which feed mostly on pelagic jellyfishs and salps, and hawksbills, which forage over coral reefs for sponges, green turtles are herbivorous. They feed on primary producers such as sea grass and algae and are therefore more tightly linked to prevailing environmental conditions such as the El Niño Southern Oscillation (ENSO) and the North Atlantic Oscillation (NOA) (ibid.).

Table 2.1: Turtle and poaching activity on the Tortuguero North beach during the first three years of the project

2004[1]	Half moons[2]	Nests	Poached	Predated	Poaching rate
Loggerhead	0	0	0	0	0%
Leatherback[1]	no data	no data	no data	no data	no data
Hawksbill[1]	3	2	2	no data	100%
Green	126	105	60	no data	57%
Total	**129**	**107**	**62**	no data	**58%**

2005	Half moons	Nests	Poached	Predated	Poaching rate
Loggerhead	0	0	0	0	0%
Leatherback	No data	83	48	no data	58%
Hawksbill	12	11	10	no data	91%
Green	1960	981	545	no data	56%
Total	**1974**	**1075**	**603**	no data	**56%**

2006	Half moons	Nests	Poached	Predated	Poaching rate
Loggerhead	0	2	0	0	0%
Leatherback	24	52	16	2	31%
Hawksbill	5	9	5	0	56%
Green	567	347	222	2	64%[3]
Total	**596**	**410**	**243**	**4**	**59%**

[1] Patrols in 2004 started after the Leatherback and part of the Hawksbill season.

[2] "Half moons" are the times a turtle comes up the beach and returns to the sea without having nested (this may be caused by garbage obstructing her path, lack of suitable nesting spots, or other disturbances).

[3] Poaching rates for green turtles were determined (and extrapolated) on the basis of nest excavations (n=53)

North Beach closely resembles the one on the Tortuguero Beach, with 2005 being the busiest year on record since CCC monitoring efforts began in 1955 (Haro and Troëng 2006; Haro, CCC, *pers. comm.*).
Poaching of nests is consistently high, around 60 %. It must be said, however, that only the 2006 percentage for green turtles (64%) is likely to be accurate, as it is based on nest excavations rather than observations of external signs of poaching. We found that by looking only at external signs (of the same nests) the percentage of poached nests was significantly underestimated (at 52%). This seems sensible, as the poachers I spoke to in San Francisco told me they usually try to make the nests seem natural after taking the eggs.

2.4 The turtling industry and black market in the Limón province

Killing turtles or taking their eggs is not anything new. Judging from the 1620 *tortoyse conservation act*, neither were alarming population declines. Sea turtles and their eggs have been an important source of protein in many cultures for thousands of years and were an important factor in the colonization of the Americas, extending the explorers' reach into the New World (Parsons 1962). The Dutch and the French enjoyed the green turtle's meat as a relief from the monotonous salt beef diet, while the British, true to their culinary traditions, perfected the sticky green turtle soup to a dish of almost ceremonial stature. The reputed aphrodisiacal and even healing properties of the eggs and (to a lesser degree) meat of the green turtle drove, and still drives much of the harvests among Caribbean Black cultures, with aphrodisiac cocktails sold in San José bars and clubs (see page 42). One San Francisco resident (while rubbing his stomach and groin): "Turtle eggs give me power, they make me feel strong… they are good for *el chingo* (*pachuco* (slang) for having sex)"

But it wasn't the Creole blacks, or the Indians that caused the near-collapse of the Tortuguero population. It was the British and the Americans and their demand for fancy soup. Initially, in the early 1900's, American ships would pass by the coast and buy turtles for 'export' from *veladores* ('stayers awake') who overturned the turtles on the beach at night. The real blow, however, came with the calipee trade, which started in 1959 after a sharp increase in British demand for the cartilaginous greenish fat to which the turtle owes its name and its soup the 'sticky' feel so desired by the restaurant-going elite. Only two pounds of calipee can be extracted from a 300 pound turtle, however, and the rest of the animals was often left to waste—the practice left the entire beach white with the bleached bones of turtles (Carr in Lefever 1992).

A poached turtle on the North beach

While the calipee carnage was eventually halted, turtles and their meat remain an important part of many a Costa Rican's diet. With much of the turtling industry prohibited, the national market was (apart from many illegal sources, including Tortuguero) sustained by only two legal sources of eggs and meat: Ostional, a beach on the Pacific Coast, and a fishing cooperative in Limón which was allowed to catch 1800 turtles per year. That is, until 1999, when by decree of the government (and under strong pressure from the CCC) a complete ban on the killing of turtles (Taft 1999) changed those fishermen's job title from 'turtle catcher' to 'poacher'. Many people employed in the fisheries (including several from Tortuguero and San Francisco) lost a substantial part of their livelihoods through this ban (Troëng et al. 2004) and although efforts have been made to compensate for this loss by the development of alternative (mostly tourism-related) activities (Cuevas, 2002) the 'poaching' continues.

I must admit, before I start talking about the poaching in San Francisco, that my own attitude towards poachers has changed since I first started working with turtles. I remember I was angry when I first saw a butchered turtle and I was angry when I first met a poacher with a bag full of eggs over his shoulder. I know many people working in turtle conservation feel this way. But as I spoke more with some of these poachers and grew more familiar with their situation, the focus of that anger changed to the debilitating system sustained by the "eco"-tourism industry and, to a certain extent, by MINAE and the CCC as well: When the economist (or conservationist) says that an animal is worth more alive than dead he is often right, especially when that animal is a sea turtle (see, e.g., Troëng and Drews 2004, Chacón 2006, Godfrey and Drif 2001), but what is not always mentioned is that those benefiting from a dead or alive turtle are often different people. According to the poacher who first told me that, 90 percent of the tickets sold for 'turtle tours' in Tortuguero are sold to groups with tour guides from San José ("who don't need any money at all")[32] and most of those 7 million dollars in tourist revenues (see p. 14) disappear in the pockets of foreign hotel owners (all but two of the hotels in the area are owned by foreigners). So while the logic of letting turtles live is apparent to conservationists and the people that benefit from their being alive (in this case, the tourism industry), it loses much of its sense when seen through the eyes of an average fisherman: "I know it's illegal, and I know we're killing them to extinction, but I can't read or write […] and I don't have a fixed job...".

Interview with a poacher

I know people in Limón with fast boats, with 400 hp. Guys with lots of money, they don't do it for the money, but rather to help us…he gives me the equipment, the boat, good gasoline and we go fifty- fifty. Whatever I bring…fifty-fifty. So I bring turtles, or eggs. Last year, one time, the last time we went I picked up two friends and they had 34,000 eggs. Only in one day, from Jalova[1] *to Tortuguero…walking, digging, disguising…we took 14 bags. And that we didn't do only once…we did it many times. We radio the boat when we have enough…(we can listen to the park guards on the radio* [grins]*)…and in less then five minutes they come and pick it up.*

The guys, they walk on the beach at night to tie the turtles together, say twelve, thirteen turtles on a single rope…when you see a turtle you lift up their back and tie them together. Then you tie a little buoy and a torch (which is the signal) to the rope and they go into the sea…and the boat is there, they can see the light, so they come and pull them up and throw them into the boat. That's how we work. We work with three in the boat hauling, and two people on the beach. We sell them in Limón…there's a big market there, and from there they go to San José…well, they go all over the country. This year we caught over 300 turtles.

But sometimes we do damage just for the heck of it…because sometimes we don't make anything. For example, you pay me 50 thousand colones per turtle (USD100)*, but if I don't bring more than twelve turtles or 10,000 eggs there's no money. Because the gasoline is already 280 dollars for the two big motors, from Limón to here. And we divide whatever remains and maybe we each make 80, 100 dollars.*

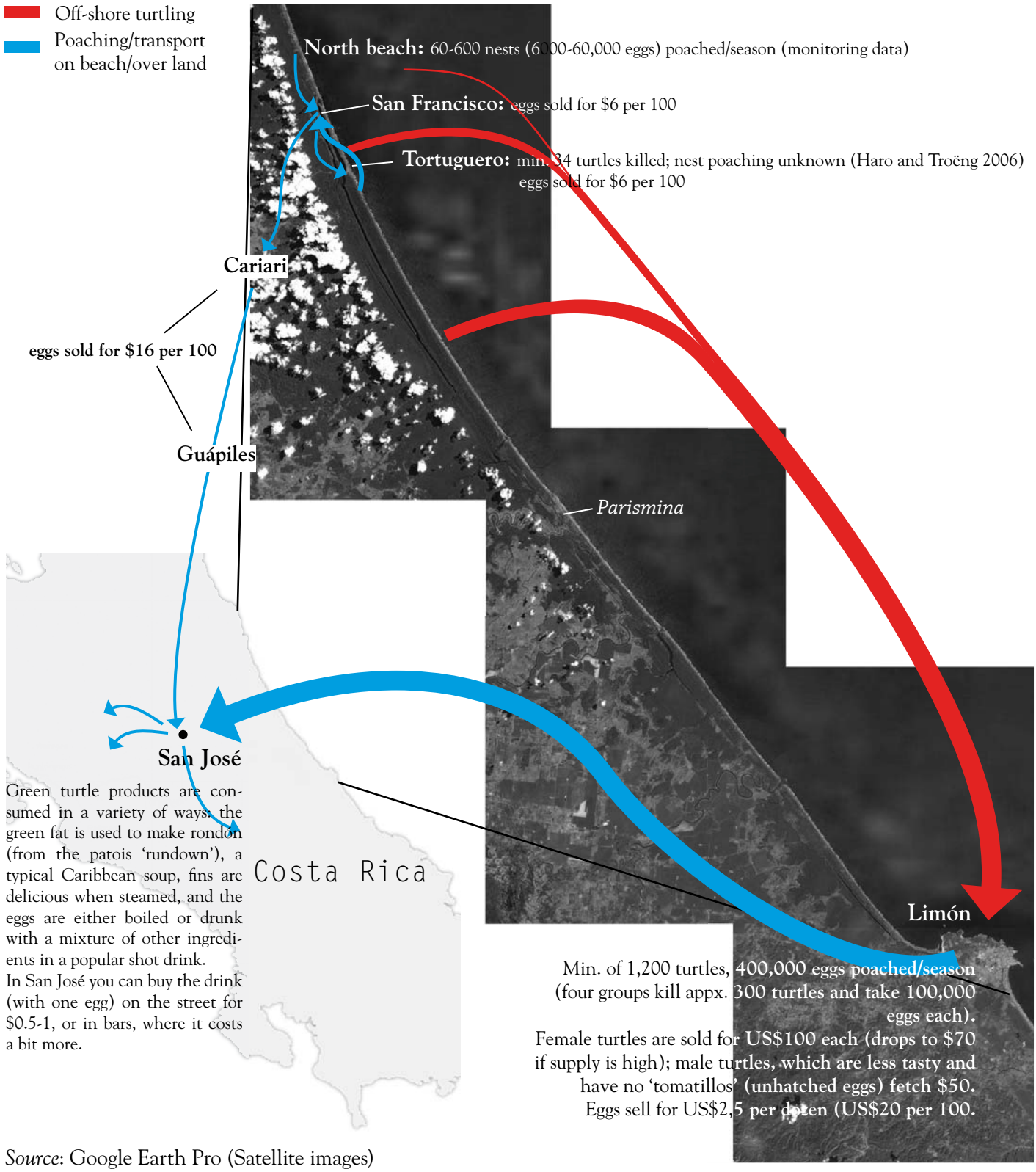
And MINAE…wherever we go they will close their eyes. More than anything they're lazy…and very corrupt. MINAE is as corrupt as it gets. We pay them 50 dollars and they

1 Jalova gets its name from a sandbank in the canal between Tortuguero and Limón; boats needed to be 'hauled over' the sandbank in order to continue their journey.

32 When trying to corroborate this information with the person selling tickets in Tortuguero, I was indeed told that 'more than three quarters' of the tickets were sold to tour guides that are not from Tortuguero. He said that most tour groups are accompanied by a guide from the moment they leave San José and that it is very difficult for local guides to find a group that is not yet taken.

Green turtle black market: poaching, prices and distribution

Numbers in the graph are estimates, based on monitoring data from COTERC and CCC (beach poaching rates) and conversations with villagers and poachers (market prices, off-shore poaching rates). Numbers are mentioned only for selected locations (for which data were obtained) and, while discussed with MINAE and CCC, were not verified. All prices in US$...



Source: Google Earth Pro (Satellite images)

give us the beach free…so we start loading…we bring four, five boats…full!
But…what we do is difficult…on the beach is the hardest, because often the only way to get to the boat is by swimming…the nights are very dark and you have to have a torch in your mouth so that the boat sees you. But…there is always a turtle…so you tie a rope to the turtle, hold it, and you go behind her…you go very quickly out into the sea. Sometimes there is a shark or a barracuda that attacks you – they are dangerous. The waves at night are very strong and sometimes you get hit by a log…one time, when I was swimming behind a turtle, a log hit me… and I lost the rope and the turtle and I stayed there, half mad, half crazy and started to swim again, and swim and swim…and in the end they found me.

I catch turtle but I don't like it. It's ugly…catching turtle is the ugliest thing there is. Because we put the turtles on their back and we put another one on top…in pairs…and we peg them together through the flippers. It hurts them a lot and they try to bite. Sometimes, when the sea is rough, the turtles bounce and the one that lies on her back breaks her shell, because they are so heavy and their shell isn't that strong. It's something…it's very ugly. Sometimes when the coastguard comes close…we throw them into the water… and these turtles, of course they die because they don't have their fins to swim. But we don't have time to cut them loose.

But this…to stop the damage that is being done, to protect the turtles…the cure is so small. If I quit, if there are no more leaders that can get the boats, there is no way to do damage. And I know there are many guys that are 'la pura muerte' [pure death – they kill many animals] *that want to talk about doing something else. We rather protect them…we know how to protect them…I think we know more than those biologists that come here, but they never talk to us.*

What arises with these two parties—conservationists/hotel owners and poachers—pulling at different ends of the same rope, is a stalemate in which, for a change, the poor wield most of the power: as long as poachers are ignored and failed to be made beneficiaries of conservation efforts, they will continue to exercise their 'veto' over those efforts by carrying on with their old way of life: killing turtles. That this practice may compromise that very lifestyle (and the entire tourist industry) in the future is, for them, entirely irrelevant. For anything to happen in terms of conservation, then, poachers must be made to care enough about the situation to change it, and with law enforcement being corrupt and hopelessly ineffective, financial incentives seem the only viable option.
A step in that direction was taken in Tortuguero in 2005. On the initiative of Mr Obando (and, interestingly, not the CCC), a local businessman, money was collected from local hotels to pay former poachers a basic salary as *rastreros*—they look for turtles at night and, when found, alert the groups of tourists walking behind the beach. While the program has worked reasonably well, about half of the poachers have since left the programme and again turned to their old way of life (Obando, *pers. comm.*).

2.4.1 Turtle poaching in San Francisco

Some of the poorer households in San Francisco occasionally take eggs to complement their income, but as a livelihood, poaching is significant only for about eight villagers, most of them (five) well-known loafers. These five operate mainly on the North beach and the Tortuguero beach and although they are responsible for most of the poached nests indicated in table 2.1 (people from nearby settlements and Cariari are responsible for the rest) the harm they do is minimal when considered on a regional scale. Of the three remaining 'big' poachers (see interview on these pages), two are affiliated with the black market operating out of Limón and their impact is much larger.

2.5 Sea turtle conservation in San Francisco

Conservation efforts in Tortuguero started with the advent of the *Brotherhood of the Green Turtle*, spearheaded in 1955 by Dr. Archie Carr, and their *Operation Green Turtle*. The objective of this programme was to conserve the sea turtle as a protein source for the Caribbean people (Parsons 1962) by a) shooting all the stray dogs responsible for eating turtle eggs and hatchlings and b) tagging nesting females to learn more about their biology and distribution (Carr 1967). The brotherhood became the CCC and over time its focus (at least in Tortuguero) changed more towards enforcement of existing legislation and research.
Numbers of green turtles nesting on the Tortuguero beach have increased gradually since the 1970s (Bjorndal et al. 1999; Haro and Troëng 2006), although, interestingly (and this is very difficult to substantiate), this finding is contradicted by the experience of several of

San Francisco's long-term residents.
In those fifty years of research, the CCC has never had the resources to systematically monitor or protect the North beach. In 1997, together with the beach of Parismina south of the Tortuguero park, the North beach was included in a series of surveys (Troëng 1998). While numbers on both beaches were approximately 1% of total nesting numbers, only the surveys on the Parismina beach were deemed useful for the purpose of quantifying illegal harvest of turtles and eggs; the North beach was not considered important enough for conservation, and monitoring efforts were discontinued.
At the time, that conclusion was probably correct. But while the North beach can still not be considered a turtle nesting 'hotspot' (see following pages), much has changed in ten years (not in the least the emergence of the village of San Francisco) that should influence the decision[33] on whether to continue the project in the future.

First, in relation to the **ecologically-based objective of conservation**, let us reconsider Troëng's statement above and put the North beach's nesting numbers into the context of those of other regions in the world (I will limit my discussion to green and leatherback turtles, since hawksbill and loggerhead numbers are very small and can be considered insignificant[34]).
Firstly, the leatherback's critically endangered status is mostly a result of its decline in the Pacific; its status is contested, however, as rookeries in the Atlantic appear to be stable (Dutton et al. 1999) or increasing (Campbell 2007). The current global leatherback population size is estimated between 26,000 and 43,000 females and with approximately 1,200 – 2,500 nesting females the Costa Rican and north-Panamanian coast represent the world's fourth largest rookery (see table 2.2; Troëng et al. 2004)

Compared to the two main Costa Rican beaches, Gandoca (with 651 and 419 nests in 2005 and 2006, respectively [Chacón, Asociación Anai, *pers. comm.*]) and Tortuguero (with 703 and 481 nests in those years [Haro and Troëng 2006; Harrison, CCC, *pers. comm.*]) the North beach represents a small but arguably significant leatherback nesting beach with 83 and 52 nests in 2005 and 2006, respectively, or about 1% of the Caribbean sub-population. (In the above table, note that 'females/year' is estimated on the basis of clutch frequencies on other nesting beaches [between 4.5 and 7.5])

Table 2.2: Leatherback rookery sizes (simplified, based on Troëng et al. 2004)

Location	Nests per year	Females/year
French Guiana and Suriname	18,481-55,654	2,464-7412
Southern coast, Gabon	29,000	5,800
North Trinidad, Trinidad & Tobago	9,000-10,000	1,800-2,000
Caribbean Costa Rica & Panama	5,759	1,152-2,579
↳ **North beach**	**50-85**	**5-18**

The green turtle red list assessment[35] (Seminoff and MTSG 2004) features a list of 31 rookeries worldwide on which the assessment is based. When assuming an average clutch frequency of 3/year and a clutch size of 100 eggs (ibid.; COTERC and GVI 2006b – this is a conservative estimate), at least six of these sites have nesting numbers that are lower than those observed on the North beach. However, in comparison to the proportion of females nesting on the Tortuguero beach (an estimated 150,000 and 84,343 nests in 2005 and 2006, respectively [Haro and Troëng 2006b; Harrison, CCC, *pers. comm.*]), the North beach's 981 and 347 nests are few (between 0.5 and 1%).

An important factor in understanding the significance of these numbers is whether the turtles nesting on the North beach are an isolated population, part of a larger metapopulation (a group of populations that are spatially separated yet interact at some level) or part of a single

33 It may seem strange that small, independent conservation organisations 'determine' whether and how conservation happens, but certainly with sea turtles this seems true for most initiatives around the world. While larger supranational organisations (the Marine Turtle Specialist Group (MTSG) of the World Conservation Union (IUCN) arguably being the most powerful one) set global conservation priorities, forge international treaties and consequently determine to a large extent for which activities funding is available and how countries regulate access to the animals, actual initiatives for on-the-ground implementation of turtle conservation are mostly the domain of smaller, independent organizations.

34 Based on numbers provided by the US Fish and Wildlife Service (2005), Hawksbills nesting on the North Beach constitute approximately 0.2 % of the Caribbean population.

35 Red list assessments are conducted by the IUCN and, while considered the most authoritative source on the conservation status of most species, are invariably contested (this is partly because of the interpretability of data, and often also because countries that engage in the trading of the animals (e.g. Cuba and Japan for hawksbills) try to prevent species from being listed as endangered).

global population: knowing of which (meta)population turtles are part and whether that population is declining, stable or thriving, helps to understand their need for protection.

Research on this subject has generally been conducted by analysing mitochondrial and nuclear DNA and the tagging of individual nesting females (Dutton et al. 1999; Encalada et al. 1996; Karl et al. 1992). Mitochondrial DNA (mtDNA), because it stems exclusively from females, is used as a tool to track matrilineage, while nuclear DNA also reveals the male-mediated flow of genes. As is expected on the basis of the maternal homing behaviour of female green turtles, mtDNA analysis shows a highly subdivided population genetic structure, with very little genetic exchange between separate populations (Encalada et al. 1996). Even leatherbacks, despite their migratory nature, show such differentiation between nesting beaches (although, unlike with green turtles, proximal nesting populations are indistinguishable) (Dutton et al. 1999). These findings seem to correspond to the data obtained from the recovery of tags on the North beach, which show leatherbacks and green turtles to have nested previously on the Costa Rican coast (mostly Tortuguero and the North beach), Nicaragua (rare) and Panama (very rare). That these turtles do indeed belong to a larger Caribbean meta-population (i.e. genes are exchanged between turtles nesting in these different countries) is confirmed by the analysis of nuclear DNA: populations that, on the basis of mtDNA analyses are found to be highly separated, are, in fact, related to some degree due to the male-mediated gene-flow[36] (Karl et al. 1992).

So while the green turtles and most leatherbacks that visit the North beach are likely to be separate from populations in other parts of the world, they belong to a metapopulation that extends throughout most of the Caribbean. On the one hand, this implies that the North beach should be considered an integral part of Caribbean conservation efforts. By protecting additional nesting habitat, the resilience of these populations is strengthened and migrating turtles that are protected elsewhere will be safe also on this beach (this argument applies to hawksbill turtles as well) (Chacón and Hancock 2004). On the other hand, because the Caribbean metapopulations to which both green and leatherback turtles belong are large and can be considered relatively healthy compared to other populations[37], the numbers of females nesting on the North beach are not as significant as they would have been had they been part of other, smaller or more threatened populations. The populations of the six green turtle study sites that were mentioned above (Seminoff and MTSG 2004), while smaller, are therefore of relatively higher importance (all belong to strongly declining populations).

In conclusion, while I emphasise that it remains extremely difficult to ascertain, in the case of a (critically) endangered species, whether a certain proportion of a population is ecologically or genetically significant (Reed and Blaustein 1997), I do not believe that the impact of the current project, *in terms of numbers*, would be sufficient to justify its continuation. The nests and few adult turtles that the project helps to save are dwarfed by numbers, pertaining to the same metapopulation, elsewhere (see also pp. 8-9 of appendix 1 for estimated numbers). Also, in light of the high offshore mortality of juvenile and adult turtles and their crucial importance to population recovery, it seems that part of the efforts now spent on protecting nesting beaches should be diverted to protection at sea (Bjorndal et al. 1999; Musick 1999).

But these are numbers. And apart from the fact that anyone who has ever worked with sea turtles cares very little about numbers, there are other factors that determine the relevance of conservation initiatives. Rather than global ecological considerations, these factors are concerned with the local and more practical aspects of conservation and relate to the **anthropocentric/economic objectives of conservation**.

Troëng[38] (*pers. comm.*) mentions a number of such factors: the duration of monitoring efforts and the length of the resulting dataset; the existence of a regional legal framework supporting conservation; the economic and cultural importance of the species to local communities; and the existence of appropriate management models that can be applied to the site in question as well (see also IUCN 2003; Troëng and Drews 2004).

The first two criteria are straightforward: in terms of sample size and length, the dataset generated by the monitoring programme is, as yet, small. Monitoring of the beach beaches, while necessary to gather the baseline data on which conservation efforts can be based, does not contribute significantly to the existing body of (scientific) knowledge regarding turtle conservation

36 Unlike females, males are not 'loyal' to specific beaches and are likely to mate with females on overlapping feeding grounds, migration corridors or nonnatal rookeries.

37 Seminoff (2004) suggests that if the conservation status of leatherback turtles were determined regionally, the Caribbean/Atlantic population would not meet the criteria for its current status.

38 Sebastian Troëng is currently director of Regional Marine Strategies at Conservation International.

(Calvo, MINAE, *pers. comm.*).

In terms of legislation, Costa Rica is reasonably 'pro-sea turtle conservation'. The country is signatory to the Inter-American Convention for the Conservation of Sea Turtles (IAC) and, as I mentioned before, harvesting of turtles or eggs is prohibited in the entire country, except in Ostional (Campbell 2007). But unlike in other countries (e.g., Mexico), the enforcement of this legislation is weak to, on the North beach, non-existent. Lack of personnel (police) and corruption (MINAE) severely compromise conservation efforts in the Tortuguero area. Therefore, stationing a police officer in San Francisco (which is desired by a majority of the village), beside solving many other community problems, is likely to dramatically reduce poaching rates on the North beach.

I firmly believe, however, that the main justification for the current project must lie in the last two criteria. The potential economic (more so than cultural) importance of turtles to San Francisco was one of the main reasons for writing this study. CBC initiatives are the most feasible and ethical way to bridge the interests of conservationists and community members in the area and to help lift the 'veto' that poachers now exercise over COTERC and GVI's conservation efforts. An additional and important benefit is the tremendous educational value of such projects. Not just the participating volunteers, but also villagers themselves often learn much and begin to gain pride in 'their turtles' (Chacón, Associación Anai, *pers. comm.*, Weitzner and Borrás 2000). Many people in San Francisco already have such pride: most handicrafts—paintings, batik art, floor inlays, wood sculptures—that people make have turtles as their theme.

That such initiatives are possible is shown by a number of successful—if difficult to achieve—management models implemented throughout the country. Community-based sea turtle conservation projects mostly work with 'Paying Participant Programmes', in which volunteers wishing to work on such projects pay money to villagers for board and lodging[39]. Examples include programmes in Gandoca and Cahuita (Asociación ANAI), Punta Banco and San Miguel (PRETOMA – *Programa Restauración de Tortugas Marinas*) and, especially interesting, the village of Parismina. The latter is run by the village itself through its village association and could serve as a guide to San Francisco. Representatives from both ANAI and PRETOMA have expressed their willingness to provide help with the development of a similar programme in San Francisco.

Lastly, the willingness on behalf of some of the province's main poachers living in San Francisco to cooperate in conservation (see box "Interview with a poacher", p. 41) offers an exciting (although, again, challenging) opportunity to target the turtling industry and black market at a level not previously explored by conservationists in Costa Rica. Such an initiative has the potential to save hundreds of turtles and hundreds of thousands of eggs each year and would ensure that protection occurs offshore as well as on the beach. In the conclusion of this paper these ideas will be discussed in more detail.

A hatching green turtle
(original photograph by Vinicio Padilla Arce)

39 Prices range from US$14 per day with ANAI to US$15-20 in Parismina, to US$45 per day with PRETOMA.

Chapter 3: Autopoiesis and Community development

The greatest hindrance in the understanding of the living organization lies in the impossibility of accounting for it by the enumeration of its properties; it must be understood as a unity.
- Maturana (1970, p.5)

3.1 Introduction: a systems perspective on community in San Francisco, Costa Rica

In contrast to the first two chapters of this paper, which described specific elements of the current situation in San Francisco, this last chapter will approach that same situation in a more systemic, more inclusive, and perhaps also more intuitive way. A danger inherent in the SLA, and indeed any approach or world view that focuses on categorisation rather than synthesis, is that one may lose track of the 'whole' in trying to understand it. A second danger is that the information thus gathered is so time-specific and, therefore, subject to change that in a year (and perhaps much sooner), much of it will be outdated. In this chapter I will propose a way of understanding community and community development that is less time-dependent, because it incorporates 'change' and 'adaptation' as defining attributes of these concepts. While the approach is mostly theoretical and may at first sight seem difficult to apply, it will, in combination with the knowledge presented in the previous chapters, help elucidate what opportunities for development are present in San Francisco and how these may be realised.

Three observations give reason for the approach taken in this chapter: first, the discussion of livelihood assets in Chapter 1 has shown a marked lack of social capital and a resulting absence of any 'community' to speak of. Second, while many initiatives may be undertaken in San Francisco to strengthen individual aspects of people's livelihoods and may create alternative sources of income, these will *not* likely result in any lasting changes as long as they do not include the strengthening of social capital as an integral objective. Theory and past experiences in other places indicate that, without social change, in terms of structurally enabling villagers to initiate and manage long-term projects, such projects will continue to benefit only the 'elite' and will eventually collapse under the weight of disorganisation, strife and mistrust (Dale and Onyx 2005; Pretty 2002). Thirdly, I take here the position that, while outside organisations such as COTERC and GVI may act as catalytic institutions, the village's development process should have the goal of eventually becoming autonomous and self-sustained.

The systems theory I will use to discuss community (development) is called *autopoiesis*, developed in the 1970s by the Chilean neurobiologists Humberto Maturana and Francisco Varela. Given its epistemological roots, firmly planted in the natural sciences, this theory may not seem an obvious choice for describing a social phenomenon. I recognise the danger of naïvely applying natural scientific principles to social systems and the temptation of looting scientific theory for cheap parallels, yet I believe that the principles of autopoiesis elegantly illustrate my views on community development, especially when applied to the situation in San Francisco. I emphasise that autopoiesis is used here as a *metaphor*; as an illustration of how natural systems, with their incred-

ible ingenuity, can inform social systems about life, how it originates and how it achieves autonomy. I do not want to claim, although several authors have considered this (e.g. Zelený and Hufford 1992, Luhmann 1982, Goldspink and Kay 2003) that social organisations are in fact autopoietic systems. That discussion is very technical and philosophical and does not serve the purpose of this paper. I will, however, base part of this chapter's analysis on these author's ideas and insights.

This chapter will begin with a description of the theory of autopoiesis, followed by a section in which the parallels with the concept of community are explored. In the final section these insights will be put to a practical use in demonstrating how a 'community' may be created and, in the process, directed towards a desirable state. There is a danger that discussing community from a systems perspective becomes an entirely functionalist exercise, because by definition it is not concerned with such (essential) matters as values, ideologies or ethical principles. To compensate for that deficiency I will, alongside the main discussion, illustrate some of these more normative aspects with my own experiences in San Francisco.

3.2 Self-creation: The theory of Autopoiesis

In his (unfortunately) characteristically convoluted style, Maturana defines autopoiesis as follows:

> *"An autopoietic machine is a machine organised (…) as a network of processes of production (…) of components that produces the components which: (i) through their interactions and transformations continuously regenerate and realise the network of processes (relations) that produced them; and (ii) constitute it (the machine) as a concrete unity in the space in which they (the components) exist by specifying the topological domain of its realisation as such a network."*
>
> (quoted in Maturana and Varela 1980, pp.78-79)

In English, this reads something like: a system is Autopoietic if the parts of which it is composed interact in such a way that both these parts and the interactions between them are continually reproduced. "The primary output" of such a system, therefore, "is itself" (Goldspink and Kay 2003, p.461). In fact, that meaning is contained in the word autopoiesis itself, which is derived from the Greek words 'auto' (self) and 'poiesis' (creation, or production) (Whitaker 2003).

While the literature on autopoiesis is vast[40], the focus in this section is on a few selected aspects that, I hope to demonstrate, are particularly relevant to community development: autopoiesis as a process; autopoietic and allopoietic systems; and the concepts of autonomy, structural coupling, change and adaptation.

The work on **autopoiesis** began as a quest for the answer to the question "What is life?"—how do we distinguish, for example, a living entity such as a horse from a 'machine' such as a chemical factory, when both are characterised by complex components and dynamic interactions of production (Mingers 1989). Interestingly, Schrödinger, in his book "What is Life" (1944), gave a first impulse towards the development of autopoiesis, by noting that a living entity is a self-maintaining system of order, achieved by, metaphorically, devouring order from its environment. Von Forster (in Reichle 2005) notes the problem: where does that order that life needs initially come from?

Maturana and Varela found the answer to that question by observing the mechanisms creating and sustaining life's most basic constituent, a living cell (Luisi 2003): using some basic chemicals imported from its environment, cells produce a great number of highly complex chemicals. These chemicals, in turn, form into functional constituents that in their interactions with each other reproduce the cell. "Nucleic acids participate in protein synthesis and the proteins in the synthesis of nucleic acids" (Maturana in Reichle 2005), i.e., order produces order. A defining element of the autopoietic unit is that it must be realised within the boundaries it itself produces (in the case of a cell, its membrane), thus separating its internal order from the external environment. In order not to violate the second law of thermodynamics ('in a closed system entropy (or chaos) increases over time'), this boundary must be semi-permeable, allowing for the transfer of high-energy inputs and low-energy outputs (waste).

The distinction with the (non-living) chemical factory must by now also be clear: the factory does not, like the (living) cell, produce something that goes towards the preservation of its internal order, rather its elements are produced by, and whatever it produces goes to, a system outside its own (Seidl 2004). Systems such as these are

40 As main references I have used Maturana and Varela (1980) and Mingers (1989). The former is a very comprehensive introduction to Autopoiesis and commonly used as a reference point for discussion; the latter is a more accessible, but shorter, synthesis of the theory.

referred to by Maturana and Varela (1980, p.135) as ***allo-poietic*** (allo- means "other"): they are functional components of a subsuming larger system (Whitaker 2003) and are delineated by an external ("other") observer with respect to a purpose within that larger system. Apart from mere self-perpetuation, such a purpose (or 'teleology') does not exist for autopoietic entities, simply because they cannot conceive of themselves in relation to other entities.

Interestingly, and relevant to the discussion of communities in the following sections, a system can simultaneously fulfil both autopoietic and allopoietic roles, if, as a component of a composite system, it contributes to that system by simply realising its autopoiesis. However, logic dictates that this is possible only from the perspective of an external observer that can attribute those functions to the system (Varela 1979).

The idea of 'purpose' may be further understood when reflecting on **autonomy**, a concept which defines a second crucial difference between the living and the non-living. Allopoietic entities are not autonomous because their "definitory organization [is] necessarily subordinated to the production of something different from themselves" (Maturana and Varela 1980, p.80). Living (autopoietic) systems, on the other hand, essentially depend only on themselves for their continued existence. They are also, in contrast to allopoietic systems, operationally and informationally closed, meaning that, while the entity may be subject to an inflow and outflow of basic elements, neither operations, nor information can enter or leave the system (Mingers 1989). The world of the autopoietic system is based on maintaining the internal processes that keep it alive—it is on the basis of these processes (independent of an outside observer) that the system has an identity, while an allopoietic system depends on an outside observer to define both its boundaries, its purpose and its identity.

But if the sole frame of reference of an autopoietic organism is its 'insides', how does it interact with and respond to its environment? The answer lies in the important concept of **structural coupling** and the related ideas of **adaptation** and **change**.

Varela (1979, pp.48-49) writes that structurally-coupled systems "will have an interlocked history of structural transformations, selecting each other's trajectories." To understand this idea it helps to imagine two entirely blind, autistic if you will, systems that, while they dangle around in close proximity to each other, do not acknowledge the other's existence. Communication occurs, but not consciously and not in the way one usually thinks of communication (only an outsider is able to observe it and ascribe meaning to it): if we remember that an autopoietic system's sole purpose is homeostasis, the maintenance of its internal order, to continue living, it must somehow adapt internally in response to external stimuli or 'perturbations' (e.g. light, heat, drought). It can do this if it is has developed a sensitivity for these stimuli (without the proper receptors, a cell won't respond to the presence of, e.g., a certain hormone) *and* if the internal structural change required is within the boundaries of what the organism requires to continue living (if the change required is too radical or too swift, the organism cannot adapt and dies). Note that change is, very subtly, determined by both organism and environment: although the internal structure of an organism contains a number of potential different configurations, it is the environment that, through defining external conditions, 'selects' one of them—the one best able to survive in these conditions. Because a structural change within the organism is also likely to affect what the organism does, it will in turn affect its environment. In the continuous interplay of "mutual non-destructive perturbations" (Quick, 2003) that results, both environment and organism will evolve in an interdependent manner. Sadly, they will never know each other.

Lastly (and this is only partly relevant to the following sections, but very important philosophically), how is it possible that an outside observer is able to describe a system that is autopoietic and, therefore, informationally closed, i.e. unknowable? According to autopoiesis it is, in fact, not possible at all: descriptions made by a system are constructs of that system that have been developed through "a history of successful orienting interactions between two or more organisms" (Maturana, quoted in Mingers 1989, p.171), they do not in any way reflect any kind of external reality[41]. Cognition, thinking, language, the processes that enable description, do not actually enable us to know reality, they only enable us to respond to it.

3.3 The analogy with community and social capital

While some of the concepts discussed above have very clear parallels in the world of social systems, other—more specific or philosophical—concepts are more diffi-

41 This stance is generally known as Radical, or Operative Constructivism (see Seidl 2004).

cult to translate into a social equivalent. In this section I will try to define community in terms of autopoietic concepts, using them in the same order as they were discussed above.

Before doing that, it is necessary to briefly, but critically, look back at the meanings of 'community' and 'social capital'.

'Community' has come to denote much of what is fine and fair in the literature on conservation and development (almost all approaches in these fields specifically mention 'community' as an important element of project implementation [see, e.g., Bessette 2004, Boyer 2000, Chambers 1994, Kumar 2002]). The problem is that, through uncritical overuse (including in mentioned sources), the term risks losing its meaning in the rhetoric of political correctness that pervades so much of the development discourse today. This is important, because the way in which the concept 'community' is constructed influences significantly the way in which we work with 'community' and thus the outcome of the development process. If, for example, community is defined (as is still quite common, also in the SLA) as a relatively static, homogenous, perhaps simple entity (e.g., as a 'stage for action', or a 'means' to achieving an end) it automatically follows that 'community' actually exists and can therefore be mobilised (Vandergeest 2006). Even if such a community does exist, this view would fail to acknowledge its internal dynamics, power structures, gender roles, etc. and is therefore quite useless when aiming to create the social foundations for sustainable change. In San Francisco, which in no way can be considered stable or simple, and which certainly cannot be 'mobilised', a much more engaging notion of the term 'community' is necessary. This notion must view community not only as a means but especially also as an end; only then will the village eventually be able to effect self-directed, sustainable change. A useful definition for this particular context, given by Agrawal and Gibson (2001), describes community as ***collective action***, steered, mediated and enforced by shared norms and values and collective institutions. Vandergeest (2006) adds the important observation that collective action can both be the cause and the result of such norms, values and institutions.

The definition of social capital is still more difficult to give. It is somewhat of a trash-can for community-related concepts, that with its "gargantuan appetite" (Fine 2002, p.796) actively absorbs anything not previously claimed by mainstream economics. Dale (2005) estimates that several hundred definitions of social capital exist, and that in our attempts to "define, measure, and quantify the [sic] undefinable" we are well on our way to losing the integrity and essence of the concept. In this chapter I want to adhere to the definition presented earlier ("the norms and networks that enable people to act collectively" [Woolcock and Narayan 2000, p.226]), while emphasising that 'networks' imply interactions. In my experience, it is the quality, quantity and direction of these interactions that define a community.

The application of autopoiesis to social systems has been attempted several times and has perhaps been contested an equal number of times. Already in the (brilliant) preface to Maturana and Varela's (1980, p.69) seminal book on the subject, Stafford Beer writes that:

…any cohesive social institution is an autopoietic system because it survives, because its method of survival answers the autopoietic criteria; and because it may well change its entire appearance and its apparent purpose in the process. As examples I list: [...] *schools and universities, clinics and hospitals, professional bodies, departments of state, and whole countries.*

Luhmann (1982), one of the most highly regarded of recent European sociologists, and Zeleny and Hufford (1992) similarly endeavoured to describe social systems (society and family, respectively) as autopoietic[42]. Mostly to the dismay of Maturana and Varela, however, who felt that such a literal ascription of the process of autopoiesis to social systems was not appropriate. Varela later developed a less specific version of autopoiesis (termed 'organisational closure') which better describes social systems (Mingers 1989). Maturana rather saw social systems and their qualities as emerging as a result of individual autopoietic (and biological) components of such systems, but not as autopoietic themselves (Quick 2003).

Whatever one's position on this subject, as an analogy **autopoiesis** goes a long way in describing the idea of 'community'. Like autopoietic systems, communities are geared towards their own self-reproduction and while they are challenged by their environments, develop autonomously, according to their internal structural arrangements (Jackson 2000). Communities are composed of, much in the same way as cells are, functional constituents and the interactions between them. While in a cell the result of these interactions is the emergent property (i.e. a property not observable in any of its component

42 E.g., according to Zeleny and Hufford (1992), a family passes the test of autopoiesis because, as a unity, it has (amongst others) a well-defined boundary, which is produced through family interactions and biological and social production and because the system is defined through separate components that interact and take on characteristics of the system they together create.

parts) we call 'life', in communities that property is, well, 'community'. The boundary that makes a community distinct from the rest of society is, like the membrane of a cell (though not quite as tangible), semi-permeable, and consists of language, norms, customs, etc. While geographic location is certainly an important defining feature of many communities, including San Francisco, it is not an essential part of their boundary: one may walk, indeed live in the physical space on which a community is established, yet never be part of it (for me it was interesting to observe that, precisely because I lived in San Francisco, I became much more aware of the differences that 'separated' me from the village).

What is very important to note, particularly with reference to social capital, is the relative importance of the system's components and the interactions between them. Both Jackson (ibid), Zeleny and Hufford (1992), Luhmann (1982) and Maturana and Varela (1980) agree that a system is reproduced not, as we might expect, by its internal constituents, but by the communication that occurs between them. The system's components are important, but only insofar as their specific qualities (e.g. the skills of workers, a carpenter's workshop, a boat driver, etc.) aid the system to adapt to the complexity of the outside environment. Without communication these components are of no use to the system: just as an enzyme does not function if not triggered by a messenger (e.g., a hormone) sent by another part of the system, a baker will not bake if there are no individuals in its community that depend on and ask for his product.

This observation adds much weight to the argument for social capital as an inherent part of any development strategy. While acknowledging the importance of other forms of capital—it is clearly important to develop and make the most of individual qualities within a community—the resilience and eventual 'reproduction' of that community system are ensured by social networks. Individual constituents can vanish or appear, but so long as strong social networks are in place that allow for internal restructuring, the ability of the community to deal with and benefit from its environment will not be affected and, usually, nor will its identity (firing Wolfowitz does not change the identity of the World Bank, or, for a more poetic interpretation, see next page). *Truly sustainable livelihoods, then, may be better achieved through the creation of community than by the SLA's focus on separate assets* (Brocklesby and Fisher 2006).

But the situation is more complex, for a community's existence can be significantly hindered or enhanced by outsiders who, functionally, become part of the community and manipulate its internal structure. Whether this means that a community is allopoietic (i.e. operationally and informationally open) rather than autopoietic is debatable—I would argue that it can be seen as both, but also that at this point the analogy becomes slightly problematic. Insofar as a community's aim and function is self-perpetuation, the continuous reproduction of its identity as a community (or, in the case of San Francisco, creation), it can be considered autopoietic. This is especially the case when the community is isolated. In situations that are less isolated, when an already established community is integrated into larger networks of governance, trade, exploitation and conservation (e.g., for San Francisco potentially MINAE, the tourism industry, GVI/COTERC) etc., it could perhaps best be compared to an allopoietic system. While presumably it is still geared towards self-perpetuation it has also come to play a functional and intentional role within a larger whole.

The ideas of **autonomy** and **structural coupling** further explain the important influence larger networks can have on communities.

To attribute the characteristics of a community to just its constituents and the interactions between them is to miss an important implication of the theory of autopoiesis: that the particular state at which a system manifests is 'selected' by the signals coming from its environment. Autonomy, therefore, has its limits: an autopoietic system may be self-sufficient and self-reproducing, but it can change *only* by interacting with, i.e. being structurally coupled to, another system or the environment. If this other system or environment forces the autopoietic system beyond a point at which a change in its 'identity' is required that is so dramatic that it cannot internally adjust, the system loses its autonomy and ceases to be autopoietic—it either disintegrates and dies, or it looks outside for help and becomes allopoietic. In other words, while an autopoietic system is autonomous, the range of its potential states and its conditions for change are demarcated by its surrounding environment.

If, as I argued above, any community that is embedded in a larger social system performs both an autopoietic (with respect to itself) and an allopoietic role (with respect to the larger system, which (again with respect to itself) is also autopoietic[43]) it follows that change is

43 This recursive hierarchical embedment of increasingly larger, semi-autonomous systems (e.g., cell, human, family, community, country, society) is described in detail by Gunderson and Holling (2002) in their work on 'panarchies'. Each of these systems have different characteristics and evolve at different speeds, and while a smaller system may 'revolt' against the dominion of the system in which it is embedded,

Ersilia

In Ersilia, to establish the relationships that sustain the city's life, the inhabitants stretch strings from the corners of the houses, white or black or gray or black-and-white according to whether they mark a relationship of blood,

of trade, authority, agency. When the strings become so numerous that you can no longer pass among them, the inhabitants leave: the houses are dismantled; only the strings and their supports remain.

From a mountainside, camping with their household goods, Ersilia's refugees look at the labyrinth of taut strings and poles that rise in the plain. That is the city of Ersilia still, and they are nothing.

- Italo Calvino – Invisible cities (p.76)

both difficult and limited (Stafford Beer in Maturana and Varela 1980): the larger autopoietic system (e.g., a country, MINAE) perceives the smaller system (the community) as a functional component of itself and will use its power to manipulate the community's role so as to prevent conflict with the interests of the larger system. It thereby effectively denies the smaller system its own 'full' autopoiesis. A country that takes part in the world economy, for example, cannot achieve a pure form of communism because it will be restrained in its actions by the autopoietic system of global capitalism. Similarly, San Francisco, in pursuing its autopoiesis, cannot make unrestrained use of the land and natural resources surrounding it because the village is seen by MINAE, as befitting their mandate, as a functional component of a larger system characterised by ecotourism and conservation. MINAE, as the ensign bearer of the subsuming system, sets most of the rules and limits within which San Francisco is allowed to evolve (in this context, a key strength of the SLA in understanding communities is its focus on the institutional framework enabling or disabling their development). Certainly in the future it will likely be in the village's own best interest to strike a balance between being autopoietic and allopoietic, between 'being itself' and participating in a world that is not 'self'. This balance is arguably required for any system that is a component part of a larger system, but necessarily involves compromise.

The glue connecting the system

Why do systems interact, and why do individuals interact to form systems? One very clear message that autopoiesis gives us is that the driving force behind the living universe is self-interest, or self-preservation. Everybody wants to live, and everybody wants to live well. If individual acts seem altruistic, they are usually combined with long-term interest (Das 2004) (in social capital terms: "I help you now [with the expectation, conscious or unconscious, that] you help me out in the future"). While this assertion may seem a bit bleak (and I certainly do not mean to say that human society cannot transcend self-interest), it is also realistic. Self-interest is a powerful force in achieving community development, for better or for worse.

When one of the people in San Francisco asked me, during an interview, why I had come to San Francisco, "why do you care so much?", part of my answer involved self-interest: certainly, I had come to San Francisco because I cared, but, perhaps mostly, I had come to learn, to gain experience. I realised that any connection established in a system is durable only when the parties on both ends have an interest in maintaining it—there must be a degree of reciprocity in order for it to last. I became part of the system of San Francisco only after people had begun to realise that I could potentially contribute something to their future. Similarly, COTERC may work with San Francisco because it sees important opportunities for conservation, while San Francisco may cooperate because it sees an opportunity for development.

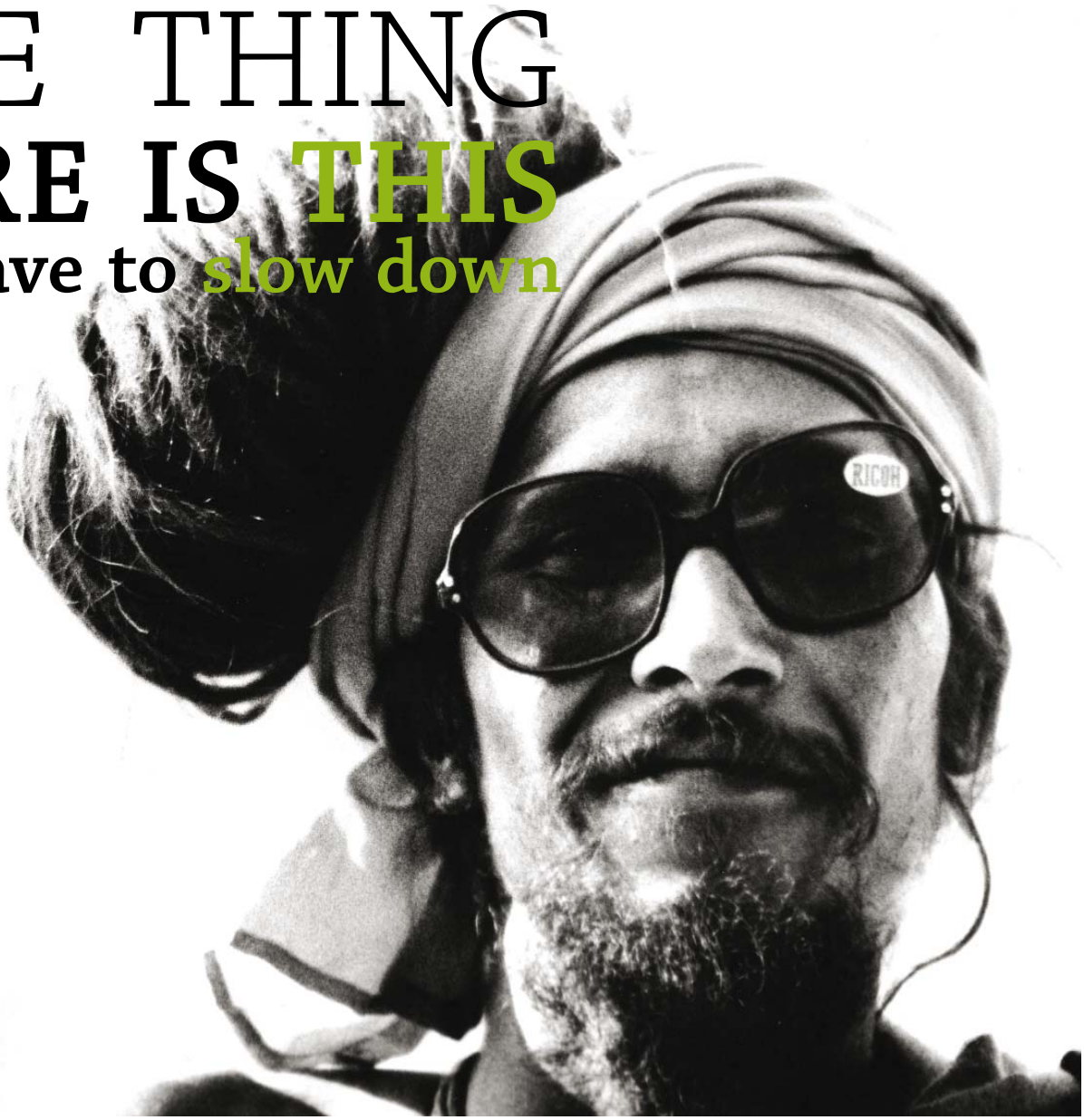
If any part of a system wants to work with, or influence another part of the system, it has to make it attractive for that other part to work together. If San Francisco wants to work with MINAE in co-managing natural resources it must entice the ministry with something it wants, something that coincides with its mandate.

In the previous section it was mentioned that organism and environment influence each other's evolution in a "continuous interplay of mutual non-destructive perturbations". This is very much the case with social systems as well. Communities organise themselves in accordance with the way they perceive reality (Mingers 1989) and the role they think they should play within that reality to benefit most from it (this is what often drives collective action); in the process, reality itself is changed (ibid). In San Francisco, a self-image that involves hunting, poaching, logging, resource extraction, etc. will lead to exactly that, while a self-image involving conservation is likely to change the surrounding environment for the better. Whichever perception prevails, a cycle of continuous feedback between environment and community will reinforce the relational strength between them. Theoretically, the longer this relationships persists and the more non-destructive perturbations have taken place in shaping it, a memory, or historical awareness develops in these systems, making them both more adept at dealing with disturbance in the future (Mingers 1989).

A final insight regarding communities as autopoietic systems concerns the nature of **change** and **adaptation**. I already mentioned that, proportional to the strength of its internal linkages, or social capital, a community's identity exhibits a certain tenacity, an ability to maintain its spirit even in the face of major environmental disturbance or changes in its constituents. What is important to understand is that the internal reorganisation required for adaptation is often complex

that larger system sets the rules with which the smaller system needs to comply in order to maintain its autopoiesis.

THE THING
HERE IS THIS
you have to slow down



Sometimes you want something done by the next day and sometimes that do not happen. But we know that if it do not happen today, it probably happen tomorrow, or at least this week, or the week after.

- A villager on 'time' (photograph is of someone else)

and takes time[44]. That 'speed limit' on change must be acknowledged by outside agencies wanting to implement projects at the community-level, including by COTERC and GVI in San Francisco. Rather than a 'blueprint'-model of project implementation, in which activities are mostly externally driven and subjected to a specific (and therefore non-appropriate) timeframe, a more adaptive 'process'-oriented approach, in which project activities take shape through iterative learning (Brinkerhoff and Ingle 1989) should be pursued[45]. Structural social change happens over historical time (Alinsky 1971), not project-time. However, a project can trigger, or contribute to social change.

3.4 The creation of community – Autopoietic development in San Francisco

The previous sections have discussed something lacking in San Francisco. I hope to have demonstrated in the first chapter of this paper that, except in a most elementary form (as a group of people tied to the same geographical location and wanting to stay there), the village is not a community. It does not have those "shared norms and values and collective institutions" that accommodate internal differences and make possible collective goals and action (Murphree 1994). As individuals, people living in San Francisco can survive, taking from their environment (and, occasionally, each other) what they need, but in the long run, as turtles, fish, land and the Cerro's forest slowly disappear, this is destined to lead to a classic 'commons' problem.

To prevent this scenario from happening in San Francisco, conservation goals must somehow be implanted in the village's collective consciousness. The most appropriate and sustainable way to do that is, in my view, by helping to initiate a community-based conservation project in the village; this, in turn, requires social capital and a general sense of community and consensus regarding future goals. While I write this from the perspective of COTERC and GVI—people in San Francisco do not (yet) see conservation as a top priority—it will ultimately be in the village's own interest to care as well, as the world is likely to reward them for it (e.g., through ecotourism).

In short, building community with the aim of CBC is a worthwhile goal. What matters specifically to COTERC and GVI is that the process of community building is accompanied by a concurrent growth of conservation goals of local people.

Drawing on the insights from the previous sections, I will here suggest a number of ideas that could help in achieving these two goals. Throughout that discussion, the importance of education, institutions, outside agencies, community involvement and power dynamics will be explained as well.

Perhaps one last warning with respect to systems is in place: a systems perspective can increase, sometimes dramatically, our understanding of reality, however, because systems are, quite literally, in the eye of the beholder (a system is not an inherent quality communicated to the observer, rather it is something recognized by him) they should rarely be taken as prescriptive. The following suggestions for change, because they are in part based on the idea of community as an autopoietic system, should therefore be implemented with caution and in an adaptive fashion (using continuous self-evaluation).

Creation

Autopoiesis tells us that in order to stimulate the creation of community, both 'building blocks' (constituents/human capital) and interactions (social capital) must be addressed. The two cannot be seen as separate: quality and variety of community members are necessary to match the challenges posed by the world outside its boundaries, but networks of communications are necessary to harness these qualities and to allow them to be expressed for the common good. Strengthening one of the two when the other is absent will not likely be very effective.

Concretely:

The 'quality' of a community's people and (micro-) enterprises may be strengthened in two ways: through

44 This is all the more true for social systems, where the linkages that require restructuring are mediated by human emotions and thus add a level of complexity to the functioning of such systems that makes them much less predictable than natural systems.

45 Ervine (2007), based on research on a number of integrated conservation and development projects in Chiapas, Mexico, found that externally imposed (by the World Bank and the Global Environment Facility) community projects were generally much less successful than endogenous ones. When a community is inspired to undertake a certain activity it usually also means that some internal structure is in place to carry out its implementation. Such structure may completely lack in communities that are told or paid to engage in a certain activity, and 'logical frameworks' do not usually incorporate time for the development of that structure.

education and training, or by adding constituents to the community that have an expertise not present in the community[46].

Training was mentioned by many villagers as something they hoped COTERC and GVI would continue with and intensify in the future. The English language and environmental education classes that have been given over the past years are appreciated greatly, but also workshops in which specific skills and the 'marketing' of small products are taught would help many people. Care must be taken to target such workshops *specifically* to the people that are normally excluded (passively but sometimes also actively[47]) from such events: batik and decoration courses given by INA (see p. 22) in the past were attended only by a few relatively 'privileged' women that were able to free time during the day.

Education is incredibly important in community development, in this context mostly because many villagers have either lived in more remote areas or worked in more traditional fields and now have to adapt to the tourism industry and more frequent contact with foreigners, but it is not necessarily enough. In its development (e.g. establishing a cooperative or village association), San Francisco is faced with, in SLA's terms, 'transforming structures and processes' the handling of which requires expertise a rural village rarely has. A number of organisations exist in Costa Rica that can help communities (and notice that the existence of a 'community' is already assumed here) with their own development, but the hurdles thrown up by other (mostly government) institutions are large and difficult to overcome. It is here that outsiders and development agencies can make a crucial difference: they can either themselves become a *functional*, extended part of the community, or help it become more connected to wider networks that contribute the necessary expertise. In the case of COTERC/GVI, that 'expertise' may be as modest as having a computer and printer, some familiarity with official/legal language, the ability to write a grant proposal and having access to a few helpful people in positions of relative power in NGOs and government. As an outsider it is indeed difficult (but not usually impossible) to fully integrate into a community, but it *is*, as Rivera and Erlich (1995) suggest, feasible for an outsider to fulfil the function of mediator between community members and the outside world, thus becoming a functional component of its system and potentially increasing its political capital.

The position of the researcher/development worker

(Or: who are you, where are you from and how much money do you have)

Whether it is because we have messed up so often, because, as the dependency theorists claim, international development is just another guise of neo-colonialism, or because it is all simply too complicated, 'outsiders' are not generally considered the most suitable agents of development (Rivera and Erlich 1995). Some think 'we', the outsiders, should stay away from the developing world altogether. I disagree, as I hope to have shown in this chapter: I think outsiders can play a very important role in the development of communities, as long as they are aware of some of the pitfalls that have caused so many of the failures of international development in the past.

One such pitfall is money. Is it good to bring a suitcase full of money? No, certainly not. Some money, of course, is necessary and I know I would have achieved more had I had a bit more of it in San Francisco. But there was a big advantage of not having any money to directly implement ideas, namely that villagers knew I had nothing more to give to them than my help. They knew they didn't have to become 'friends' with me in order to get a piece of the pie; they knew that if anything was going to happen, any project was going to get off the ground, it would be through their collective efforts, their cooperation and their resources. While this meant that it was incredibly difficult to get people to come together for village meetings (there was no direct (financial) benefit involved), I think it did ensure that people were candid with me about

Interactions are rather more difficult to create. I wrote earlier that human systems derive part of their complexity from the fact that their interactions are, by definition, mediated by emotions. This implies that if interactions are to be established or changed, then so must the properties and behaviour of the people engaging in them change. Even in a small village such as San Francisco, with its 274 people, trying to individually forge

46 At this point it is possible to say that the community becomes allopoietic, but the question arises: who counts as a member of the community? This necessarily depends on the definition given to 'community' (see the previous section in this chapter, or Vandergeest (2006), Woolcock and Narayan (2000). If community, as I have argued, can be (partly) created and defined by collective action, any person who commits to that action becomes a functional part of the community.

47 One Nicaraguan woman, who lives in San Francisco without official documentation (*cédula jurídica*), told me that other women never want to work together with her. She was one of the only people that mentioned her Nicaraguan background as having a negative influence on her position in the village.

their ideas, their opinions, and their view of the future of the village. Perhaps most importantly, it also ensured that people looked inside their community for solutions.

A second pitfall is using a fixed approach. All development approaches, PRA, RRA, AI, CBNRM, SLA[1], etc., have their neatly demarcated tools for eliciting information and stimulating action and all, without exception, assume the existence of a community. While I tried to use some of their principles in my talks and meetings with villagers it was clear from the beginning that few of the actual tools would be very useful—I am sure that in other situations (perhaps even at a later stage in San Francisco), with different people, role-plays, storytelling and 'group assets exercises' could be very useful, but I honestly think that people in San Francisco would have thought me a fool had I tried to make them do such things. Instead, speaking informally with smaller groups of people in the environments and under the circumstances they chose (on the soccer pit, while fishing, in front of people's houses) proved much more appropriate and very effective. In such smaller groups I actually found that being an 'outsider' meant that people were probably more honest and told me things (mostly about village dynamics and the roles of specific people) they probably would not have discussed with most of their fellow villagers.

That last point is important, as it implies that my (and any outsider's) involvement inevitably changes, for better or for worse, the local dynamics. This shows, again, that community development is a very subtle process and that any outsider involved in it must be constantly on guard with respect to his attitudes, behaviour and the position he takes within the community.

1 Participatory Rural Appraisal, Rapid Rural Appraisal, Appreciative Inquiry, Community-based Natural Resource Management, Sustainable Livlihoods Approach, respectively.

social bonds would be very complex.

Instead of creating individual bonds, social capital can also be created by institutionalising social interactions in the form of community organisations, or through small livelihoods projects in which an objective shared between various people stimulates interaction.

Based on experience with several projects in Cambodia, Vandergeest (2006) observes that for a community to flourish, hard work is required (not only by organisers, but also by the communities themselves): villagers' perceptions of their community improved drastically after the accomplishment of some collective effort towards, in this case, resource management. The overview on page 34 shows some ideas for such small livelihoods projects that, when undertaken with the specific purpose of bringing people together and stimulating cooperation, should begin the process of creating social capital in San Francisco.

While such projects lay some of the foundations of a community, they will not by themselves be sufficient to generate sufficiently wide involvement and create the "common voice" a cohesive community really needs (Vandergeest 2006, p.341). In fact, Lee (1999) warns that action without a community consensus may lead to division and failure. White (2003) writes how members in a community development group in England found that organisational development working alongside smaller development projects was essential to achieving community involvement. Also in San Francisco, where I came to associate my efforts to stimulate participation with the image of pulling a train up a hill, a more institutionalised and perhaps more 'enforceable' form of social capital will be necessary—most of the villagers I talked to realised that community organisation would create many opportunities for a better future, but all of them also said that involvement would not happen in the near future, unless much effort would be spent on bringing people together.

Two common examples of more 'institutionalised' forms of social capital in Costa Rica are the village association discussed in chapter 1 and the cooperative. The idea of establishing a cooperative was one of the first to arise in my discussions with villagers[48]. It would create the necessary connections between different community members, combine their skills, and create jobs that are much more secure than the ones most people have now. In the end, however, establishing a cooperative (centred around the co-management of the Cerro) would require a level of organisation few people in San Francisco thought possible and an initial amount of financial capital only some were are able to contribute. Moreover, the activity around which the cooperative was to be centred (see appendix 4) was not expected to be easily approved by MINAE.

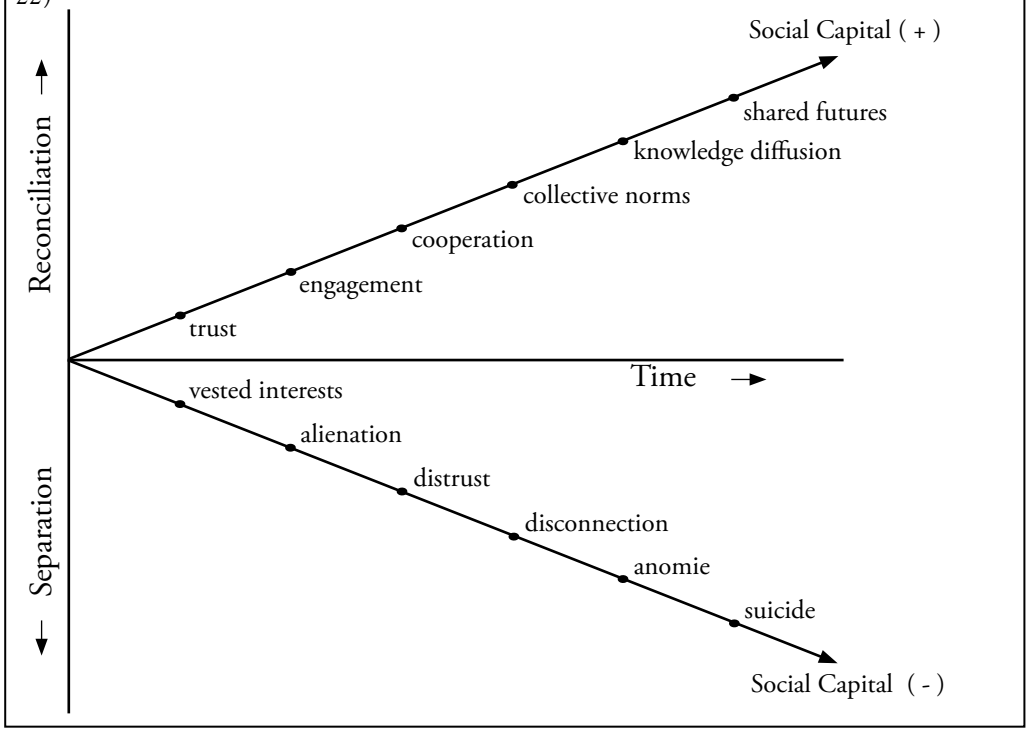
Instead, people believed that a village development association would be more appropriate. Not dependent on the success of any particular project and much less costly, such an association still has the legal ability to

48 INFOCOOP (*Instituto Nacional de Fomento de Cooperativas*) is an institute that assists communities throughout the (legal) process of establishing a cooperative. The institute is tremendously helpful, but does, understandably, assume a level of organisation to be already present in a community.

steer communal (livelihoods) activities and attract and administer municipal funds. More important for social capital and the building of community, however, is that such a community institution gives San Francisco a defined representative (Murphree 1994), its 'common voice'. Because a community association is probably also the most democratic[49] way to construct that voice, it would create a venue for the settlement of disputes, deal with theft, security, overexploitation of natural resources, etc. (Juanwen and Qiu 2006) and begin to create some of those common norms that allow a community to work towards a collective goal.

The diagram below identifies a number of key elements in the building and destruction of social capital. The linear paths suggested by the diagram are, of course, much simplified—reality is more complex, as multiple elements may be at work at the same time—but for those working in San Francisco it may allow for a more intuitive grasp of where the village is in terms of community development, what 'symptoms' must be watched for and which qualities should be strengthened.

Figure 3.1: Building and destroying social capital (adapted from Dale and Onyx 2005 (pp.21-22)



Participation and involvement

Participation has become somewhat of a dogma in international development and has suffered, even more than its colleague 'community', from overuse and outright abuse. "'Participation' and 'involvement' turn out to mean the co-option of local elites and leadership for derived programs," and the new paradigm for conservation and development (Murphree 1994, p.405), and gameplaying by international institutions and academia has pushed participation away from its grassroots expressions into the domain of theory (see, e.g., Cooke and Kothari 2001; Rogge 2007; Stirrat 1997, and many others).

In this section I refer to two types of participation (the same distinction is maintained in the academic literature): firstly, the degree to which villagers are 'allowed' to participate in projects led by outside organisations, and, secondly, public involvement and democracy at the grassroots level (not related to outside agencies).

In the first context, participation is often explained as constituting a continuum starting, at one end, with mere consultation and ending, at the other end, with supporting independent community interests. While different levels of participation are suited to specific situations, the level of participation 'allowed' by an implementing agency is generally related to its (hidden) motives: the more abstruse these motives, the less genuine the participation.

In this respect my position as researcher and community organiser in San Francisco was straightforward: not bound by donor requirements or project objectives, I had the luxury to simply ask the village how I could help. This may not be a very sophisticated way to characterise the 'right form of participation' (which I think it is) and does in no way do justice to the thousands of academic pages 'problematising' the concept, but it is what I feel should be at the heart of one's intention when doing this work.

49 'Development associations' must be elected democratically by at least 50 community members. Already when I was there, however, during the first stages in the creation of the association, manipulation of this 'democratic' process by some of the more powerful villagers was in full force (trying to elect family members or friends, negotiating positions, convincing others that certain people were not suitable, etc.).

Based on my experience in San Francisco I found the second type of participation much more problematic and in need of reflection: how does the actual process of creating participation work—how can people be convinced to become involved in communal projects and contribute their voice? Cleaver (2001, p.37) calls community-based development approaches "inevitably messy and difficult, approximate and unpredictable in outcome," and this is in large part due to the difficulties in ensuring broad and especially equitable participation. It is tempting to think (as most participatory approaches to development seem to do) that 'empowering self-analysis' (Kumar 2002), understanding one's situation and knowing what can be done to improve it, will automatically be followed by the required action. Indeed, in most studies related to the subject, after a 'solution' is found participation seems to be there, almost magically, as something that simply happened and continued to happen. But unless money is offered as an incentive (which would lead to all the wrong motives on behalf of participants), this is absolutely not the case in San Francisco.

After looking into nine different development approaches for practical advice and only finding information on how to conduct participatory village games (again: the participation is already assumed), the most practical and simple advice I found came from the completely different field of community development. Lee (1999) gives the humble advice to simply start knocking on people's doors. This indeed appeared the only way in which to include every persons' voice and ensure that not just the 'hawks' (as I came to call the illustrious five mentioned in the first chapter) but also the people whose opinion is generally ignored would attend village meetings. I realised that if anyone was to attend such meetings I would have to convince them of the benefits of participating (the 'glue' had to be spread) and if anyone was to come back a second time, those benefits would have to coincide for every person in the group; had I organised a participatory village game-playing meeting at the beginning of my stay nobody would have come. The result was that I knocked on every door not once but four times and dreamed up that image of the train.

It was interesting (and frustrating) to observe that, while the first village meeting was attended by many people from different parts of the town, including some of the poorest, and none of the 'hawks', the second meeting was taken over by the hawks and many of the other people stayed away. When I asked someone why this was so he told me that after the first meeting people had started to believe that there were real opportunities for community projects and that he had stayed away because he knew that once this was the case the leaders would take over, and he would not be listened to anymore. Somewhat less interesting (but equally frustrating) was that I had to compete with the immensely popular 'La Esclava Isaura', the telenovela *(soap opera) aired every evening at 8 o'clock. La novela is a bit of an institution in Costa Rica (and much of Latin America). Meetings should not overlap with showing times and never be longer than one and a half hours (after which attention starts to drift).*

Lastly, 'being participatory' means listening, but does it also mean refraining from voicing your own ideas? Many people I talked to were a bit uncomfortable when I asked them about their ideas about the future. They had never been asked this question and perhaps had never allowed themselves to think this way. I found that having open, basic ideas and presenting those to people, elicited a much more active response. People might not have thought about certain options, or thought they were impossible to achieve, but when someone else mentions them they connect and become enthusiastic. People took up my ideas, translated them to their own reality and modified them in such a way that they became their own.

Manipulation (or "Altruism is Pointless")

Sustainable community development is a bit treacherous. Not just because, ideally, by practicing it the 'developer' works herself out of the job (Kapoor 2002) (this may be one of the reasons most development approaches have steered away from the concept), but mainly because strengthening a community's social and political capital enables it to do things by itself, things not necessarily in line with what the 'developer' initially had in mind (much like raising a child). Much has been written about the hidden motives and neo-colonialist practices of development organizations and practitioners, the ideologies and power differentials we bring along when 'helping' the 'poor' (see, e.g. Kapoor 2004). But although it is important to be aware of this luggage when engaging in (community) development, to be "hyper-self-reflexive" as Kapoor (ibid) calls it, it can also have a paralysing effect. **Everybody has a motive, always. Development practice is never entirely altruistic and once that fact and the reason behind it are openly acknowledged, the work becomes more honest. For COTERC and GVI the primary, and entirely valid, reason to work with San Francisco and assist it in its development is conservation. The question for COTERC and GVI, then, is how to guide that development process in a direction that is concurrent with conservation goals.**

Autopoiesis, and specifically the concept of structural coupling point at a number of options:

Perception leading to action: the premise of the following idea is that the way a community acts on its environment is a direct result of the perception it has of it. Changing a community's perception, therefore, can change its actions, which can change its environment. While many individual households depend on that environment for their livelihoods, the community as whole, as a system does not, quite simply because that 'whole' does not exist. If a community were to exist in San Francisco, and the collective benefit of, e.g., conservation would exceed the added individual benefits of exploitation (i.e. exploitation is no more a Pareto optimal distribution of available resources), clearly conservation would be favoured and even enforced through social pressure.

Currently, this is not the case and San Francisco (*the system*) therefore does not need to be sensitive, or responsive to the state of its surrounding environment (e.g. declining fish and peccary populations); it does not gain anything by doing so. Using autopoietic terminology, one might say that San Francisco and its environment are not yet structurally coupled because the former does not exist and therefore necessarily lacks the 'receptors' that would trigger internal change in response to stimuli sent out by the latter[50]. As conservation and education organisations, COTERC and GVI can help create these 'receptors', they can help sensitise people to their environment and to the long-term consequences of their actions. Education is one tool, but in changing people's attitudes[51] it works mostly on the long term and the past few years have shown that it does not necessarily reach the desired people. In addition, a somewhat more persuasive and less voluntary approach may prove successful as well: if the perception of the village in relation to its environment can be changed in one that sees the environment as sustaining the village, creating livelihoods not just for a few but for many villagers, a dependence is created that requires the village to be sensitive to changes in the environment and respond to its degradation. This response will, in turn, only be possible once 'shared norms and collective institutions' are in place, i.e. when a community exists. Supporting ecologically-oriented initiatives (e.g. a CBC project for the Cerro or for sea turtle conservation) that the community as an entity will benefit from will begin to create such responsiveness.

Inequality and Power

Issues related to inequality and power are perhaps the most difficult to resolve. When left unaddressed, without checks against unequal power relationships among villagers, projects will be manipulated by the few in power to the detriment of some in the community. But trying to change power relationships as an outside organisation automatically means becoming implicated in a community's internal struggles. To complicate matters, and this is true also for San Francisco, participation of the 'people in power' is often necessary for a project to succeed, as they are the ones with the required resources and contacts.

While I believe that development is, in most cases, inherently political (it involves not only the addition, but also the redistribution of wealth and power), I do not think that outsiders should become directly involved in the changing of power relationships. Such relationships are too difficult to understand, too complex, and the ways in which they respond to intervention nigh impossible to predict (Iraq is a sad example). But it is possible to intervene in less obtrusive ways. Chambers (1997, p.234) writes: "Putting the first last is more radical. For it means that those who are 'uppers' and powerful step down, disempower themselves, and empower others [...] It implies that 'uppers' have to give up something and make themselves vulnerable". In other words, Chambers' solution to the reversal of power is, rather naively, a voluntary one, dependent solely on the goodwill of the 'uppers'. But the 'goodwill of the uppers' is, in my opinion, almost a contradiction in terms, and it is difficult to see the practical relevance of Chambers' idea. The idea becomes much more promising, however, when we reverse it: rather then waiting for the powerful to step down, one can help the less powerful to step up. There are several ways to do that: bringing a community together, strengthening its social capital and creating community institutions will broaden its power base and create a forum in which the powerful can be challenged, either through democracy or through conflict. A second, more direct way is to work specifically with the less powerful people in small livelihoods projects. In San Francisco, most of these people are disempowered because they do not have a fixed job and are very poor. Strengthening their livelihoods will likely increase their self-confidence and their ability to participate in the community as respected members.

50 One could argue that, as a general problem, this applies to more humans, human societies, and indeed any population living above the carrying capacity of its surrounding environment: the links connecting us to our environment have become so indirect that, except in the case of natural catastrophes, we are not easily disturbed by environmental change (and simply continue living the way we do).

51 It is interesting to observe that in a country like Costa Rica, with such a long history in ecotourism and conservation, people are somehow trained to 'talk green'. Many are very familiar with the rhetoric of biodiversity conservation and what is 'right' and 'wrong', yet do not necessarily practice what they preach.

Action leading to perception: by stimulating initiatives that are ecologically oriented, both social capital is strengthened and a perception of 'environment' as breadwinner becomes integrated in the community's collective consciousness. If done at a sufficiently large scale (e.g. Cerro, turtle project, butterfly garden) and a large enough part of the community becomes engaged in its activities and benefits from it, the community will begin to see itself as a custodian, a 'protector' of the environment. A force will then slowly develop stimulating conservation rather than exploitation. That this is a long process is illustrated by the communities of Gandoca, Cahuita and Parismina, further down the coast, where it took many years to establish a successful cooperation between villagers and conservationists (Chacón, Associación Anai, *pers. comm.*, Weitzner and Borrás 2000). At the same time, however, these projects show that a change of mentality is possible, that actions can lead to changed perceptions, *and* that this change in perception has dramatic consequences for the environment (as witnessed, in these cases, by strongly reduced poaching rates).

The two avenues discussed above may sound very similar, and perhaps seem a little like a chicken and egg problem: perception or action—what comes first? From an autopoietic point of view, action cannot arise spontaneously, it must be preceded by perception. If a community does not have a certain cognitive image by which it relates its own existence to its environment, it will not initiate any action connected to it. Once cognition arises, action ensues and from that moment the system is caught in a continuous evolutionary loop of perceptual and environmental adaptation.

It is, nonetheless, possible to talk about action coming before, and leading to perception. For this, however, involvement from a third party, from outside the community itself, is necessary. This is the 'observer' mentioned in the second section of this chapter, the outsider that can give meaning and purpose to interacting elements of a system without these elements being themselves aware of their roles. COTERC and GVI are such observers and can, through continued involvement, literally add meaning to San Francisco as a community.

Synthesis and recommendations

The work I have described in this paper, and the future work I hope it will lead to require a heavy personal involvement. Working with a community, trying to make people believe and ultimately participate in something you believe is worthwhile requires a tremendous amount of energy and may lead to frustration and, at times, disillusionment.

But for COTERC and GVI there is a very good reason to spend that energy: conservation. San Francisco's precious natural environment, the Cerro, its beaches and the tranquillity of the village itself are threatened not just by local people but by the burgeoning 'eco'-tourism industry as well. To steer future changes in a direction that restores the area's already damaged ecology and prevents San Francisco from falling prey to the same overdevelopment that now characterises Tortuguero, will require the help of outside conservation organisations and close collaboration with local villagers. This help is desired also by San Francisco: villagers are canny and have a good intuition when it comes to the politics of development projects, yet they feel they simply do not have the expertise, the connections or the financial leverage to change the current situation. Building on the findings in this paper, this final section will suggest a number of ideas for such future work.

The livelihoods analysis in the first chapter has shown that the villagers of San Francisco, while poor, are not destitute. The abundance of natural resources—fish, yucca, paca, etc.—and the ingenuity with which people find ways to make money ensure that even the poorest villagers are able to sustain themselves. While this does not mean that livelihoods cannot be improved, it does imply that in the present situation it would be inappropriate for COTERC and GVI to act as 'aid' organisations in San Francisco in the sense of offering substantial financial support for livelihood projects[52]. While such an urge may exist—money is an easy way to initiate participation—it will lead to neither sustained participation nor to sustainable action. This is not to say that financial support should be ruled out as an option altogether: provided that the more disenfranchised people are specifically targeted, small initiatives, organised along the principles of a cooperative, will create positive momentum, challenge, by helping the less powerful to become more fully integrated in the community, some of the village's existing power structures, and may alleviate some of the current pressure on the area's natural resources. In the absence of other credit options (see page 27), COTERC and GVI can help lower the initial financial barrier of such projects through small donations and loans. Yet it remains important to assess people's real motivation to participate in such projects, and a good indicator is whether they are willing to bear at least part of the financial burden.

But although small livelihoods projects may somewhat ease the plight of conservation, they are not likely to lead to village-wide transformation and will do little to change the poaching situation on the North beach. Larger initiatives that engage more villagers are necessary for such wider impact, but San Francisco lacks a crucial ingredient for them to be successful: social capital, or 'community' itself. Both from personal observations and the people's responses to census questions, it appeared that the social bonds, interactions and collective norms and institutions that otherwise steer and moderate collective action hardly exist in San Francisco. Because San Francisco is not a place where social capital will arise spontaneously—most people are too isolated and have too little trust in their neighbours—I have argued that creating a more enforceable and institutional form of social capital may be appropriate to begin the process of community development. It is a fortunate coincidence that the 'village development association', an example of 'institutionalised social capital', is both relatively easy to establish, entitles a village to receive 'development' funds from the municipality of which it is part, and contributes to its political sway.

The locus of future cooperation between field station and village will most likely be sea turtle conservation. Over the past few years the monitoring project has become the most important activity taking place at the station and has proven of tremendous educational value, allowing hundreds of volunteers from all over the world a chance to take part in hands-on conservation work. The actual ecological value of the project is more difficult to assess. The critical conservation status of

52 Beside supporting the local school, a good use of the donations that visitors to the field station occasionally offer would be, for example, the building of a basketball hoop, a small playground for children, a community hall, etc.—any space that brings people together and stimulates social interaction. Surprisingly many people, especially women, said that the lack of such spaces makes the village a bit dull and lonely.

the species of sea turtles nesting on the beach and the gloomy prospect of dwindling gene pools, disappearing nesting habitat and global warming seem to warrant any and every effort at conservation. Yet when comparing nesting numbers to those in other parts of the world and considering the potential contribution of protection on the North beach at the scale of the metapopulation to which its turtles belong, numbers are arguably too small to be significant.

However, I concur with Campbell (2007) that global ecological considerations are not always the most appropriate in setting conservation priorities. Such considerations are inherently insensitive to local practicalities and, certainly in the case of Costa Rica, almost insidiously imposed upon local initiatives by Western conservation agencies (ibid). The ingredients for a successful and self-sustainable CBC project in San Francisco are present and the potential benefits of such a project to the village are high—this in itself is ample justification for the efforts currently undertaken by COTERC and GVI. I must stress that, especially for the latter organisation, the objective of using the current activities as a base study leading to a project benefiting San Francisco in the future is imperative. Without it, the project would be little more than a continuation of the process, started with the 'debt-for-nature swaps' in the 1980s, of the appropriation and commercialisation of Costa Rica's natural riches by foreign interests.

It is clear to both village and field station that the process towards CBC is a long one, its outcome uncertain. Using the theory of autopoiesis I have tried to illustrate the role outside organisations such as COTERC and GVI may play in guiding that process and creating some of the prerequisites for autonomous and sustainable community development. The observation that, like a living cell, a community consists of functional constituents and is sustained by the interactions between them, is particularly relevant to the process of community 'creation'. It illustrates that the strengthening of individual assets (human capital) must be accompanied by an effort to create social capital—the ability to harness these assets and allow them to be expressed as part of a common vision and goal.

The question of how, in turn, to create that vision and goal is more problematic, as answering it is tantamount to acknowledging the existence of the motives external development organisations almost always have and almost always try to keep hidden (this is not the case with COTERC and GVI—their motive, conservation, is clear to villagers). The 'manipulation' of the development process that is necessary for it to conform to these motives was described using the autopoietic analogies of cognition and structural coupling: the way a community perceives and consequently acts on its environment depends on the nature and strength of their association. If that connection is weak, as is the case with San Francisco, a community, as a collective, is neither dependent on, nor sensitive or responsive to changes in its environment and therefore unlikely to engage in its conservation. Through a combination of environmental education and the stimulation of ecologically oriented initiatives, outside agencies may help create that dependence and sensitivity, and ultimately lead community members to embrace a shared vision of conservation. Two such initiatives are discussed below.

Possible steps in the development of San Francisco

It is possible to write an entire second paper on this topic, but to do so would be an exercise in futility. Much can be done on the basis of the information gathered through the census conducted for this research, but I hesitate to be prescriptive, as important things might have already changed since my stay in San Francisco.

Throughout this paper I have suggested that COTERC and GVI may be involved in San Francisco in two ways: by initiating small livelihoods projects with individuals or small groups of people (see page 34), or by assisting in the development of larger CBC initiatives. These types of involvement imply different levels of commitment and responsibility: small projects can theoretically be designed and implemented by students and people that stay at the station for relatively short periods of time (e.g., a few months), whereas the projects described below will take several years to develop and require a long and stable commitment by COTERC/GVI.

Co-management of the Cerro was the first and most important idea discussed during my presence in San Francisco. The proposal in appendix 4 (in Spanish) describes the issue and initial objectives of the idea; it was drafted during a workgroup meeting with villagers interested in pursuing the idea and discussed with a representative of MINAE. In short, villagers feel that the Cerro belongs to San Francisco and that the village should somehow benefit from the large number of tourists that visit the hill throughout the year (between 20 and 400 per day). Officially, an entrance fee for the Cerro is included in the Tortuguero park fee, but operators offering 'budget' tours often bypass MINAE's ticket booth

Planting cocoa with villagers and school children

In 2006 a reforestation project was started in San Francisco by COTERC and GVI. Such a project is an example of how something small can create both environmental awareness and cooperation between villagers.
A similar idea, involving the school, children and interested villagers, could be initiated with medicinal plants: beside education and the preservation of people's knowledge on the properties and use of such plants, it can also strengthen livelihoods when marketable crops (e.g. cuculmeca) are grown.

and don't pay at all. Regardless of whether entrance fees are paid, no money goes towards the management or protection of the Cerro, which, as a result, is severely overexploited—its trails have eroded and wildlife has all but disappeared. Villagers rightfully argue that, because they live close to the Cerro and know it so well, they are the best people to protect and restore it. They suggested that a small entrance fee (US$1 per person) would generate enough income to employ people to collect garbage, restore trails, create a garden with medicinal plants, make an information stand, etc. and that the remaining money could be spent on ameliorating public facilities in the village.

A barred tree frog found on the Cerro

While MINAE responded positively to the idea (given their shortage of personnel they welcome the idea of co-management and CBC), they have since advised that revenues generated through entrance fees can not go towards parties other than MINAE (although SINAC[53], the component of MINAE responsible for the forestry sector within conservation areas, seems to believe that the principal economic beneficiaries of parks should be local communities [(Solórzano 1997]. It may be possible for individuals working directly on restoration activities to be paid by the ministry, but the only way for the community to make money from co-management schemes is by organising activities around it (guided tours, selling drinks, snacks or handicrafts, etc.).

53 SINAC – *Sistema Nacional de Áreas de Conservación* (National System of Conservation Areas)

I suspect that, knowing this, villagers may find the idea less enticing (although the interest in restoring the Cerro seems genuine, it comes second to financial interests). Certainly from a conservation perspective the initiative remains worthwhile, however, and should the village choose to explore it further, the Cahuita National Park is a good example to look for guidance (the process that led to the co-management of that park is discussed in detail by Weitzner and Borrás [2000]). While substantially different in two ways (people already lived in the area before the Cahuita park was established and resisted rather than requested the charging of entrance fees by MINAE), it shows well how a conflict situation (the community used civil action to oppose the ministry's interventions) may lead to and indeed be necessary to achieve a fruitful form of cooperation. It also shows the difficulties inherent in working with an agency (not so much its people, which are very helpful) that has only recently stepped down from its imperial throne and is slowly getting to know its subjects (when we invited MINAE to visit San Francisco in the summer of 2006, they had not been in the village for five years).

Just as with the Cerro, San Francisco cannot charge an entrance fee to 'its' North beach. What makes a **community-based sea turtle conservation** project financially more attractive than the above project, however, are the activities that may be associated with it. Also, in terms of conservation it may be the only way in which to convince the people that are now poaching to cooperate with the field station and lift their 'embargo' on conservation.

In the second chapter (and pages 13-14 of appendix 1) a number of projects are mentioned with management schemes that could be applied, with some creativity, to San Francisco. Except for Parismina (where the village, in collaboration with the coastguard, has organised itself into a conservation association), all projects are run by external (but Costa Rican) conservation organisations. While nesting numbers on the beaches on which these

projects have been implemented are comparable to those on the North beach, poaching rates were usually higher (up to 100% in Gandoca [ANAI 2006]) and, thus, all projects operate under the rationale that poachers (and often entire communities) must be compensated for renouncing their previous livelihood. This is achieved through 'paying participant programmes' (PPPs), in which volunteers stay in villagers' houses and pay for food and accommodation (see page 46). Villagers are not usually engaged in the conservation work (hatcheries, beach monitoring, data analysis) itself.

The stable income that PPPs can offer to a relatively large number of households makes the formula attractive also to people in San Francisco. But the idea has its problems: it is difficult for poorer villagers (i.e. the ones that depend on poaching) to benefit, as they do not usually have a spare room to rent out. One way to ensure they do benefit is by moving beyond a PPP to a complete community-based conservation project, in which not just outside organisations have the capacity to conduct conservation and research activities, but villagers as well.

The latter is by far the most difficult *and* potentially rewarding option, and can succeed only if COTERC and GVI are willing to invest in a multi-year education and capacity building programme. Both organisations have affirmed that they do not have the intention (and in COTERC's case, capacity) to sustain the current project indefinitely and gradually handing over its activities and responsibilities seems a highly rewarding way to stimulate both livelihoods and conservation spirit in San Francisco.

While I argued that numbers become less important once a community can successfully sustain and benefit from a CBC programme, a unique opportunity exists to dramatically increase the impact of the current project by involving the poacher from page 41 in conservation efforts. He is one of the province's twelve turtling *cabecillas* (headmen) operating out of Limón and has repeatedly offered to bring together a number of his colleagues to discuss alternatives to turtling. Employing one such chief during the green turtle nesting season could increase the impact of the field station's conservation efforts by a factor of 100 (see chapter 2). Even if working together proves too troublesome (the three *cabecillas* that I met during my stay were shrewd, suspicious and quite violent), being able to simply start a dialogue with such 'big' poachers could already prove tremendously valuable.

I want to end this paper with a defence against a criticism I myself have of it. Like many critics of mainstream development, I am discouraged by the mindless pursuit of economic growth it advertises as the solution to global poverty. Yet if I judge the ideas for community development described in this paper against the principles of mainstream development, I am not sure how they are different. It seems that all they may eventually lead to is the integration, through tourism, of San Francisco into the global economy, commercialising whatever resources have not yet been capitalised upon and laying the groundwork for ever more flat screen TVs. I certainly hope it won't. I have a strong dislike for flat screen TVs and would be apprehensive about entrusting the livelihoods of a community to an industry that is as fickle, invasive and destructive as tourism.

But at the same time these are the options that appear achievable given the constraints and opportunities of a country like Costa Rica. They were also the outcome of a process that I believe was genuinely participatory, and therefore reflect the aspirations of a village wishing to change. I hope that whichever trajectory is chosen, whichever project implemented, it will be done in a way that maintains the beauty and quiet that was the reason that so many people came to San Francisco and made it their home.

A woman in San Francisco

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Appendices

If documents are not attached, please contact author (fledelik@yahoo.fr)

- appendix 1: Feasibility study (also available at http://www.coterc.org/marine.html)
- appendix 2: Census questionnaire
- appendix 3: 'Diagnostico comunal' - census results as required by government of Costa Rica for the establishment of a 'development association'.
- appendix 4: Initial 'Cerro co-management' proposal to MINAE.

DIAGNOSTICO COMUNAL – SAN FRANCISCO

1. Descripción geográfica, clima y relieve:

La comunidad de San Francisco se encuentra en el Distrito de Colorado, en el cantón de Pococí de la Provincia de Limón.
El pueblo está a unos 5 kilómetros al Norte de Tortuguero y directamente al Sur del Cerro Tortuguero (ver mapa agregado).

Los límites son:
Norte: La Laguna Cuatro
Sur: El pueblo de Tortuguero
Este: La Laguna de Tortuguero hasta la desembocadura (bocana); al norte de la bocana el limite es el Mar Caribe
Oeste: La Laguna Penitencia

La división política es Barra de Colorado, Cuatro Esquinas, Tortuguero.

El clima es trópico-húmedo (con un promedio de 5.000 milímetros de precipitación por año)
El tipo de relieve es llano, con un cerro (un antiguo volcán erosionado) al Norte del pueblo.

2. Ubicación histórica:

La comunidad de San Francisco es relativamente joven. Aunque los primeros habitantes llegaron hace 28 anos, la mayoría de la gente que vive en el pueblo ahora tiene menos de cinco años de vivir en el.
Don Genaro y su esposa Doña Isabel fueron los primeros habitantes del área; ellos cuidaban un terreno que pertenece a la compañía 'Mil Colores' de San José.
Fue al Sur de esa propiedad donde se fundó la comunidad de San Francisco. En 1989, Don José Manuel Beita Ramírez inició un precario y luego vinieron otras familias: Don Marcelino Siles Hernandez, Doña Mary Vargaz Arias, Antonio Cerdas Herrera y Doña Vianei Atencio fueron unas de las primeras personas en San Francisco.

Hasta el ano 2000 muy pocas personas se unieron a la comunidad. Muchas veces hubieron enfrentamientos con el MINAE, el cual reclamó propiedad del terreno. Ellos trataron de expropiar a las personas, quemando ranchos. La última vez que esto paso fue aproximadamente hace 5 años. En aquel entonces 15 familias habitaban en la comunidad y decidieron buscar la ayuda de un abogado. Por otra parte, para poder ejercer mas presión a las autoridades y al MINAE el pueblo trabajó con el fin de construir una escuela para los niños; de aquí nace el nombre San Francisco: cuando se fundó la escuela en el 2001, la principal contribuidora de la escuela (la dueña del hotel Jungla, Doña Ana Moskarelli) pidió el nombre San Francisco. La escuela ya tenía el nombre 'Laguna Tortuguero', entonces se decidió llamar al pueblo San Francisco.
Después de la fundación de la escuela, el pueblo tuvo una reunión con el abogado y el MINAE. Fue en esa reunión, en 2002, que MINAE se dio cuenta que ya había un pueblo establecido por lo que cedió el control. San Francisco fue declarado pueblo municipal y el terreno –desde el Sur de la escuela hasta la propiedad de Don Genaro– donado a la comunidad (doña Vianei tiene los papeles de este acuerdo).

Luego, con el crecimiento del turismo en Tortuguero, el establecimiento de hoteles en el área y la concurrente disponibilidad de trabajos, mas y mas personas vinieron a San Francisco. Muchas de ellas provenientes de las Palmitas (Cariari), y también de otras partes del país.

Todavía la tenencia de tierra en San Francisco es un tanto complicada: el terreno es parte del Refugio de Vida Silvestre Barra de Colorado, JAPDEVA es el dueño, y el MINAE es responsable por la gestión del Cerro. Además, San Francisco está ubicado (al igual que Tortuguero) en la 'milla marítima', lo que significa que el gobierno tiene el derecho de reubicar las familias que viven dentro de una zona de 50 metros de la laguna.
Sin embargo, es muy improbable que esto suceda, ya que JAPDEVA, durante una reunión con unos vecinos de San Francisco, anunció que podría otorgar los títulos de escritura pública a la gente del pueblo.

3. Servicios:

En San Francisco existen los siguientes servicios:

- Escuela Publica 'Laguna Tortuguero' (2001)
- Kinder y casa de maestros (2001)
- Jardín de niños (2005)
- Comedor escolar (2006)
- Campo de fútbol
- Electrificación – el 'camino central' es alumbrado también (2001)
- Teléfono – 25 casas tienen acceso a teléfono privado; no hay teléfono publico (2004)
- Iglesia Evangélica MMM (2004)

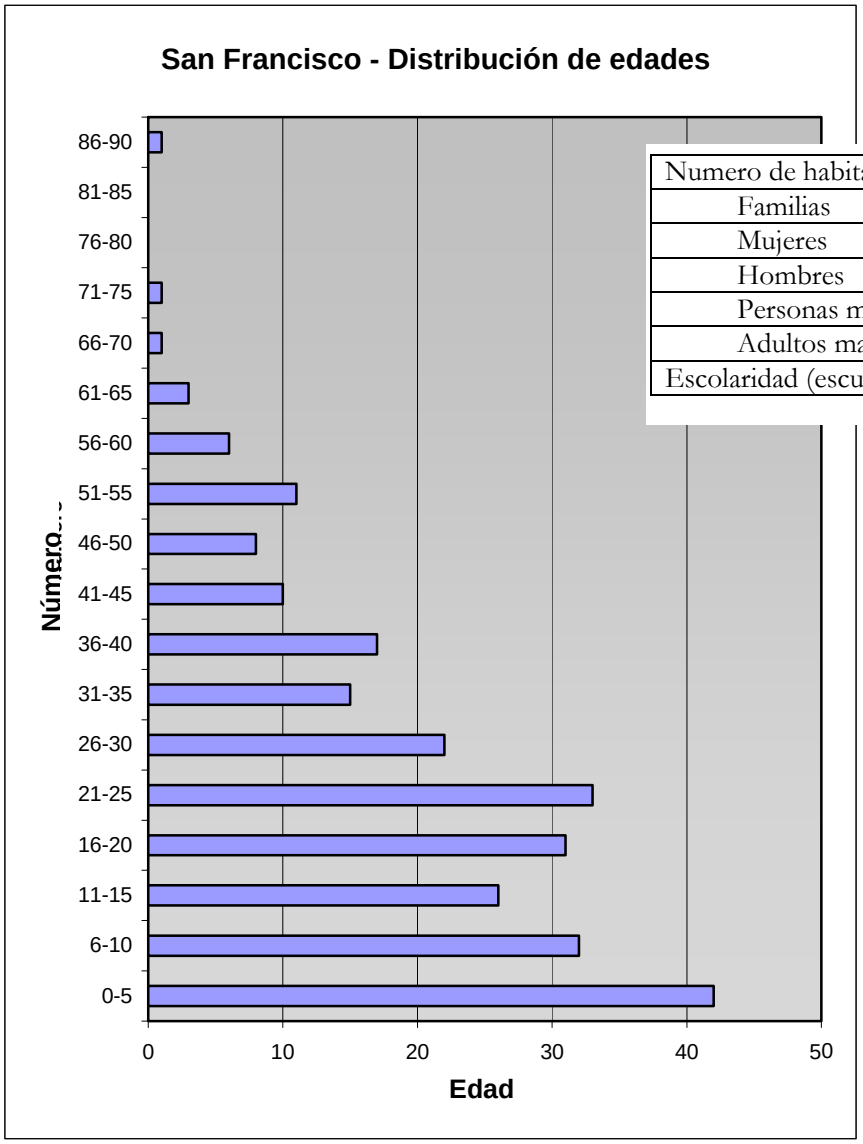
Transporte público:
Se puede llegar a San Francisco con bote público desde La Pavona, al Este de Cariari. Los buses de Cariari conectan con botes (dirección Tortuguero) en La Pavona.

El horario:

Cariari	6.00 am	12.00 pm	3.00 pm
La Pavona	??7.30 am	1.30 pm	4.30 pm
San Francisco	8.20 am	2.20 pm	5.20 pm
San Francisco	6.20 am	11.50 am	3.20 pm
La Pavona	7.30 am	1.30 pm	4.30 pm
Cariari	8.30 am	2.30 pm	5.30 pm

4. Población:

Un censo fue hecho en San Francisco en Diciembre 2006 por un estudiante de la universidad de York, Toronto, en Canadá. Los datos siguientes solamente incluyen las familias que viven en San Francisco permanentemente:



Numero de habitantes	268
Familias	76
Mujeres	127
Hombres	141
Personas mayores de 15 anos	165
Adultos mayores de 60 años	6
Escolaridad (escuela y colegio)	62

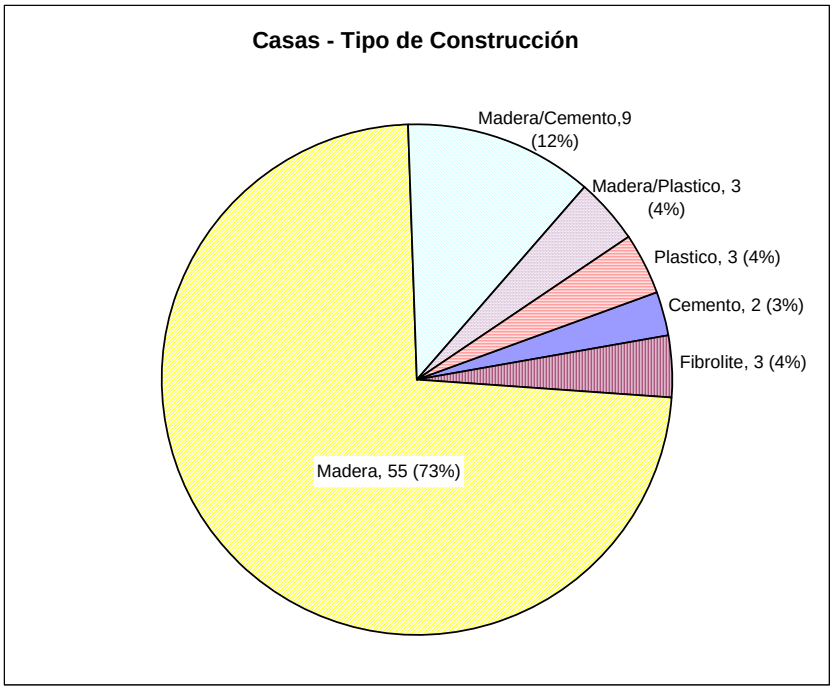
Nacionalidades

Costarricenses: 216 (81%)
Nicaragüenses: 48 (18%)
Colombiano: 1 (0.3%)
Desconocido: 3 (1%)

Figura 1: Distribución de edades de los vecinos de San Francisco; número de habitantes, escolaridad y nacionalidades.

5. Vivienda:

En el pueblo de San Francisco hay 86 casas; 75 de ellas están habitadas de manera permanente. El siguiente diagrama muestra el tipo de construcción de estas 76 casas.



- 16 casas están en buen estado
- 41 casas están en estado regular
- 17 casas están en mal estado.

6. Salud:

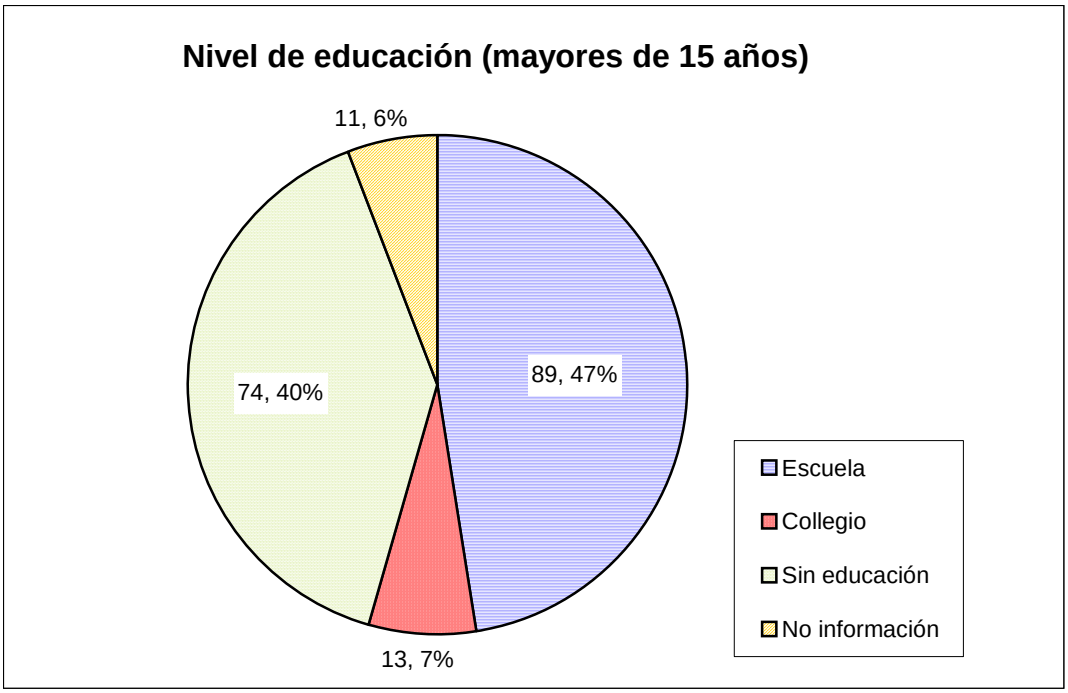
En San Francisco no hay presencia de EBAIS. Los problemas principales tienen que ver con la contaminación del agua, tanto la de los pozos como la de los ríos. Hay problemas gastrointestinales y a menudo los niños sufren de alergias, a veces graves. No hay otros problemas sustanciales.

En el pueblo no hay agua potable—todas las casas tienen pozo (a menudo muy cerca de los drenajes). Las aguas negras son dirigidas a drenajes: unas casas tienen tanques sépticos, otras tienen letrinas. Los ríos están contaminados por aguas negras de algunos de los hoteles en el área (ellos botan directamente en el río) y, cuando hay mucha lluvia, los pesticidas de las bananeras.

Como no hay centro de salud, en caso de emergencia la gente tiene que ir a Cariari con ambulancia, lo cual tarda más de 2 horas.

7. Educación:

Desde 2001 hay una escuela y un kinder en San Francisco. La escuela tiene dos maestros, el kinder una maestra.
El gráfico de abajo muestra el nivel de educación que tienen los habitantes del pueblo.



Además de los mayores de 15 años, hay 28 personas (17 %) que no han terminado la escuela; de las personas que han terminado la escuela, 20 (12%) han empezado pero no terminado el colegio. No hay personas con grados universitarios.

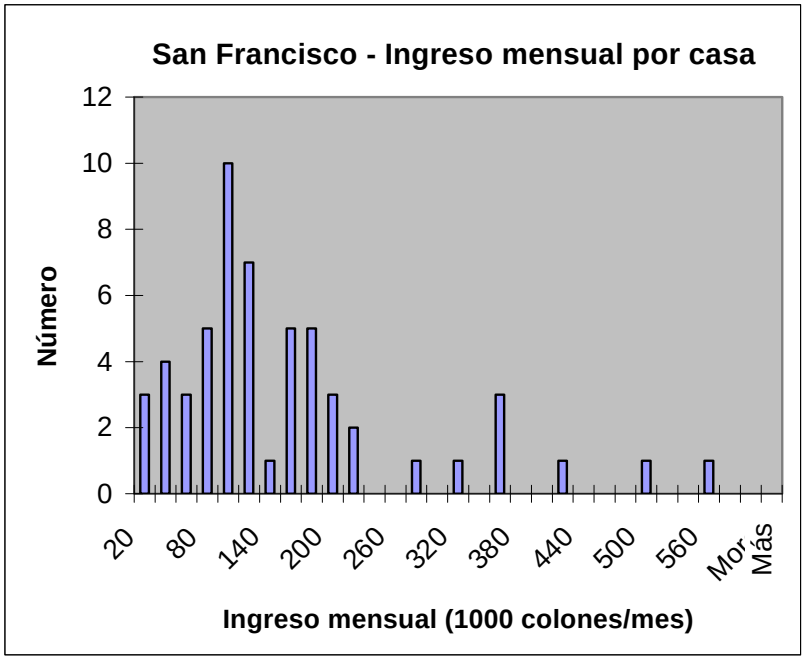
8. Actividades económicas:

San Francisco tiene dos pulperías, una tienda de ropa, un bar, una ebanistería, dos talleres de botes, una señora que hace helados muy apetecidos y un señor que alquila su rancho a los turistas.
En promedio, 1.6 personas trabajan en cada familia/casa (3.6 personas es el tamaño promedio de las familias)

Abajo está un cuadro que detalla las principales actividades económicas y los ingresos promedios por actividad.

	Nº personas	Ingreso promedio (colones/mes)
Con trabajo fijo	57	187.000
- hoteles[1]	36	
- trabajo propio[2]	11	
- otro[3]	10	
Sin trabajo fijo	50	89.350
- 'chambero'	32	
- otro[4]	20	
Total	107	**165.000**

[1] Guía, capitán, jardinero, cocinera, guarda, salonero, cabinera.
[2] Lanchero, ebanista, construcción de botes, pulpería, tienda de ropa
[3] Construcción de botes, turismo, capitán botes públicos, finca, cuidar casas
[4] Pescador, trabajo de contracto, cocinera, carpintería, huevero, cazador



9. Recreación:

La forma de recreación mas común en San Francisco es el fútbol. En el verano se organiza un campeonato entre varios equipos del área. Además, hay un bar con pool y karaoke, y a veces se organizan bailes. Por su puesto está el rió y la playa también.

10. Religión:

Un 50% de la comunidad es católica, pero como no hay templo católico este grupo no está activo. Hay unas 25 personas del credo evangélico y ellos tienen un pequeño templo con reuniones semanales. Los demás miembros de la comunidad son de otras religiones.

11. Inventario de grupos organizados:

En San Francisco existen los siguientes grupos organizados:

- Junta de Educación
    - Directiva: presidente, Dennis Bermudez Venegaz; Vice Presisdente: Rafael Mora Mora; Secretario: Siomara Aragón López; Tesorero: Minor Ramírez Vargaz.
- Patronato Escolar
    - El patronato se desintegró al fin del año escolar; se reorganizará otro al comienzo del año siguiente.
- Comité de Deportes: Arley Atencio, Minor Ramírez Vargaz, Giovanni Arollo Cuillo.
- Comité de desarrollo: Dennis Bermudez Venegaz, Giovanni Arollo Cuillo, Minor Ramírez Vargaz, Elvin Rojas Rojas, Alexis León.

12. Problemáticas y expectativas:

Un problemática grande en la comunidad de San Francisco es el desempleo (especialmente de la juventud; casi no hay fuentes de trabajo en el pueblo). Hay bastantes jóvenes que roban, a menudo para financiar alcoholismo o la drogadicción.
Hace falta una acera peatonal, un acueducto, una delegación policial, un muelle público y algunas otras cosas que se mencionan en el plan de desarrollo del pueblo
Los principales problemas ambientales son: la sobre-explotación del Cerro, la casa, el saqueo de los nidos y matanza de tortugas.

Las viviendas: ver grafico (ver descripción y gráfico en página 4)

Calidad del agua: mal

Peligro natural: maremotos, deslizamientos del Cerro Tortuguero (aunque casi no afectan al pueblo)

Todo el área está dentro de una zona protegida (ACTo), con humedales alrededor y ecosistemas muy frágiles como el yolillal.

Plan de desarrollo de la comunidad:

- Creación de una asociación de desarrollo (de lo cual se trata esta solicitación), la cual servirá como una herramienta para el crecimiento comunal
- Conservación y restauración del Cerro con el fin de regular la sobre-explotación y de crear mayores beneficios para el pueblo (ver plan adjunto)
- Creación de un acueducto para el pueblo
- Creación de un basurero.
- Puesto de comando (se está gestionando)
- Proyecto de muelles y mejoramiento de caminos dentro del pueblo.
- Puesto de salud.
- Mejoramiento de la escuela y construcción de un colegio.
- Servicios de teléfonos públicos.
- Áreas de recreación (parque)
- Templo católico (ya hay lote)
- SEN (se está gestionando—papeles y construcción hacen falta).

13. Anexos:

1. Plan para la gestión del Cerro
2. Mapas de San Francisco
3. Foto del pueblo desde el Cerro (mirando al Sur, en la dirección de Tortuguero)

Todos sus repuestos serán completamente confidenciales. NO compartiré, con ninguna persona, los resultados individuales de este censo. No tiene que contestar a preguntas que no quiere contestar.

Frederik van Oudenhoven

¿Cuantas personas viven en su casa?
_____ Hombre(s)
_____ Mujer(es)

¿Vive(n) acá permanentemente? _____

¿De que edad son Uds.?	¿De que sexo?	¿Trabaja?	Asiste a la escuela?	¿Ha tenido una educación?
1. _____	Mujer / Hombre	Sí / No	Sí / No	No / Escuela / Colegio / Universitaria
2. _____	Mujer / Hombre	Sí / No	Sí / No	No / Escuela / Colegio / Universitaria
3. _____	Mujer / Hombre	Sí / No	Sí / No	No / Escuela / Colegio / Universitaria
4. _____	Mujer / Hombre	Sí / No	Sí / No	No / Escuela / Colegio / Universitaria
5. _____	Mujer / Hombre	Sí / No	Sí / No	No / Escuela / Colegio / Universitaria
6. _____	Mujer / Hombre	Sí / No	Sí / No	No / Escuela / Colegio / Universitaria
7. _____	Mujer / Hombre	Sí / No	Sí / No	No / Escuela / Colegio / Universitaria
8. _____	Mujer / Hombre	Sí / No	Sí / No	No / Escuela / Colegio / Universitaria

¿Cual es el trabajo principal que hace Ud.? _____

¿Y otras formas de trabajo propio (en su familia) que sirven como fuente de ingresos? _____
_____
_____

¿Que habilidades tiene Ud.? (por ejemplo: sembrar, la agricultura, cocinar, artesanía, batik) _____
_____
_____

¿Cuanto gana Ud.?
___ insuficiente para vivir (en colones por mes? _____)
___ suficiente para vivir (en colones por mes? _____)
___ mas que suficiente (en colones por mes? _____)

¿Recibe o manda dinero de/a parientes que viven fuera de la comunidad? _____
¿Qué porcentaje de sus ingresos constituye ese dinero? _____

¿Cual es el valor do sus propiedades?
Su casa y lote:
Sus otros propiedades:

Tiene Ud. acceso a:
___ electricidad ___ servicios médicos
___ agua potable ___ modo de transporte ¿Cuál? _____
___ teléfono ___ servicio

¿Hay temporadas en que es mas difícil sobrevivir que en otras? ¿Por qué? _____
_____
_____
_____

Por su sobre vivencia, ¿depende Ud. en recursos naturales en la área? ¿Cuáles? _____
_____

¿Cómo cambia la disponibilidad de esos recursos durante el año? _____
_____

¿Desde cuando vive en San Francisco? _____

¿Por qué vino aquí? _____
_____
_____

¿Donde vivía antes de venir aquí? _____

¿De que origen es Ud.?
__ Costa Rica
__ Nicaragua
__ Otro pais: _____

¿De cual cultura se considera Ud.?
__ negra/caribeña
__ blanca
__ mestiza/morena
__ Otra: _____

¿Es Ud. parte de una asociación o un comité (formal o informal) en San Francisco o a fuera? ¿Cuál? ____
_____

¿Tiene otros parientes en San Franscisco, o cerca de acá? ¿Cuántos? _____

En el caso de que Ud. tiene dificultades (por ejemplo, con su salud o financias), ¿se ayudarían sus parientes, el pueblo, o las asociaciones en el pueblo? _____
_____

¿Como se siente Ud. en la comunidad de San Francisco? _____
_____
_____

¿Tiene confianza en la gente de la comunidad? _____
_____

¿Se siente seguro(a)? _____

¿ Tiene interés en trabajar en proyectos junto con otras personas de la comunidad?_____
_____

¿Tiene ideas para la comunidad, o proyectos que querría hacer? _____
_____
_____
_____

¿En que piensa que COTERC/GVI pueda ayudar al pueblo?_____
_____
_____

Frederik van Oudenhoven

TURTLE CONSERVATION PROJECT FOR THE TORTUGUERO NORTH BEACH

FEASABILITY STUDY

YORK UNIVERSITÉ UNIVERSITY
redefine THE POSSIBLE.

GLOBAL VISION INTERNATIONAL

Canadian Organization for Tropical Education and Rainforest Conservation

Turtle Conservation Project for the Tortuguero North Beach

Feasibility Study

Prepared by Frederik van Oudenhoven

for
Canadian Organization for Tropical Education
and Rainforest Conservation (COTERC)

York University

Global Vision International (GVI)

Toronto, August 2006

Picture on cover page:
Green sea turtle returning to the sea after
nesting in the early morning.
Picture: GVI (edited by F. van Oudenhoven)

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Summary of recommendations

The results obtained from the first years of monitoring the Tortuguero North Beach indicate significant, but highly variable numbers of nesting turtles, high poaching rates and low hatching success. A minimum of two years of continued research is required to substantiate findings, but in the meanwhile it is advised to shift some of the emphasis of project activities to nest monitoring, excavations and more frequent beach cleans.

Nest excavations are important to determine the cause of low Leatherback hatching rates. The critically endangered status of Leatherback and Hawksbill turtles warrants consideration of nest relocation or, as a last resort, a hatchery on the North Beach.

The fact that the North Beach has never been officially monitored, in combination with the numbers of nesting turtles and the opportunities for community based conservation activities present in the community of San Francisco, should be sufficient reason to obtain financial support to continue project activities for at least one or two years.

Numbers of turtles on the North Beach may be biologically significant, but will not be enough to secure long-term funding from donor agencies. If the project is to be continued it will have to be financially self-sustainable; one means of achieving this may be by starting a community based conservation project with the community of San Francisco.

The potential of the North Beach for educational purposes is very high. Environmental education in San Francisco, the participation of numerous volunteers in the project and presentations to tourists in the nearby hotels all contribute to the long-term conservation of sea turtles and their habitat. This aspect of the project should not be forgotten or neglected.

The turtle project is not currently a conservation project. For that there would either have to be more protection on the beach itself or an increase in involvement of the local community in the project. In the short term, employing poachers to conduct research activities for Caño Palma may be the most feasible solution.

Judging from three turtle projects managed by ANAI on the Pacific coast of Costa Rica, the numbers of turtles on the North Beach may be sufficient to sustain a paying volunteer programme in San Francisco. Although difficult to implement, this would be the most preferable option in the long run in terms of turtle conservation, increasing community involvement and increasing the benefits accruing to the community.

It will take a very strong, charismatic and experienced person to expand the turtle project to include community based conservation activities. There may be other organisations in Costa Rica that are capable of and willing to assist Caño Palma in initiating and managing these activities.

Introduction

Two years ago, at the beginning of the 2004 Green sea turtle nesting season, COTERC and York University initiated "El Proyecto Tortugas", a programme monitoring sea turtle activity on the beach north of the Tortuguero river mouth on Costa Rica's Caribbean coast. The project began with daily morning censuses and has since grown to include both morning censuses and nightly patrols, during which turtles are tagged and various kinds of biometric data collected.
This feasibility study is both a critical review of the project as it has been carried out over the past years and, building on the data collected and experience gained, a look at the future, to see whether, and how, the project may be sustained over the coming years.

The latter is not an easy question to answer. During the three months I have spent at the Caño Palma research station, walking the beach almost every night, working with so many turtles and experiencing what beautiful and, in a way also, helpless animals they are makes it very difficult to be objective about their protection and base decisions solely on numbers. Similarly, burying a poached turtle, or knowing that the eggs counted during night patrols have a fifty percent chance of ending up in someone's bag the next morning makes it, at times, tempting to become very angry and resentful with those people involved in poaching.
Yet most of those people have families, mouths to feed, they have little schooling and no land to build on. San Francisco, where most poachers live, is a poor community and prohibiting poaching, stationing guards on the beach, although seemingly an easy solution might not be enough to stop people from poaching. *The idea followed through in this study centres around the (perceived) necessity to involve community members, preferably some that are now poaching, in the conservation and research efforts of the Caño Palma field station*.

In writing this study I have tried to be as straight forward as possible: there exists a rich source of literature concerning turtle biology and community based conservation and voluminous reports could be written about the situation in San Francisco. Yet for all the 'complex' issues at hand in San Francisco and on the North Beach, the central problem, although unique, is not all that complicated and neither should be the solutions sought by COTERC.
For that reason, although literature has been used to shape and substantiate my ideas, this report, rather than a literature review, is a compilation of personal observations, ideas and 'solutions'. These, in turn, have been very much influenced by all other people involved in the turtle project, some of the residents of San Francisco, and other stakeholders consulted over a period of three months.

The study is roughly divided into four parts: (1) a review of the **current project**; (2) an examination of the **conservation value of the North Beach**, both from a biological as well as from a scientific/educational perspective; (3) a look at **the community of San Francisco** and possibilities for community based turtle conservation (included is a review of two existing Costa Rican projects that have successfully integrated community development with turtle conservation); (4) a discussion of **other important stakeholders** (GVI, MINAE, CCC) and any other important aspects that need to be taken into consideration. Different options and ideas for the continuation of the turtle project are presented in the third part.

A few disclaimers:
This report is not a scientific paper; where used, references are included, but often knowledge was assumed common and has not been referenced. For turtle inquiries I refer to any good turtle biology book (e.g., Spotila, 2004).
This document was written for COTERC, York University and GVI to have a clear and critical overview of the current project and its future potential and is not meant to be distributed widely; views expressed are mine and I take responsibility for them, they may not reflect those of the above organisations.
For privacy reasons and university regulations, the names of some of the people consulted for this study are not mentioned in the text.

Review of the current project

Project summary: Turtle conservation project for the Tortuguero North Beach

The turtle project is carried out on Tortuguero's 'North Beach', just north of the river mouth that marks the end of Tortuguero's famous beach hosting the largest Green turtle rookery in the world (CCC, 2004) and to the south of the Barra de Colorado wildlife refuge (the patrolled area ends at Laguna Cuatro. See figure 1, next page)). COTERC's biological field station is located on the canal behind the beach; the beach is reached through *Cabinas Vista al Mar*, one of the two hotels along the patrolled area of the beach.
This year, the Caribbean Conservation Corporation (CCC) has been monitoring the Tortuguero beach for well over 40 years, but, even though the intent has long been there, has never had the resources to patrol the North Beach as well. Halfway the nineties an exploratory study of the beach, up to Barra de Colorado, was conducted, but not many tracks were observed and the beach was thought to be not important enough. COTERC similarly initiated a turtle project in the nineties, but did not have the resources to sustain it.

The current project, initiated by COTERC in 2004 in association with York University, Canada, is a feasibility study aimed at establishing whether the beach is a significant nesting site for sea turtles and warrants some form of protection. To this end poaching rates must be determined as well. More specifically, the research protocol mentions the following objectives for the four species of sea turtles that nest on the beach (Green [*Chelonia midas*], Leatherback [*Dermochelys coriacea*], Hawksbill [*Eretmochelys imbricata*] and Loggerhead [*Caretta caretta*] turtles, in descending order of incidence). To gather data on:

- The spatial and seasonal distribution of nesting females
- The number of nests
- The incidence of poaching of nests and turtles
- The incidence of predation
- Hatchling survivorship, emergence and orientation (COTERC and GVI, 2006).

In addition, Caño Palma has this year begun to participate in a regional (Caribbean) research programme administered by the CCC. The programme involves the tagging of turtles and the collection of biometric and physical data (size, health, clutch size, etc.), which is entered in a database and shared with participating turtle projects.

Results

The tables below show the last three years of results.

Table 1: Turtle and poaching activity during the first three years of the project.

2004[1]	Half moons[3]	Nests	Poached	Predated	Poaching rate
Leatherback[1]	no data	no data	no data	no data	no data
Hawksbill[1]	3	2	2	no data	100%
Green	126	105	60	no data	57%
Total	**129**	**107**	**62**	no data	**58%**

2005	Half moons	Nests	Poached	Predated	Poaching rate
Leatherback	2	83	48	no data	58%
Hawksbill	12	11	10	no data	91%
Green	1960	981	545	no data	56%
Total	**1974**	**1075**	**603**	no data	**56%**

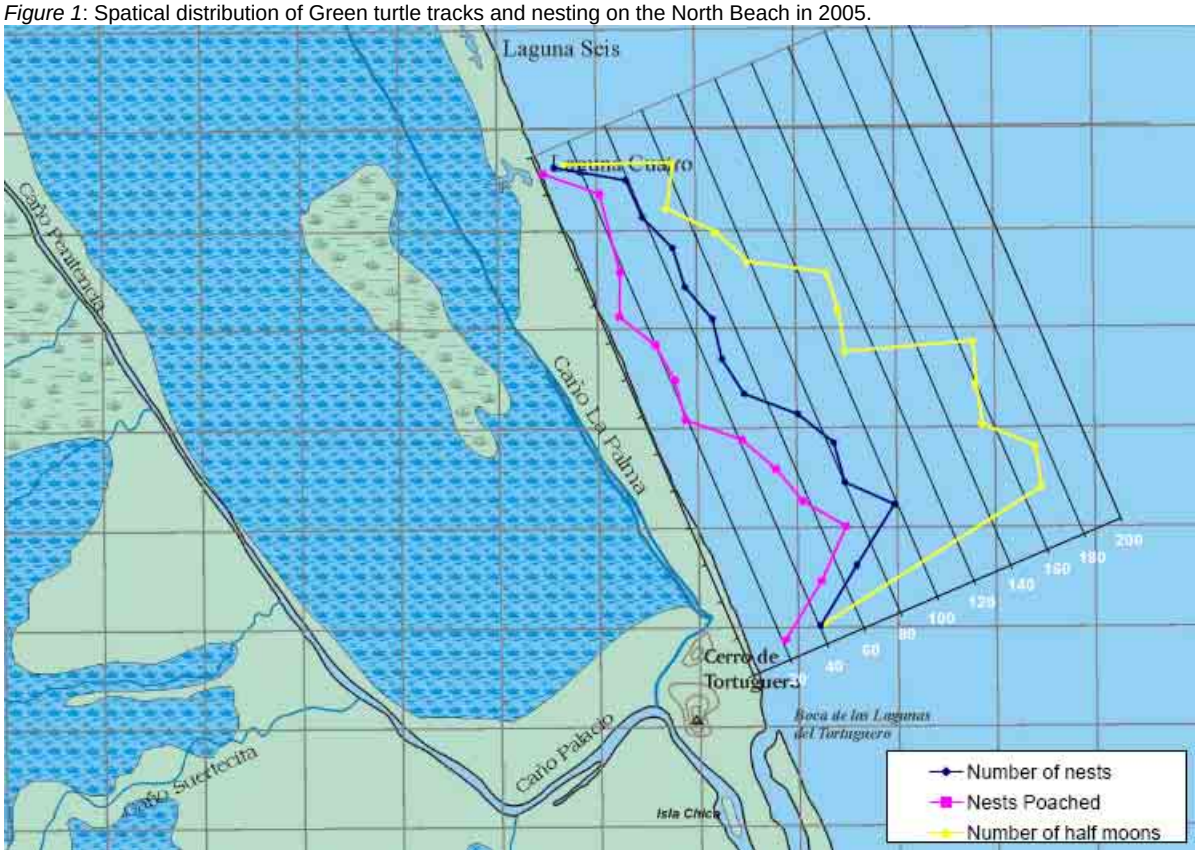
2006[2]	Half moons	Nests	Poached	Predated	Poaching rate
Loggerhead	0	2	0	0	0%
Leatherback	25	51	12	2	24%
Hawksbill	5	9	5	0	56%
Green	258	151	63	2	42%
Total	**288**	**213**	**80**	**4**	**38%**

[1] Patrols in 2004 started after Leatherback and part of the Hawksbill season.

[2] Data for 2006 updated until August 30.

[3] "Half moons" are the tracks of turtles that come on to the beach, but return to the say without laying eggs.

Figure 1: Spatical distribution of Green turtle tracks and nesting on the North Beach in 2005.



Note that patrols in 2004 were only started in June and therefore missed the bulk of the Leatherback season and probably a number of hawksbills as well; the 2006 data are only updated until August 30 and do not include the last two months of the Green turtle season. Comparison between years is therefore difficult, also because data have been obtained in different ways and the frequency of patrols between years was different.

However, it is safe to say that the first year of the project (2004) was very quiet, the second year (2005) very busy, and the current year (2006) falls somewhere in between. Considering that 2005 was the year in which the CCC encountered its highest ***number of tracks*** in Tortuguero in 40 years of patrolling (>80,000) and assuming a correlation between Tortuguero and the North Beach, it can probably be said that 2005 was indeed a peak year also for the North Beach and that a thousand nests is the most we should expect to see.

The second obvious conclusion that can be drawn is that in the current season ***poaching*** has strongly decreased from previous years. It is tempting to attribute this drop to the night patrols, but other factors (the poaching rate in 2005 may be unusually high because several families that were evicted from their homes resorted to poaching) may account for the difference as well. Nonetheless, the increased presence of volunteers on the beach is certainly a good thing and is likely to diminish poaching to a degree.

This year is the first in which it will be possible to determine ***hatching success*** with some accuracy, as the project now includes the triangulation of the exact position of nests thus making excavations possible. Triangulation can only be done when turtles are found laying the eggs at night (taking GPS measurements is not accurate enough (accuracy <5 m) to find the relatively small egg chambers), which means that the number of nests that can be excavated is limited. Triangulation of 60 to 80 nests should however be possible this season, which gives a large enough sample size to determine poaching rates, hatching success and the reasons for failed nests.
The results for the Leatherback season do not seem very hopeful. Even though poaching rates were relatively low (24%), very few nests have been seen to hatch. This does not necessarily mean that nests did not hatch (hatchling tracks are easily missed or washed away by tide and rain), but given some extremely high tides and, at times, enormous amounts of debris on the beach it is very likely that many Leatherback

nests, which are positioned much closer to the sea than those of Green turtles, flooded or were unable to hatch. Again, excavations should provide more insight into both hatching success and causes of hatching failure. A cause for celebration has been the hatching of a very rare Loggerhead nest (during patrols two loggerheads were seen and tagged; the last time a Loggerhead was observed in Tortuguero was three years ago): excavation of the first nest showed that all 111 eggs hatched!

What all the above comments point toward is a ***need for*** at least two years of ***continued monitoring*** on the North Beach. Sea turtle nesting is subject to a large degree of annual variation and seems to move in cycles of two to four years, with individual turtles usually nesting every three years (Bjorndal et al., 1999). These cycles are poorly understood (in Australia, for example, the El Niño phenomenon seems to be partly responsible [ibid]), but fact is that our data seem to be in accordance with those general trends and that more information is needed to have a better understanding of both numbers and behaviour of turtles on the North beach. This baseline information is necessary for any future elaboration of the turtle project, especially if some form of tourism is sought as an option for revenue generation.

Implementation of the protocol

The project as such (i.e. the implementation of the protocol) has been running very well. Jana Daigle as coordinator and Lydia Chaparro as project biologist have done an incredible job in getting the project of the ground, arranging permits, drafting protocols and obtaining support from different sides. With very few resources (Turtle Beach Lodge has given the financial support necessary to purchase tags and tagging equipment) and the help of Andres and many COTERC/GVI volunteers and staff the beach is being patrolled approximately 11 hours a day (20:30-4:00 at night (21:00-2:00 during the Leatherback season) and 6:00-9:00 in the morning). Both MINAE and the CCC are very supportive of the project and happy that the North beach is finally being studied.
A recent development has been the cooperation of the police. Don Gerardo from San Francisco has managed to have police from inland Costa Rica come to Caño Palma to patrol the beach three days of the week during mornings or nights.

Comments and suggestions

These comments pertain only to the project in its current form and not yet to any extensions or community based activities.
The turtle project seems to be in a state of constant flux which makes it difficult to comment on it. The most recent development has been the handing over of most project activities to GVI because of a lack of COTERC personnel.

→ One of the most important points that will be made in this report is that, provided that COTERC wants to maintain its role in coordinating the project, a qualified, full time staff member should be contracted to manage both research and (potential) community development activities. If this is not financially possible it is probably better to hand over the project to another organisation.

Community involvement in the project is meagre. The research protocol mentions presentations, both in hotels and in the village of San Francisco, as an important objective for this turtle season, yet only one, not very well attended presentation was held in San Francisco. It should be feasible to have regular, donation-based information sessions at Turtle Beach Lodge (they have requested this on several occasions). Increasing involvement of the community, however, is probably not realistic until some form of financial benefit is involved: a few adults and quite a few children from the local school have joined Caño Palma staff during night patrols, and several villagers have expressed their wish to help, but genuine interest in the project seems low.

The main activity during night patrols has been the tagging of turtles and collection of data. As noted above, it is important to continue this for at least two more years in order for the data to be valuable and reliable enough for comparison. However:

→ Although these data are necessary to inform future conservation efforts for the North Beach, it may already be possible to do more for the conservation of sea turtles by shifting the emphasis of the project toward other activities, namely **beach preparation** and **nest monitoring**. The tagging programme is interesting in that it tells us where the turtles that nest on the North Beach come from, where they go and whether they come back, but other than that the 300 turtles Caño Palma may be able to tag per season will not add significantly to the knowledge generated by the 44,000 turtles already tagged by the CCC.

Figure 2: Project biologist Lydia Chaparro and one of the volunteers cleaning the beach

Picture: Jane Haakonsson (edited by Frederik van Oudenhoven)

Having had to navigate by night through the rubbish left on the beach during high tides I am surprised turtles even manage to make it to the sand. There is no doubt that the high number of 'half moons' (turtles coming on the beach but returning without having nested) is due in part to logs and rubbish obstructing their way and regular (twice a week, more often when necessary) cleans of the busiest nesting parts of the beach should improve nesting percentages. Cleaning the beach may require a lot of manpower, but while volunteers are present at the station it is a worthwhile effort; it is also common practice in many other turtle projects around the world (Chaparro, 2006, personal communication).

A second reason for doing beach cleans more frequently is that logs may prevent nests from hatching and hatchlings from reaching the sea.

→ It is too early to say with certainty that the hatching rate of Leatherbacks and/or Greens on the North beach is very low, but this year's observations certainly seem to point that way. For many years the CCC has had relatively low Leatherback hatching rates on the Tortuguero beach (35% in 1977, 57%, 46% and 67% in 1986, 1988 and 1989 (Bjorndal et al., 1999) **and only ~25% in 2005** (Haro and Troëng, 2006a) and, similarly, Bell et al. (2003) found low Leatherback hatching success (19.8 to 54.2%) at Playa Grande, on the Pacific Side of Costa Rica. The CCC has started looking at the causes for this and it would be very useful if Caño Palma could research some of the determinants of hatchling success (such as distance from the high tide line at the time of laying, flooding by ground water or tide, obstruction by debris, depredation, etc.) as well. This would involve the daily monitoring of nests and the triangulation and excavation of as many nests as possible. Again, this does require effort, but given the extremely endangered status of especially the Leatherback turtle (see, for example, Spotila et al., 2000) and since it directly involves the study/protection of hatchlings, it should probably have priority over the tagging programme. Moreover, information on hatchlings could point towards the possibility/necessity for the creation of a hatchery in the future.

All in all, it is important (and at the moment also feasible) to generate as much information as possible about turtle nesting on the North Beach. In doing so, however, it is also important to remember that the primary objective of the project is (or will be?) turtle conservation and that time and resources should be allocated accordingly.

Conservation Biology – value of the North Beach

I already mentioned in the introduction that it is not necessarily easy to determine, based on numbers, whether a beach, or a certain part of a population, is important enough for protection. The answer to that question is necessarily subjective, dependent on the perspective of the person or institution being asked. Below are some considerations that can help inform this decision for the North Beach.

(More or less) relevant turtle biology

Four species of sea turtle nest on the North Beach:	Nesting in Caño Palma:	Conservation status (global):
→ Greens (*Chelonia Mydas*)	June to November	Endangered
→ Leatherbacks (*Dermochelys coriacea*)	March to June	Critical
→ Hawksbills (*Eretmochelys imbricata*)	May to September	Critical
→ Loggerheads (*Caretta caretta*)	May to September	Endangered

The **main threats to the survival** of the different species differ: Greens have been and still are intensively poached, both for their meat as well as for their eggs. Leatherbacks are poached for their eggs but not for their meat, they are often killed by plastic bags floating in the water as these resemble their main diet, jellyfish. Hawksbills are killed for their carapace, especially in Cuba, because they fetch a lot of money on the Japanese market; their eggs are also eaten. Loggerheads are extremely rare in Tortuguero (but probably the least endangered globally) and the only species not deliberately poached for its meat or eggs (although poaching has been the reason for its decline). In addition to the poaching at nesting beaches, threats to all species include fishing, long lines (turtles end up as bycatch), and habitat loss and alteration (e.g., beach development).

But why is it that a species that has survived for more than a 100 million years, the longest of all living marine species (Roach, 2003), is so vulnerable to human exploitation and so difficult to protect? Their **life histories** are an important part of the answer: all species of cheloniid sea turtles (which includes all sea turtle species except the Leatherback) have extremely low growth rates, accompanied with a high age at maturity (up to 35 years for Greens) and very low intrinsic rates of population increase (2 to 6% [Musick, 1999]) (see table 2 for growth coefficients[1] relative to other marine animals).

Species	*k* coefficient	Source
Thryssa hamiltoni Hamilton's anchovy (IndoPacific)	0.80–1.40	(Hoedt 1992)
Thunnus albacares yellowfin tuna	0.45	(Moore 1951)
Paralichthys dentatus summer flounder	0.32–0.40	(Desfosse 1995)
Dermochelys coriacea leatherback turtle	0.27	(Zug and Parham 1996)
Scomberomorus commerson narrowbarred mackerel	0.17–0.25	(McPherson 1992)
Mycteroperca sp. groupers	0.06–0.17	(Ault et al. 1998)
Epinephelus sp. groupers	0.05–0.18	(Ault et al. 1998)
Xiphias gladius swordfish	0.09–0.19	(Berkley and Houde 1983)
Acipenser oxyrinchus Atlantic sturgeon	0.03–0.16	(Kahnle et al. 1998)
Galeoid sharks (Carcharhindae)	0.04–0.07	(Branstetter 1990)
Cheloniid sea turtles (Cheloniidae)	~0.08	(Chaloupka and Musick 1997)

Table 2: von Bertalanffy growth coefficients (*k*) for different marine animals

Strictly speaking, *k*-values describe only relative growth rates. However, growth rates are very often strongly correlated with age at maturity and intrinsic rates of population increase and are therefore a good tool for comparison between species (Musick 1999).

For comparison, the African elephant and baleen whales have *k*-values of approximately 0.10-0.14

Source: Musick 1999, p.3

[1] Provided by the Von Bertalanffy equation $L_t = L_\infty(1-e^{-k(t-t_0)})$, commonly used to describe the growth of individuals over time (L_t = length at time t). The equation shows how organisms with low *k*-coefficients will need many years to reach their maximum length, which often also implies that it takes them a long time to reach sexual maturity.

This means that even though sexually mature turtles are rather promiscuous and able to nest several times in one season, the time needed by juveniles to reach maturity exposes them to so many dangers that only one percent to one per mille of all hatchlings is thought to complete the road to adulthood. The low intrinsic rate of increase of sea turtle populations is a direct result and means that any harvesting above that rate—2 to 6% of the total population—results in population decline (natural stochasticity not taken into account).
Interestingly, Bjorndal et al. (1999) suggest that the very reason that the Green sea turtle has survived the period of intense exploitation at the beginning of the 20th century may have been its very low growth rate (age at maturity in the Caribbean is approximately 25 years): the large number of age classes in the subadult portion of the population continued to supply recruits to the breeding population, even after years of complete harvesting on the nesting beaches.
The **critical importance of juveniles** to population maintenance or recovery is recognised by many authors (ibid), which is why it is argued that turtle conservation should shift some of its emphasis on protecting nesting beaches (eggs on nesting beaches constitute the least responsive life stage of a turtle's life cycle) to protecting juveniles from being caught in sea (Crouse et al., 1987). Halfway technology is a good example of this. Although Caño Palma is limited to working with the adult turtles that nest on the North Beach (and, of course: no nesting adults, no juveniles), it is good to be aware of this.

Also interesting is the much higher *k*-value of the Leatherback turtle (0.27), indicating faster growth and lower age at maturity than other species of sea turtles (Leatherbacks reach sexual maturity after approximately 5 to 14 years [Spotila et al., 2000]). This potentially affects population dynamics and thus the resilience in the face of human disturbance. One of the reasons for their higher growth rates is that Leatherbacks have a relatively high metabolism and are warm-bodied, allowing them to migrate and feed on the colder nutrient-rich waters other turtles cannot survive in (Olori, 2004). Yet Leatherbacks are critically endangered and it is thought by many that they will be extinct within ten to fifteen years (e.g. Spotila et al., 2000). Low natural hatching rates are certainly to blame and literally every nest is important. *This warrants very serious consideration of nest relocation or even a hatchery as a possibility on the North Beach*.

Sea turtles have an **extraordinary sense of time and location**, many species returning to the beach where they were born to lay their nests. This sensitivity is probably facilitated by the ability to use the Earth's magnetic field for navigation (Lohman et al., 2001), which has led researchers (research not yet published) to hypothesise that Tortuguero's Cerro functions as a signpost for turtles to find their way to the beach. An old volcano, the magnetic field induced by its solidified magma (which aligned with the Earth's magnetic field at the time of solidification) produces a magnetic anomaly that could be sensed by the turtles (Haro, 2006, personal communication).

Sea turtles play key roles in two ecosystems that are critical to them as well as to humans—the oceans and beaches. The negative impact of their extinction on both systems would probably be large.
Together with the manatee, Green turtles are one of the few species that feed on near-shore sea grass beds (this is also where they are easily captured by fishermen). Sea grass, which needs to be kept short in order to remain healthy, constitutes essential breeding ground for many marine species and when the Green turtle disappears many species dependent on healthy sea grass are likely to go with them.
Similarly, other sea turtle species play an important function in their ecosystems through their role in the food chain: Hawksbills feed on coral reef sponges, Leatherbacks keep jellyfish populations under control and Loggerheads prey on molluscs, crustaceans and fish.
In addition to their roles in the food chain, turtles also bring rare and needed energy to fragile beach ecosystems. Nutrients from hatched eggs as well as from eggs that never hatch and hatchlings that fail to make it to the sea provide proteins to beach vegetation thus assisting in erosion prevention (this is not such a problem on the North Beach as it is on many other nesting beaches) (Spotila, 2004).

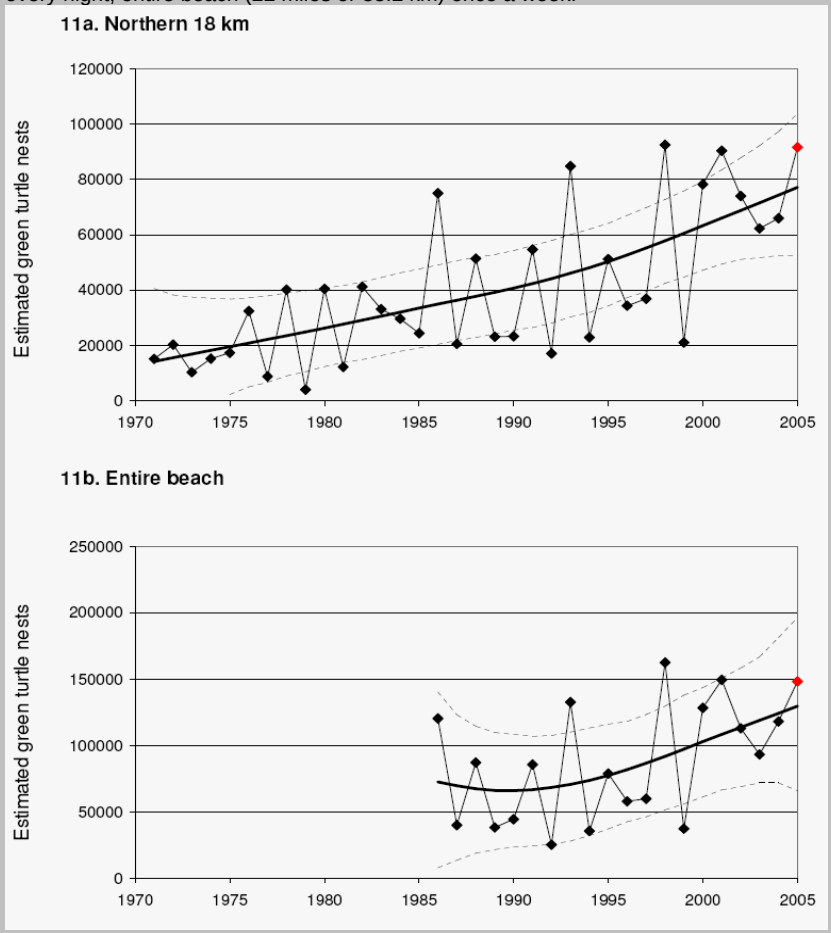
The numbers

The position of the North beach is unfortunate in that it happens to be situated directly next to one of the world's most famous turtle beaches, making the thousand or so turtles that visit it seem rather pitiful. To contrast that, twenty three Green turtle tracks and seven nests a year are enough to inspire a turtle project on Réunion Island, off the eastern coast of Madagascar, including daily surveys (Ciccione and Bourjea, 2006).
So comparison is inevitable and necessary. So far, we only have one full year of data for comparison with the numbers observed by the CCC and they indicate that **the North Beach hosts less than 1%** of the female part of the Tortuguero Green turtle population. In 2005, an estimated 150,000 nests were laid over 22 miles of beach (Haro and Troëng, 2006b), versus 981 on the 3 miles of the North Beach (see figure 3, next page).

For Leatherbacks, however, the density of nesting occurrences is virtually the same on both beaches, 2005 saw 703 nests over 22 miles in Tortuguero (Haro and Troëng, 2006a), compared to 83 nests on the North Beach (density: 32/mile vs. 28/mile). Even in comparison to Gandoca, one of the Caribbean's important Leatherback nesting beaches, which had 641 Leatherback nests in 2005 (ANAI, 2006), the numbers on the North Beach are high enough to merit attention (figure 3).

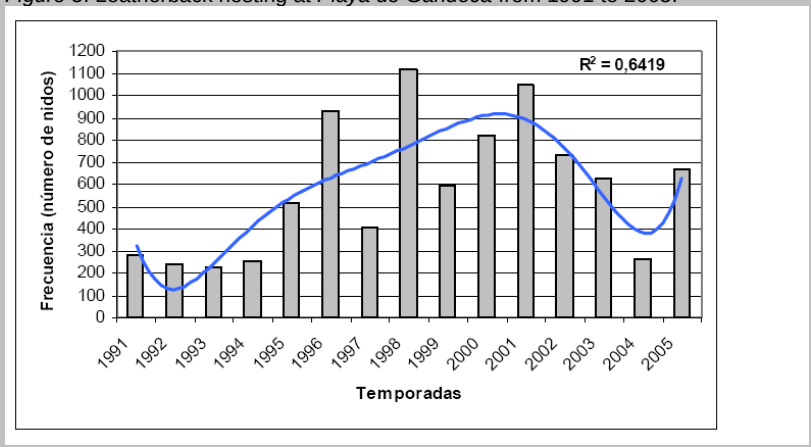
At first glance, then, the North beach seems quite deserving of some form of protection. But it is also important to consider the larger context and look at regional—and not just local—influences on the Caribbean turtle population. Based on cautious estimates, with increased protection measures on behalf of Caño Palma, the North Beach could produce some 11,250 hatchlings on average per year, 12 to 100 of which (depending on who you read) will eventually reach sexual maturity.
This number is dwarfed by both the total numbers of Green turtles in the Tortuguero population (the CCC estimates there to be approximately 148,000 females, they do not know how many males there are (CCC 2006)) and by the number of turtles that are killed each year: perhaps 60 turtles are killed annually by San Francisco poachers (most of them off shore), large fishing boats from Limón come up to Tortuguero and harvest up to thirty turtles per run and in Nicaragua between 11,000 and 35,000 Green turtles are harvested every year, most of them from the Tortuguero population (Lima et al., 1999)).
Although these numbers are by no means exact, they do show that numbers of turtles poached and produced on the North Beach are very small as compared to numbers elsewhere, numbers that pertain to the same population of turtles, yet are far beyond our control.
The fact that most turtles are poached offshore also shows the need to work directly with poachers. Beach patrols and the presence of the police will partially solve the problem of nest poaching, but will not stop people from going out into the sea and kill turtles.

Figure 3: Green turtle nesting trends at Tortuguero (Northern 18 km are monitored every night; entire beach (22 miles or 35.2 km) once a week.



Source: Haro and Troëng, 2006b, p.44.

Figure 3: Leatherback nesting at *Playa de Gandoca* from 1991 to 2005.



Source: Asociación ANAI, 2005, p.19

Figure 4: Turtle poached on the North Beach. Egg yolks seen are those of the undeveloped eggs that would have been laid approximately two weeks later.

Pictures: Frederik van Oudenhoven

I was happy to find the following quote in an article in Conservation Biology: “Determining what is “biologically significant” is a major problem in conservation biology and does not seem to have easy solutions” (Reed and Blaustein, 1997, p. 281). The article is relevant to this report in that it tries to shed light on the ways to determine the significance of a population change (positive or negative) to the survival of that population. Importantly, the authors remind us that a statistically significant part of a population does not necessarily mean that that part is also biologically significant, and vice versa. In a turtle context this may mean that 1%, although statistically not highly spectacular, may have significant biological and ecological importance; it is simply very difficult to say and I am not familiar with the criteria maintained by conservation agencies. Given the endangered status of the Green turtle and knowing that originally the Tortuguero population may have been in the tens of millions (Bjorndal, 1999; Hays, 2005), they might need every bit of help they can get.

Educational value of the North Beach

The discussion on conservation values aside, there is a second way in which the North beach is already fulfilling an important role. From March until August more than 50 volunteers from over eight countries, 40 Costa Rican high school kids and some fifteen children and ten adults from the village of San Francisco have accompanied Caño Palma staff on night patrols, observing turtle nesting and assisting in the work done by research assistants. The looks on some of their faces were unforgettable and signalled the invaluable impact of hands-on conservation experience as a form of education. Even if nesting numbers are insufficient to sustain a conservation programme alone, in combination with a well-designed educational programme, extending to include the community of San Francisco and the tourists visiting the two hotels on the beach, the project can be very worthwhile indeed.

Community based conservation – possibilities in San Francisco

Few conservation projects have been successful without the involvement of local people, especially where these people have been a strong force in the depletion of the resources. Local people can be an invaluable source of knowledge in identifying threats and opportunities and, once benefiting from conservation measures, can ensure their continued success (Vieitas et al., 1999).

That being said, there are many ways in which the community of San Francisco deviates from the 'ideal' conservation community and turning the turtle project into a community project will not be an easy task. It will require resources, tact, perseverance, and, above all, a very skilled person to manage and implement project activities. Personally, I do not think any community conservation activities should be initiated until more is known about the turtles on the North Beach, which may require another two years of research. A good start has been made creating a scientific foundation for the project and it would be a pity, if not irresponsible, to waste that effort doing things hastily and ill-prepared. If this involves declining requests from people in San Francisco (read more about Don Gerardo later) than that is probably preferable to making promises that cannot be kept.

The community of San Francisco

San Francisco is sometimes referred to as "the village that should have never been there"… Over a period of less than ten years it has expanded from a small community of illegal land squatters to a village of more than 400 people and a school (which was the first official recognition of its 'accepted' status).

I do not know enough about the village to be able to talk about it in detail. Its inhabitants are from Nicaraguan and Costa Rican descent and bring with them a mixture of the 'black', Caribbean, culture and the 'white' culture from central Costa Rica. Being the host of several people that do not want to be found by Costa Rican police or government, San Francisco is not necessarily an easy, entirely harmonious community; it is certainly a very poor community. On the other hand, however, the village has a great spirit, a council, a well-run football competition and quite the assortment of wonderful characters.

Deserving of a special notice is **Don Gerardo**. Gerardo came to San Francisco about six months ago and occupies a property outside of the village, next to the Cerro. He has quite the suitcase full of ideas, some promising, others not so much so, and seems to be trying to hijack parts of the turtle project in order to start a volunteering project similar to the one managed by ANAI in Gandoca (see page 14). In doing so he has been trying to provoke hostility in the village towards Caño Palma, declaring that the station must have a lot of money and should use it to help the community. Gerardo does seem to get things done, however, and if COTERC can cautiously steer his laboriousness into a direction that benefits the turtle project it may prove to the village our resolve to make the turtle project benefit the community while at the same time preventing possible confrontations.

Poaching and poachers in San Francisco

I talked to a few people from San Francisco about the poaching situation on the North Beach (it would be considered disrespectful to approach poachers directly).

One of the first things they would tell me is that the consumption of turtle meat and eggs has been part of Caribbean black culture for a very long time. They told me there had never been a problem taking turtle eggs or killing turtles for their meat. It was only when the 'whites' came to the coast and started to harvest them in unsustainable quantities that populations started to decline (remember that Campbell soup started the large scale harvesting of green sea turtles in Tortuguero in the early 20th century). When asked about it, most people in San Francisco will denounce the poaching of turtles or their eggs, but almost half of the families will eat turtle products occasionally, when available; very few will actually go out on the beach to look for nests.

There are approximately 10 households that poach (usually only nests) about twice a week out of poverty. They do not usually consume the eggs, but sell them in order to have money to buy food, medicines, etc; fishing is often a second main source of income for these families. Together they may be responsible for 30 to 40% of nest poaching, but this is very hard to say.

The big problem on the North Beach are some six poachers that go out almost every night, poach everything they encounter and sell the eggs and meat to support their "vicios", drinking and drugs. These are men that are strong enough to work and, according to the people I spoke to, they are the ones Caño Palma should try to work with if it wants to do something about the poaching.

Although eggs fetch quite a bit of money in San Jose, in San Francisco and Tortuguero only 2000 to 3000 colones, or US $4 to $6, is paid for a bag (= one nest, or 80 – 120 eggs) of eggs. If sold in Cariari, the same bag is worth approximately 8000 colones, or US $16. What is intriguing is the fact that the people that buy

these eggs are mostly the wealthier lodge and shop owners, boat captains, even government officials—the people that will guide tourists around at night and tell them how important it is to protect the turtles.
Almost as a defence against what is happening in San Francisco, I was also told by villagers about the fishing boats that come up from Limón and catch up to thirty turtles per day. Apparently park guards know that this is happening, but cannot intervene because of corruption and the money that is at play. Even when the harvesting of turtles was still legal (see previous chapter), illegal capture by Limón fishing boats was already common. After the promulgation of the 1999 law against turtle capture (Taft, 1999)) fishermen lost a substantial part of their income (Troëng et al., 2004) and although efforts have been made to compensate this loss with revenue generation from other activities (Cuevas, 2002), poaching apparently continues to be a problem.

Some literature on community based conservation (CBC)

Below are a few articles that discuss CBC, some in relation to turtle conservation (references not included in Bibliography). Relevance to the turtle project and/or San Francisco is described in short commentaries.

Berkes, F. (2003), "Rethinking Community-Based Conservation", *Conservation Biology* 18(3), pp. 621-630.

> *An exploration of the theoretical aspects of CBC, emphasizing the importance of an interdisciplinary approach to conservation science that integrates knowledge of social (cultural) and ecological systems.*

Gibson, C.C. and S.A. Marks (1995), "Transforming Rural Hunters into Conservationists: An Assessment of Community-Based Wildlife Management Programs in Africa", *World Development* 23(6), pp. 941-957.

> *This article is an evaluation of some of the earlier, large, donor-driven CBC projects in Africa. It identifies some of the reasons for the failure of many of these projects, most of which are not relevant to COTERC because it simply does not have the resources to make such large errors. One of the chief findings is that by failing to make rewards specific to the hunters and instead providing (unconditional) benefits that accrue to the entire community, individuals continue to hunt while still receiving all the benefits. Although projects did often succeed in increasing protection of larger target species, this was found to be by virtue of increased enforcement levels only and not because benefits were offered to the community. In response to the increased enforcement levels, hunters changed their tactics and prey selection, but the overall volume of meat harvested stayed the same.*
> *For San Francisco this paper means the following: if the turtle project wants to achieve a decrease in poaching rates, the first people to be included from the village should be the people now poaching. It is unrealistic to start a CBC project in San Francisco that will benefit community members that are already better off and expect peer pressure towards the poachers to do the rest. A small, individual approach is necessary and probably the only one feasible for Caño Palma.*

Govan, H. (1998), "Community turtle conservation at Río Oro on the Pacific coast of Costa Rica", *Marine Turtle Newsletter* 80, pp. 80-81.

> *Account of a small community on the Pacific Coast of Costa Rica that has initiated a turtle management organisation. Although it does not talk about the current form and activities of that organization (I suspect it might not be doing so very well), the article is interesting for its description of the order in which activities leading to the formation of the organisation were carried out: four years of turtle monitoring were carried out, leading to the publication of a small paper in* Marine Turtle Newsletter *with an analysis of the first years of research. Only after that was the organisation formed and were other activities commenced.*
> *For Caño Palma a similar schedule may be advisable.*

Jones, C.B. and R.H. Horwich (2005), "Constructive Criticism of Community-Based Conservation", *Conservation Biology* 19(4), pp. 990-991.

> *This article urges CBC projects to carefully evaluate the consequences for biodiversity conservation AND the* ***integrity of local communities*** *prior to implementing any project activities. The importance of monitoring the consequences of conservation programs for psychological factors (e.g. human values) related to conservation is also highlighted, as these are indicators of true long-term effects.*
> *Especially the second point made, about the integrity of local communities is important for the turtle project. Although Costa Ricans are probably quite used to having tourists around, the impact of incorporating tourism or volunteering into the project (this is certainly*

something desired by Gerardo and some other villagers) on the community should be taken into account.

Kiss, A. (2004), "Is Community-Based Ecotourism a Good Use of Biodiversity Conservation Funds?", *TRENDS in Ecology and Evolution* 19(5), pp. 232-237.

An article very critical of community-based ecotourism projects, saying that many apparent success stories actually involve only few (if any at all) conservation benefits, provide only a modest supplement to local livelihoods, and remain dependent on external support for long periods of time. As in the Salafsky article below, incorrect, or scientifically dubious reporting is mentioned as a major impediment to assessing a project's true worth.

Some requirements for CBC to work are identified: where only small areas of habitat are concerned and modest changes are sufficient to bring about required results, CBC (and, more specifically, ecotourism) may be a good solution. However, revenues generated through project activities are not often large enough to draw labour away from biodiversity unfriendly activities and when they are, earnings may be invested in activities that threaten biodiversity in other ways (expansion of agriculture, for example).

In short, very few projects end up even covering their costs, let alone making profits. CBC and ecotourism may generate income and contribute to community development, but only within limits and with considerable investment of support and time.

Salafsky, N. and R. Margoluis (1999), "Threat Reduction Assessment: a Practical and Cost-Effective Approach to Evaluating Conservation and Development Projects", *Conservation Biology* 13(4), pp. 830-841.

Written in response to the question whether 'integrated conservation and development' projects are actually contributing to conservation. The chief reason for this question, the authors argue, is that no appropriate methods exist for measuring the success of such projects. The paper describes a way to set objectives and evaluate project outcomes so that the effectiveness of project interventions can be determined.

Although in the case of a possible CBC project in San Francisco the above question will not likely be as pertinent (two very obvious main objectives would be: reduction of poaching rate and increase of benefits to community of San Francisco, both fairly straightforward to measure), it is good to remember to be very articulate in defining project objectives and expected outcomes, especially when grant money is involved. Working with ***Logical Framework Analysis****, although somewhat painful at times, may be a good approach. The importance of having good baseline data (e.g. on initial poaching rates) is also emphasized.*

Sheil, D. and M. Boissière (2006), "Local People May be the Best Allies in Conservation", *Nature* 440, p. 868.

The main message of this short correspondence is the idea that locals can be very valuable allies in conservation efforts, both because of their unique knowledge of the local resources and because they may physically protect them against intruders.

Although the people in San Francisco are not indigenous and have no ancestral bond with the land, let alone the turtles, if a feeling of ownership of the turtles on the North Beach can be fostered (in other words, when people can make money with activities other than poaching) they are indeed likely to be willing to protect them, either against fellow villagers or against poachers coming from elsewhere.

Examples of community based turtle conservation in Costa Rica

Although it is unlikely (and probably not desirable) for Caño Palma to begin a CBC project with San Francisco in the near future, it is helpful to know what some other projects in Costa Rica have done. Two successful organizations and their projects are discussed below: PRETOMA (Pacific coast) and ANAI's project in Gandoca, on the Caribbean coast close to the Panama border. Both projects include hatcheries and use paying volunteers to sustain project activities.

PRETOMA (Programma Restauración de Tortugas Marinas) http://www.tortugamarina.org/

Pretoma is a non-governmental organisation (NGO) officially established in 1997 and operates three projects on nesting beaches on the Pacific coast of Costa Rica, all of them using a similar formula.

All three of PRETOMA's projects were initiated or requested by the local communities of villages close to the nesting beaches; in two cases, PRETOMA was approached by poacher families seeking to change their ways (PRETOMA, 1999). Punta Banco, the location of the first project, is a nesting site for Olive Ridleys and

has been monitored since 1996. In those first years, which were funded by various international donor organizations, the project hired several local community members each season to help with nightly patrols.
As it became increasingly difficult to find funding every year —CBC stopped to be the 'new thing', many other projects embarked on similar projects, and donor agencies became more interested in other fields of research— and as the communities in which research was being conducted grew impatient for the benefits they were promised, PRETOMA decided to find a way to become financially self-sustainable.
The 'Paying Participant Program' ('PPP', started in 2003) has volunteers that come to the projects pay for the accommodation of their choice, either home stays in the local community, in a lodge, or at the research station (which is rented from the village) (PRETOMA 2005). Prices for staying start at US $310 per week (!) and become less the longer a volunteer stays on. In the first year, the income generated from Punto Banco was already sufficient to financially support both the Punta Banco and a second project (I do not know how much of the money actually goes to the community).
The reasons for creating hatcheries in the projects managed by PRETOMA were twofold: poaching and predation rates were between 80 and 100 percent, and severe beach erosion had eliminated virtually all viable nesting habitat (Gaos et al., 2005). The same is true for ANAI's Playa Gandoca (Chacón, 2006). Hatching success rates in these hatcheries were mostly above 80%, with some low years between 48 and 60 percent (Gaos et al., 2005).
Interestingly, the numbers of turtles nesting at either of PRETOMA's nesting beaches is at or below the numbers observed on the North Beach: from 1996 to 2003, an average of 153 nests were laid on the Punto Banco beach per year, with a high of 233 and a low of 73 nests per year; other projects had comparable or somewhat lower numbers (ibid).

Because nobody was present at PRETOMA during the summer months I have not been able to visit them during my stay at Caño Palma. However, they have expressed their interest in our turtle project through email and have told us they are very willing to provide help when needed.

Asociación ANAI – Gandoca beach http://www.anaicr.org/

ANAI, a Costa Rican NGO has been working on many community based development initiatives in the Talamanca region of Costa Rica since 1978. They helped establish the Gandoca-Manzanillo National Wildlife Refuge in 1985 and since that time have been running a sea turtle conservation project in the same region as well.
Fortunately, Didiher Chacón, the director of the ANAI turtle programme came up to San Francisco to give a presentation about Gandoca and the paying participant project they have been running for the past fifteen years. ANAI had been invited by MINAE (the Costa Rican Ministry of Energy and the Environment), not only to give a presentation to the community of San Francisco, but also to evaluate the situation on the North Beach and in San Francisco. Their report to MINAE will determine to a large extent whether MINAE is going to be supportive of efforts by Don Gerardo (and Caño Palma?) to implement a project similar to ANAI's in San Francisco.

The central idea of the project in Gandoca is not very different from those managed by PRETOMA, although the primary reason for having paying volunteers was not to finance the turtle project but rather to have a source of income for villagers that would keep them from poaching (poaching rates were close to 100%); this explains why the Gandoca project seems to be more participatory than the PRETOMA projects.
Chacón made it very clear that the problem in Gandoca was not that people were poaching for drugs or alcohol. Gandoca is a relatively peaceful, homogeneous community and poaching was done out of sheer poverty. Nonetheless, he also made it clear that there had been and still is a lot of resistance against the project and that it required a lot of struggling to get the project accepted.
Volunteers come to Gandoca either through foreign volunteer organisations (approximately 60%) or through the ANAI website (40%). They choose accommodation in one of fifteen houses in the village and, to prevent confusion and people from claiming that ANAI is stealing their money, pay the family directly for their stay (US $14 per night), even when the volunteer organisation through which they came charged them money as well. A one-time fee of US $35 is paid to ANAI, in order to support research activities. During a year's turtle season, which extends from February to August, the project receives well over 500 volunteers, generating up to US $111,000 in the year 2005 (Chacón 2006). This alternative income far exceeds the income that would be received if all the eggs laid on Gandoca beach were sold on the black market (ibid).

Perhaps the most valuable advice I gained from meeting Didiher Chacón is that it takes a very strong, charismatic, intelligent and persevering person to run a project like the one in Gandoca and deal with the hassle that comes with it. This is something that must be realized by COTERC before engaging in any kind of CBC activity in San Francisco.

Opportunities in San Francisco

The above exploration of community based conservation initiatives spells a mix of caution and hope for San Francisco. There are certainly opportunities for successful community engagement, there may be sufficient turtles to support a volunteer programme and support from the CCC, MINAE and probably other turtle programmes is available. On the other hand, it was not the community of San Francisco that asked COTERC to initiate a turtle project, San Francisco is a very different community than those from Gandoca and Punto Banco, and COTERC neither has the expertise to do CBC work, nor, at the moment, the resources to employ a full-time person that does.
In this section a few alternatives that can be pursued by COTERC in San Francisco are described in a very rudimentary way. Once a certain course of action is chosen ideas can be developed further. Ideally, each of the activities described below are followed by and complemented with the next activity, thus building on experience gained and increasing the level of community involvement and control in the project with each step.

Environmental education at San Francisco school

Perhaps somewhat lost in between all the 'bigger plans', but no less important, are the classes that the station manager has been giving at the local school. San Francisco has some wonderful, very bright children and they have been the ones coming with us on turtle walks and persuading their parents to do the same. Some of the children will call the station when somebody in the village is about to kill a turtle. Although education may yield effects only in ten to fifteen years it is important and should be continued as long as possible.

Poachers becoming researcher

This alternative involves a first direct, but very modest involvement of the community of San Francisco in the turtle project. It allows the current preliminary research on the North Beach to be continued, together with GVI volunteers. Moderate funding is required to compensate poachers for their work and time spent at the station (US $200 - $300 per month per person would be enough) and ideally for one COTERC employee managing the turtle project and selecting and training poachers; this funding could be requested in a grant proposal to the US Fisheries and Wildlife Service, making clear the research is preliminary and intended to lead to a larger scale CBC initiative.
As Gibson and Marks (1995) stress, it is important that benefits accrue to the people that are to give up poaching. One of the main hunters/poachers in San Francisco has approached the station asking whether we could give him a job: he was tired of hunting and did not want to continue doing it for the rest of his life. Besides him, two other poachers can be approached and trained in order to do the same work as the research assistants have been doing this season: guide night patrol groups with volunteers, tag turtles, take measurements and gather other information. Training could be given in January and February (the CCC would probably be willing to have them participate in their Leatherback training sessions, just as RA's have been allowed to attend sessions this year) and may involve a ten week stay at the station, including intensive English classes (GVI may be able to help here).
Such training would give the poachers important qualifications, enabling them to play an important role in the potential development of the North Beach turtle programme or apply to work in one of the other 41 (!) turtle projects in Costa Rica. If one or more poachers prove to be very suitable for working in the project, initial training can be followed up by teaching data entry and project management skills; this would be the most 'sustainable', long-term kind of empowerment I can think of within the context of the turtle project.

Potential difficulties with this approach may include: it is not easy! Poachers must be approached and consulted about these ideas, which, again, requires some skill in diplomacy. Also, some poachers will not be trustworthy; they are likely to be rough people to work with and may not be the best people to be sent out with volunteers. It would also be difficult to ensure that nests are not being poached regardless of the job and compensation.

After two more years of research, when reliable data is available and it is possible to reflect on the experience of employing poachers to do conservation work, a small paper can be submitted to a number of small journals. Apart from ensuring that data are actually used and analyzed, this would be a good way to establish the project, let the world know what is happening on the North Beach, and it will function as a stepping stone to any elaboration of the project.

Volunteers being hosted in San Francisco

This is a rather large move up from the previous step, both in terms of resources and expertise required and level of community involvement in and ownership over the project. ANAI and PRETOMA should be consulted and, if possible, involved if the project is to move in this direction.
The main drive behind this idea has been Don Gerardo, and although it is difficult to trust the way in which he wants to achieve it, I do believe that, in the long run, this is one of the very few ways in which the turtle project can be self-sustainable and truly beneficial for the wider community of San Francisco.
There are many potential difficulties with this option, however, most of them due to the differences between San Francisco and the villages in above projects. To name a few:

- the lack of infrastructure in San Francisco requires initial capital investment in order to be able to host volunteers; the families that are now poaching and would really need money will not have the money to make those investments, instead villagers that are already better off will be able to lodge volunteers and increase their income even more.
- there are entire weeks during which no turtles are seen on the beach (which is not uncommon in ANAI's and PRETOMA's projects either). During such weeks, and in general during the day-time, alternative activities, apart from beach cleans, need to be available to entertain volunteers. 'Just' turtles may not be enough. ANAI and PRETOMA have hatcheries that require a lot of work during the days and .
- an important part of GVI's expeditions are dedicated to the turtle project and to many of their volunteers the turtle walks are the most impressive part of their stay at the station. GVI would have to give up the Caño Palma expedition if it loses involvement in the project. Ideally, GVI could find a way to provide volunteers to stay in the village, although this will require a lot of preparation that Gerardo may not have the patience to wait for.

It would probably not be COTERC's role to manage a project that goes in this direction. Rather, this would be the point where Caño Palma hands the project over to the community and changes into a role of advisor and facilitator.

Tourism

Before discussing any options related to tourism, remember that the North Beach, although a public area, is not open to tourism. Current turtle tours organized by Turtle Beach Lodge are tolerated but not legal. Any more official form of tourism is likely to require a permit from MINAE and once this permit is given it may mean that several hundred tour guides from Tortuguero decide to come and have a look at 'the unspoiled North Beach' as well and that nobody from San Francisco will benefit. We initially looked at possibilities to offer guide training to people from San Francisco (the *Instituto Nacional de Aprendizaje* (INA) offers free courses that are required to obtain a guiding license), but realized that this is not a viable option since the course takes place in Limón over a period of six months (most people from San Francisco cannot afford to stay away from home for that long) and, once a license is attained, the competition with Tortuguero guides would be very strong.
I indicated before that research into the hatching rates of Leatherbacks could justify the creation of a hatchery (*only for Leatherbacks and Hawksbills*). A few turtle experts that were consulted have strongly advised against a hatchery on the North Beach and emphasized that it should only be seen as a last resort; they did not know, however, that hatching rates are as low as they appear to be now. If such a hatchery would be established it could be a big attraction for tourists and included in the standard 'Tortuguero turtle tourist package'.
Tom Mason suggested selling information on hatching dates to tour guides and hotels (regardless of whether a hatchery is started or not), which would be possible if people from the village (poachers) are part of the nightly patrols. Given the low hatching rates and very large variance in nest incubation periods (in 2005, the incubation period for Leatherback nests (n = 7) observed by the CCC was 55 to 87 days, with a mean of 64 days (Haro and Troëng, 2006a), while the incubation period for Green turtle nests (n = 28) ranged from 49 to 65 days with a mean of 57 days (Haro and Troëng, 2006b), a lot more research is needed to be able to do this. The only way to get around this variability may be through the daily monitoring of nests (which is labour intensive): a small depression usually appears in the sand on the location of the nest the day before it hatches.
Other possible ideas include the formation of a village cooperative, the "Turtle Protection Society", for example, that manages turtle activities, volunteer stays, and can be approached by tour guides and lodges for information on hatching dates and location.
An annual Sea Turtle Day could be organized by this cooperative and children from the local school, in cooperation with nearby lodges, MINAE and the station. During this day the village opens its doors, food and souvenirs are sold, presentations held and videos shown. This would require a lot of work and motivation

from the community itself, but can do miracles towards improving the reputation and self-confidence of the village (San Francisco's bad reputation came up in the discussion following ANAI's presentation to the community. Villagers seem quite concerned and in a way offended by that reputation and would like it to change).

These ideas seem, and probably are, a long way away. (Eco-)tourism is not an easy option for San Francisco and probably less preferable than a paying volunteer programme. However, small-scale tourist activities that do not directly depend on the viewing of sea turtles may be a feasible option for the village and compel people to diversify their livelihood activities, including the production and marketing of handicrafts.

Not everything in San Francisco has to be related to turtles. There are alternative livelihoods that can be developed for the poorer families (shrimp farming and the cultivation of medicinal vines found in the region may be options), but exploring theses options goes far beyond the scope of this report.

Other factors to consider

Legal aspects

Two things are important to remember for the North Beach (both were mentioned in previous chapters): in Costa Rica exists a complete ban on the possession of turtle products, be it meat, eggs or carapace. Poaching on the North Beach is therefore illegal and poachers, when caught, can receive up to three years of imprisonment. Enforcement of this law is weak, however, as witnessed by the frequent signs in restaurants: "Hay huevos de tortuga" (turtle eggs available).
The second aspect concerns the management status of the beach itself. A new management plan for the Barra de Colorado wildlife refuge (which includes the North Beach) will be issued this autumn by MINAE, but no changes are likely to be made to the status of the beach (Calvo, 2006, personal communication). This means that the beach remains a 'public area', open to all public, without the protection status of the Tortuguero beach. Although tolerated, tourism is not officially allowed: tour guides need a permit to be able to give tours in specific areas of the country, but no such permit exists for the North Beach.

Important stakeholders

Apart from the community of San Francisco, there are several other important stakeholders on which successful implementation of a CBC project would depend:

→ **MINAE**: Carlos Calvo, MINAE's regional director for Tortuguero, visited Caño Palma in July. He seemed very impressed with the project and happy that the North Beach was finally being monitored. He was also rather shocked by the fast growth of San Francisco (the last time a MINAE representative visited the village was five years ago). Given the 'ignore' status that the Costa Rican government seems to have granted to San Francisco, it could prove difficult to gain MINAE's support for community based turtle activities, yet the fact that MINAE requested ANAI to come to San Francisco may indicate their willingness to improve the situation in the village. Calvo told us that MINAE is happy to provide contributions towards equipment costs, but does not have the resources to offer any further financial support to the North Beach project.

→ **CCC**: during the past two years, the relation with the CCC has been very good. The CCC has been supportive of the project (again, they are happy that the North Beach is receiving some attention), shared information and offered training to Caño Palma's research assistants. Their continued support is necessary for the future of the project and, given their interest in reducing poaching rates on the Tortuguero beach (many of San Francisco's poachers also poach on the Tortuguero beach), working with the community of San Francisco may be a good opportunity to work together.

→ **GVI**: GVI has supported the project with a biologist and the volunteers necessary to patrol the beach at night and in the morning. For the activities of which the project now consists such support is essential. From their side, the turtle project is very suitable to be done with volunteers who have no previous training in the field and the turtles have become an important part of the Caño Palma 'expedition'.
There is a great opportunity to cooperate on similar projects in the future: if research protocols can be designed together, COTERC offering its research experience and expertise and GVI indicating the limits that volunteer based research brings with it, much can be done at Caño Palma.

→ **Hotels:** both Cabinas Vista al Mar and Turtle Beach Lodge have given important support to the project. The tagging equipment has been purchased from donations from Turtle Beach Lodge, while Cabinas Vista Al Mar is offering food and lodging to the policemen that have begun patrolling the beach in August. Turtle Beach Lodge has been very eager to cooperate with Caño Palma on the project, asking for presentations to be held at the hotel and offering to carry out research patrols on the northern part of the beach. Although the motivation behind this eagerness is certainly mostly self-interest—offering tourists a 'turtle research tour' is apparently much more exciting than just watching turtles—and it would be unwise to have the hotels carry out research, it is worth seeking ways to increase their (tourist's) participation, even if just for educational purposes.

Conclusion

After almost three years of monitoring Tortuguero's North Beach the results of the turtle project are very promising. Much effort on behalf of project coordinators and the increased involvement of volunteers have allowed activities to be expanded from morning censuses to working with turtles at night, allowing valuable data to be collected and giving volunteers an unforgettable experience of hands-on conservation work.
The fact that the North Beach has never been officially monitored, in combination with the numbers of nesting turtles and the opportunities for community based conservation activities present in the community of San Francisco, should be sufficient reason to obtain financial support to continue project activities for at least one or two years.

The results obtained so far suggest several conclusions:

- → numbers of turtles encountered fluctuate strongly from year to year, but are sufficiently high to merit attention.
- → poaching incidence on the North Beach is high. This year's numbers appear lower, possibly as a result of increased presence of Caño Palma staff and volunteers on the beach.
- → due in important part to poaching, but possibly also because of high tides, beach erosion and debris on the beach, hatching success of especially Leatherbacks appears to be very low.
- → to substantiate these conclusions and to determine with more accuracy nesting incidence, poaching rates and hatching success of the different species of sea turtles, the current project activities must be continued for at least two more years. The possibility of a hatchery for Leatherbacks and Hawksbills should not be excluded.

For the current project to become a successful conservation, rather than research project it is essential that the community of San Francisco be involved in and benefit from project activities, even if that community is far from a model society and collaboration with it will not be easy. Employing poachers to conduct research activities for the station seems a good (and manageable) initial step towards community involvement, allowing for the continuation of data gathering while at the same time offering an alternative source of income to the people responsible for an important part of the poaching. Over time, when enough is known about the turtles nesting on the North Beach, activities could be expanded to include a paying volunteer programme in San Francisco and perhaps even some forms of tourism. By this time, Caño Palma should hand over project responsibilities to the village (or another, more experienced organisation) and act only as an advisor and facilitator.

Caño Palma cannot continue managing, let alone expanding the turtle project without a qualified and committed staff member. Ensuring that the project is properly manned should be priority over the coming months; if this is not (financially) possible it is preferable to hand over the project to another organisation.

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Conservación y Restauración del Cerro

Propuesta inicial para la gestión del Cerro por la comunidad de San Francisco

El asunto:

El Cerro esta explotado de manera insostenible. No solo por miembros de la comunidad de San Francisco, sino también por el turismo en la región. Aunque el precio de admisión que cobre el parque de Tortuguero a los turistas incluye dinero para la gestión del Cerro, nada ha sido hecho para su conservación. Unos de los resultados son:

- La desaparición de los animales que vivían en el Cerro: ya cuesta encontrar chanchos de monte, tepezcuintes, y varias especias de aves.
- La disminución de la 'palma real', usada por mucha gente en la comunidad para hacer techos, la disminución del cuculmeca y otras plantas medicinales. Otras especias están cortados por su madera. La extracción de balastre por los hoteles y construcciones locales empeora la erosión de la montaña.
- El gran numero de turistas que entran el Cerro (entre 20 y 400 personas por día, depende de la temporada) ha erosionado los senderos así que ellos son peligrosos para andar; muchas personas (ancianos, personas fuera de condición y con problemas médicos) no los puedan usar.

Objetivos:

La comunidad de San Francisco se propone a que la responsabilidad de las gestiones del Cerro sean de San Francisco; a cambio del trabajo requerido, una entrada fija de 500 Colones (USD 1) por turista sería cobrado. Esto trataría al mismo tiempo la escasez de personal del MINAE y traería una fuente de trabajo y de ingresos para el pueblo de San Francisco. La conservación y la restauración del Cerro consistiría en:

- Arreglar los senderos principales (y tal vez mejorar un sendero que rodé la montaña) y cerrar los otros senderos (así que la fauna pueda regresar).
- Construir paseos de madera y escaleras donde sea necesario; instalar mecates en partes empinados o resbaladizos.
- Vigilar contra la extracción de madera y las hojas de palma. El pueblo ya está solicitando, con la ayuda de la estación biológica Caño Palma un puesto de policía permanente. Este puesto ayudaría también con la vigilancia en la playa durante el tiempo de desove de las tortugas.
- La creación de un vivero de plantas medicinales (cuculmeca, noni, gavilana, juanilama, zacate limón, etc.) para la venta y la educación/el turismo.
- Un basurero al empiezo del sendero y el mantenimiento (la limpieza) del Cerro.
- Un tablón de información sobre la ecología del Cerro y la conservación hecha por la comunidad.
- La educación de la comunidad y especialmente los niños.
- Hacer un censo de los turistas que visitan el Cerro, de donde vienen, con cual hotel y por cuanto tiempo están en el Cerro.

¿Cómo?:

Para asegurar que los ingresos del Cerro sean distribuyendo de manera adecuada, una asociación sería creada en San Francisco. Los asociados (que incluirían idealmente las personas que explotan el Cerro) trabajarían por la asociación en la conservación del Cerro y serían pagados por los ingresos que traiga el turismo.

Es esencial que una asociación sea establecida antes del empiezo de este proyecto.

La creación de una asociación es parte de un plan de desarrollo integral del pueblo de San Francisco. Los beneficios del proyecto serían gestionados por la asociación e invertidos en otros proyectos para el mejoramiento del pueblo y su ecología.