Projeto tamar-ibama:
Twenty-five Years Protecting Brazilian Sea Turtles Through a Community-Based Conservation Programme

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Abstract This article discusses the use of sea turtles as flagship species by the organisation tamar to promote marine conservation in Brazil. tamar is an example of a successful long-term partnership, or strategic alliance, between government, an ngo, the private sector, and local communities to promote the wise use and protection of sea turtles, nationally and internationally. In addition to a long-term research programme on turtles, tamar has striven to incorporate human and social issues into all of its conservation initiatives by using a wide variety of outreach activities that involve local communities as well as other stakeholders. The involvement of fishermen, other members of local communities, and other interest groups at different socio-economic levels has been a successful long-term strategy, with most turtle nesting areas showing significant increases in activity since tamar began its work on the Brazilian coast in 1980. tamar has shown that the use of sea turtles as a flagship species to spread conservation messages not only to local communities, but also to government, the private sector and non-governmental organisations, through different tools, such as educational, media, and public campaigns, is essential for ensuring long-term protection of these animals and their habitats.

Introduction

In 1980 the Brazilian government established the National Sea Turtle Conservation Programme (Projeto tamar, the name of which derives from the contraction of 'TArtaruga MARinha', the Portuguese name for sea turtle), which is affiliated with the federal government's institute for environment (ibama). Conservation activities focus on major nesting and feeding grounds distributed along 1,100 of the 8,000 kilometres of mainland coastline, as well as sites on three oceanic islands, involving nine states (Marcovaldi and Marcovaldi 1999).

One of the greatest and most complex challenges to the long-term conservation of sea turtles in Brazil, and elsewhere, is changing the habits of coastal communities in which intense rates of natural resource use is a vital source of subsistence and income, essential to survival. Conservation of endangered species has traditionally implied interfering with livelihoods in such communities, and it is necessary to change the paradigm that conservation is a barrier to human survival or socio-eco-

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nomic development.

Environmental policy in Brazil during the 1970s and 1980s was exclusionary. Federal legislation was generic and restricted to the prohibition of wildlife products and derivatives. Governmental efforts were exclusively directed at terrestrial protected areas, and policies involving the conservation of coastal and marine natural resources were nonexistent (Fundação PRÓ-TAMAR 2000).

The challenge for TAMAR, when the first research and conservation field stations were established, was to devise an approach to motivate coastal residents with low incomes and few alternatives, who were used to digging up sea turtle eggs for consumption and sale as part of their livelihood strategies. Local people who exploited these creatures had to be drawn into conservation and research projects that were designed to generate direct and indirect benefits for their communities. TAMAR devised plans to alleviate pressure on sea turtles by stimulating social participation in the search for economic alternatives, new forms of production, local self-sufficiency, and creative sources of income generation. Addressing this challenge necessitated complex and increasingly multi-disciplinary programmes and projects aiming to provide appropriate stewardship of natural resources (Fonseca and Pinto 1996). The strategy that TAMAR developed turned out to be an effective way to meet turtle conservation goals without negatively affecting the socio-economic condition, characteristic of those involved in natural resource use (Marcovaldi and Thomé 1999).

Besides providing direct employment by creating new jobs, the programme has also developed active environmental and public outreach campaigns. Professional opportunities include research, internships, and work at visitor centres, shops, and museums (discussed below). Production of handicrafts, ecotourism guides, and participation in cottage industries comprise additional sources of income for local people. Outreach efforts involve a variety of initiatives and topics, including educational and health-related projects, sports activities, kindergartens, community vegetable gardens, and technical assistance to various fisheries sectors, as well as other local activities. Resources are additionally invested in supporting cultural aspects of the communities. In addition, ten visitor centres nationwide further complement educational and outreach activities as important tourist attractions where local youth are trained as guides, and also provide sources of sales and income to the programme. It is important to point out that a majority of these projects entail informal education, and involve several schools and kindergartens (TAMAR 2004).

TAMAR has been successful in achieving many of its goals. Through the many projects developed by TAMAR, it has become possible for involved community members to participate in economically attractive activities, which have opened doors previously unavailable to them. This not only helps them to make an income and improve their education and living conditions, but also facilitates the process of social inclusion, a major issue for developing countries (Marcovaldi and Thomé 1999).

The conservation programme employs sea turtles effectively as a flagship species for the promotion of environmental awareness more broadly. TAMAR's involvement and use of sea turtles as flagship species has furthered the creation of various coastal and marine protected areas. In addition, ongoing national sea turtle conservation campaigns, carried out since the beginning of the programme, have enhanced awareness of marine resources throughout Brazilian society, with a focus on endan-

gered or threatened species occurring along the coast. Thanks to these diverse initiatives, each year around 14,000 turtle nests are protected along Brazil's mainland and islands, hundreds of turtles are released alive from fishing gear, and more and more people are supportive of the programme.

Initial and Current Structure

Before TAMAR was launched, official sources assumed there were no sea turtles nesting in Brazil, but significant evidence for the presence of these marine reptiles was uncovered following an extensive literature review and a comprehensive two-year survey of 4,000 kilometres of coastline carried out between 1980 and 1981 (Marcovaldi and Marcovaldi 1999). As a result, Projeto TAMAR's first objective was to determine which species of sea turtle occur in the country. Subsequently, the objectives for each species were to determine: conservation status and abundance; seasonality and geographic range, particularly location of principal nesting beaches; the location of feeding grounds; and the primary threats to survival.

In 1982 TAMAR established field stations at the three primary nesting sites encountered: Pirambu, Praia do Forte, and Comboios, in the states of Sergipe, Bahia, and Espírito Santo, respectively. Study areas were delimited based on anecdotal accounts of the relative numbers of nests, as well as considerations of nesting beach characteristics, especially for the less abundant species. TAMAR has since expanded, and today a network of twenty-one field stations in nine states, each with its associated conservation and monitoring activities, protects five species of sea turtle, their nests, and nesting and feeding areas (Figure 1). The species protected are: *Caretta caretta, Chelonia mydas, Dermochelys coriacea, Eretmochelys imbricata and Lepidochelys olivacea*.

Although the initial objectives were focused on issues of biological conservation, it quickly became necessary for TAMAR staff to integrate with various coastal communities. This was because the field stations were located in, or close to, isolated fishing villages. One of TAMAR's principal rules has been that staff must live full-time in the communities where they work, for through this process the perceptions, needs, and limitations of fishermen and their families become clear. It was soon realised that integration with coastal communities would be essential for the success of the conservation programme. Hence, the primary objectives of Projeto TAMAR today are to guarantee the protection and recovery of sea turtles in Brazil through both research and the involvement of the local communities

TAMAR's Modus Operandi

The organisational structure of the programme required considerable flexibility to integrate effectively with coastal communities, and also to respond to ever-changing budgetary situations. As a federal programme, TAMAR was initially affiliated with, and assisted by, several national non-governmental organisations (NGOs). These included Fundação Brasileira para a Conservação da Natureza (Brazilian Foundation for Nature Conservation) and the Fundação Garcia D'Ávila (Garcia D'Ávila Foundation). As the programme matured and increased in scope and personnel, and financial needs expanded at a quickening pace, these alliances became unman-

Figure 1. *Distribution of* TAMAR *Stations in Brazil, showing the major conservation functions of each station; abbreviations for states are CE = Ceará; RN = Rio Grande do Norte; PE = Pernambuco; SE = Sergipe; BA = Bahia; ES = Espirito Santo; RJ = Rio de Janeiro; SP = São Paulo; and SC = Santa Catarina.*

ageable. In response, the Fundação PRÓ-TAMAR (PRO-TAMAR Foundation), a specialised, non-governmental organisation, was legally created in 1988 to support and co-manage Projeto TAMAR jointly with IBAMA, primarily by raising and administering funds. The Foundation is comprised of a board of Trustees, a president, an executive director, and seven regional directors responsible for the twenty-one field stations. It

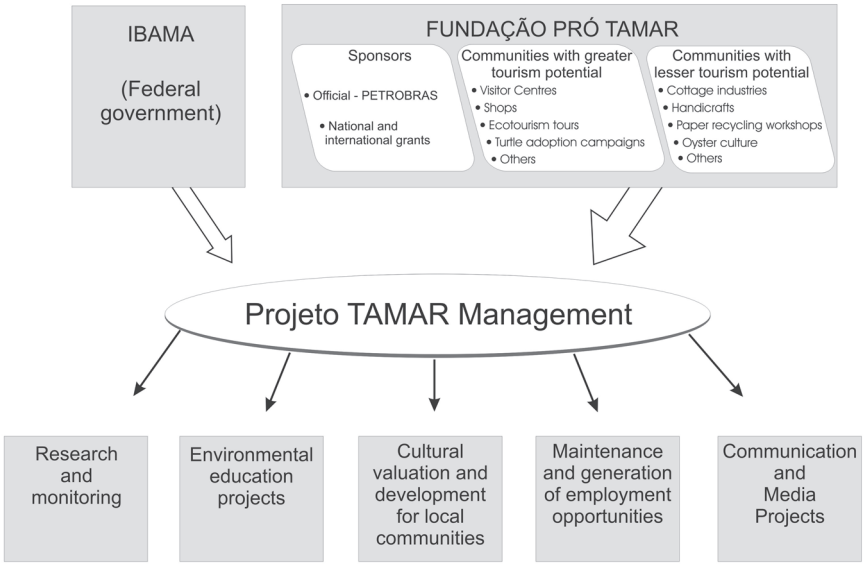

Figure 2. TAMAR's *modus operandi, showing the major organisational structure, with the primary inputs, of which about a third is from the federal government (*IBAMA*) and the remainder from the Foundation, as well as the primary outputs; it is important to emphasise that there is considerable interaction and overlap between the various activities, so that, for example, personnel and funding for cultural valuation and development may contribute directly to educational activities, income generation, and so on.*

provides the salaries and stipends of a staff of more than 1,000 people, who include administrators, biologists and field technicians, fishermen and other members of local communities, trainees, interns, special consultants, and others. Because fiscal support from federal agencies is unpredictable and unstable, the Foundation works in an opportunistic way to meet needs and take advantage of situations that change from year to year.

A system of partnerships between the public and non-profit sectors institutionalises a hybridised organisation, increasing the effectiveness of protection, handling and research activities with sea turtles. The role of IBAMA, the Brazilian agency responsible for environmental policy, is to guarantee the protection and recuperation of species in danger of extinction, including the five sea turtle species occurring along the Brazilian coast; it is also responsible for supporting major operational expenditures of the programme, mainly salaries of senior staff and capital expenditures, such as buildings, vehicles, and equipment. In recent years the contribution from IBAMA has averaged about a third – but on special occasions nearly half – of the annual budget, a grand total that has been equivalent to more than 2.9 million US dollars. The PRO-TAMAR Foundation on the other hand, functions as a synergistic element that complements the role of the state (see Evans 1996 on the importance of institutional synergies), ensuring the continuity of sea turtle conservation activities through a more efficient and flexible administrative structure. In the three-way alliance that includes IBAMA and local communities, the Foundation serves as a catalyst and an intermediary between government and citizens in remote coastal villages.

The Foundation has provided and administered about seventy per cent of the funding for TAMAR. Private and public organisations in Brazil, as well as international agencies, contribute to these funds. Income is also generated through the programme's own self-supporting activities, of which visitor centres, ecotourism, and manufacture and sale of a wide range of TAMAR products are examples (Figure 2, and see below).

The constancy of the IBAMA - PRO-TAMAR Foundation partnership has become a *sine qua non* condition for generating credibility, respect and ties of trust (Fukuyama 1995) between the involved communities and conservation efforts. Its existence has been decisive in the formation of favorable public opinion in local, as well as other segments of society. As a result, the sea turtles, under TAMAR protection, became flagship species for a programme of environmental conservation and community development.

In addition to the partnership between IBAMA and the Foundation, since 1983 the programme has had the official sponsorship of PETROBRAS, the parastatal petroleum company of Brazil. This has covered as much as sixteen per cent of the annual budget, administered by the Foundation. PETROBRAS receives from this world-class advertising, based on the conservation of a flagship species.

Community – the Most Important Partner

Along with its mission of sea turtle protection, TAMAR incorporated humanitarian and social issues into its conservation efforts. Indeed, the first strategy adopted to effectively promote sea turtle protection was to involve the community. For this purpose, fishermen were hired to carry out sea turtle conservation and management activities. At the beginning of the programme the only way to immediately halt the take of turtles and eggs was to hire key fishermen and provide them with alternative livelihoods. They received a salary for patrolling the nesting beach in their regular fishing areas during the nesting season. This provided an alternative source of income for them, as well as direct involvement and capacity building for sea turtle conservation. These fishermen work about three hours per day, for which they receive the minimum monthly wage, the same as a person who works eight hours per day. In the early years, nearly all of these fishermen had been the main turtle hunters and egg collectors in their respective areas. Their 'official responsibilities' for turtle monitoring conferred upon them status within their communities and gave them a greater knowledge of sea turtles (which they then share with others) and an enhanced conservation ethic. Some of these fishermen have worked with us for more than twenty years. Each man comes from a different community, and this is a practical way to disseminate the sea turtle conservation message. These fishermen are seen as TAMAR representatives in the outlying villages. They are proud of the work they do for the conservation of the species and are respected by members of their community (Marcovaldi and Marcovaldi 1999).

This community involvement strategy solidified as TAMAR station managers began to reside within the communities adjacent to areas of sea turtle occurrence. The managers became increasingly able to quickly identify the expectations and prospects of these rural coastal communities. Technical assistance has been continuously offered in various ways including providing rides to medical facilities, providing assistance and advice on gaining representation in municipality forums, and

giving advice and initial start-up help for establishment of productive activities. As a result, an opportunity was created that initiated an on-going learning process about local customs and traditions, as well as about the biology of sea turtles.

Twenty-five years of cohabitation between TAMAR biologists and community members resulted in the development of ties of trust capable of promoting social capital (Putnam 1993). This factor has been fundamental in motivating participation in sea turtle conservation efforts. Integrated environmental conservation and social inclusion programmes became possible, especially through education and the betterment of local quality of life (Patiri 2002a).

In this manner, TAMAR began gradually to incorporate activities that encourage environmental sensitivity through the use of sea turtles as flagship species. With the evolution of TAMAR's *modus operandi* for conservation, additional categories of activity were developed, based on the same philosophy of community encouragement and involvement. Of notable importance are a variety of public outreach initiatives, including educational and cultural valuation programmes. These form the basis for economic alternatives appropriate to local opportunities and standards of environmental sustainability. The significance of these various endeavours relates to community involvement in environmental causes. One of the most important aspects of the programme is community outreach and education, designed specifically for the coastal villages, which includes video and slide presentations at schools, hatchling release ceremonies, and cultural festivals: in each coastal state various cultural activities are supported and promoted by the programme. The central goal of these diverse initiatives is to increase local awareness of the importance of a healthy marine ecosystem, which includes turtles (Marcovaldi and Marcovaldi 1999).

TAMAR's strategy is based on the principle that, without the participation of communities, conservation programmes may be condemned to failure. Today, local villagers, including fishermen, constitute the majority of TAMAR staff. More than 1,000 people, about eighty-five per cent of whom are local coastal residents, are currently involved directly with the programme. Among these are some 400 fishermen who work with various field activities of (TAMAR 2004); this includes people from twenty-five coastal fishing villages, with populations varying from 500 to 27,000 people, communities that range from small villages with economies based mainly on extraction of natural resources and incipient tourism, to national and international tourism centres. Based on a multi-pronged strategy, these diverse programme activities interact among themselves and with initiatives of other stakeholders, providing sustainability to TAMAR projects and long-term results.

Sea Turtle Conservation Activities

Nesting Areas

Intensive study areas (ISAS) and conservation areas (CAS) have been implemented in each of TAMAR's fifteen continental stations at nesting beaches. Despite more than two decades of conservation work, it has not been possible to extend comparable efforts to all parts of the Brazilian coastline, nor even to all of TAMAR's field stations.

ISAS are located where there is a major concentration of nesting activity of any one of the five species, and can encompass from five to fifty kilometres of contin-

uous sandy beach. A research team, consisting of the station manager and a variable number of trainees and interns, generally students in the natural sciences, patrols the ISA each night and day during the nesting season. Motorised vehicles are used to patrol larger areas, generally exceeding ten kilometres of beach.

Nesting turtles encountered during patrols are measured, and metal tags are applied to the flippers. All clutches left at their original site (*in situ*) are marked. In areas where predators are a serious threat, nests are protected with a plastic (or wire) mesh buried just below the surface of the sand, above the eggs; the mesh size is large enough to allow hatchlings to escape from the nest (see Marcovaldi and Marcovaldi 1999 for details). In general, the involvement of personnel from local communities in the ISAs is limited to checking, marking and protecting the nests.

Unlike the ISAs, TAMAR's CAs are monitored by researchers and surveyed solely by local fishermen and other coastal inhabitants. When one of these TAMAR field assistants encounters a nest with eggs, he carefully digs up and transfers all the eggs to a Styrofoam box that is subsequently delivered to station staff at predetermined collection points. The eggs are then moved either to open-air hatcheries or to safe beach areas. This procedure normally reduces transport time to less than twelve hours between oviposition and reburial, critical for successful embryonic development (TAMAR 2004). Each TAMAR station has a hatchery where eggs are normally transferred from the surrounding CAs (Marcovaldi and Marcovaldi 1999).

The ISA, where nests are always monitored *in situ*, serves as a control against which to evaluate hatch success and incubation conditions of transferred eggs in the CA. TAMAR carefully monitors a variety of incubation variables in order to keep conditions similar between the natural, *in situ* nests, and those that have been transferred. Although there are several reasons why it is preferable to leave clutches *in situ*, hatcheries are a necessary interim step. At present, clutches that cannot otherwise be protected from predators, heavy beach traffic, beach erosion, or even egg poaching in inaccessible areas, are moved to hatcheries or other beach sections for safe incubation (Marcovaldi and Marcovaldi 1999).

The main goal of TAMAR is to keep as many clutches as possible *in situ*. Nowadays, nearly seventy per cent of all clutches are left in their original places. Clearly, the full cooperation of people in the coastal communities is a fundamental prerequisite for attaining successful hatching from clutches left *in situ*. In fact, the nesting beaches could only be effectively protected with the work and dedication of the field teams composed mainly of local community members.

In total, some 150 fishermen and other coastal inhabitants contribute, under the supervision of trained biologists, to a comprehensive long-term research project that includes routine collection of information on nesting and hatching success. All data obtained are organised in a standardised national database. The number of nests with eggs that have been protected each year has risen from around 200 in 1984 to 14,000 in recent years; this is due to an increase in survey effort, as well as recent increases in nesting activity (TAMAR 2004).

Feeding Grounds

Stations dedicated to protecting turtles at their feeding grounds (Figure 1) were set up in areas where it was believed that large numbers of turtles were being incidentally caught and subsequently drowned in various forms of artisanal fishing nets and

weirs (Marcovaldi 1993).

Building on experience gained from work at other stations, research and monitoring activities of turtles in the water have been designed to incorporate active participation of coastal residents; the primary sites are Almofala and Ubatuba, in the states of Ceará and São Paulo, respectively. These two sites encompass the feeding areas with the higher known rates of incidental sea turtle capture elsewhere along the coast. As discussed below, fishermen and other coastal residents are taught about the natural history of sea turtles and their role in the ecosystem. The objective is to develop strategies to reduce the numbers of turtles drowned through incidental capture. Results so far include the introduction of alternative fishing methods and fisheries products, such as oyster and mussel culture (Giffoni, Gelli, and Gallo 1998; Silva *et al.* 2000).

Another positive measure has been recruiting fishermen to actively resuscitate stunned turtles. Frequently, after being caught in a net, a sea turtle becomes comatose and appears dead (Shoop, Ruckdeschel, and Wolke 1990). In the past, stunned turtles incidentally caught by the fishermen were quickly thrown back in the water, causing their subsequent death. These actions were based on the fishermen's fear of punishment, since turtles in Brazil are protected by law, and their intentional capture is banned. In response to this situation, TAMAR began distributing brochures and posters explaining how turtles that are incidentally caught can be resuscitated, following up with casual conversations and workshops to instruct fishermen how to reduce incidental capture and mortality. They are encouraged to check their nets often for sea turtles, and are instructed on methods for reviving unconscious animals. After rehabilitation, fishermen release the turtles into the ocean, in most cases bearing tags that TAMAR staff have put on the animals. Today, approximately 250 fishermen cooperate with TAMAR to minimise incidental capture by coastal fisheries, and some 5,500 turtles have been resuscitated since the implementation in 1991 of the Ubatuba and Almofala stations.

Since June 2001, TAMAR has been developing the National Plan for the Reduction of Incidental Capture of Sea Turtles in Fishing Activities. The Plan involves a management system based on a network of all TAMAR stations, as well as affiliated research centres, universities, oceanographic museums and non-governmental organisations along the coast of Brazil, and also includes some international cooperation. The main objective is to reduce the incidence of turtles captured and killed in the course of various fishing activities. Specific objectives include monitoring, research, mitigation actions, negotiation, and other fundamental concepts through implementation of central principals of the Code of Conduct for Responsible Fisheries of the UN Food and Agriculture Organisation (FAO 1995).

Surface pelagic longline and drift nets are the oceanic fisheries that have been monitored. The drift net, also known as 'surface net', targets mainly sharks, particularly the hammerhead (*Sphyrna* spp.); however, it incidentally captures certain marine mammals and turtles. TAMAR has been monitoring the incidental capture of sea turtles in drift nets at Ubatuba since 2002, with the voluntary support of local fishermen. With longline fishing activities TAMAR has been developing two main lines of research: 1) testing mitigation measures with modified bait and hooks, to avoid capture and mortality of sea turtles, and 2) satellite monitoring, to asses post-capture effects. The Plan also has established cooperative agreements with vessel

owners to develop conservation plans for sea turtles. As regards drift net fishing activities, discussion fora with stakeholders are created to find possible solutions to minimise the capture of these animals, for example through replacement with other more selective gear. These measures are important not only for the sea turtles, but also for the fishermen since they minimise the damage to their fishing equipment and result in more efficient fishing effort (Marcovaldi *et al.* 2002).

Outreach Activities

From the start of its programme, TAMAR has faced a fundamental challenge: to discover solutions for re-establishing turtle populations along the Brazilian coast where they have been decimated, mostly by human activities. Great difficulties were encountered in arresting the slaughter of females on nesting beaches and in maintaining clutches at their original sites (*in situ*).

Two years of coastal surveys carried out during programme initiation indicated that almost all nests were poached, and that a large number of females were slaughtered in the course of fishing activities, although no historic data are available. Most fishermen were unaware that regulations forbid the capture of any sea turtle species (SUDEPE 1982). Moreover, in the early 1980s most coastal youth had never seen a baby turtle, or knew to relate one with a turtle egg. Hence, young people could not appreciate the fundamental importance of conserving eggs for there to be turtles in the future.

The other challenge was to find ways to diminish social tensions caused by Brazilian environmental legislation, which prohibits local populations from using natural resources that are under threat of extinction. In order to facilitate social integration and credibility, as well as enhance effectiveness of conservation initiatives, TAMAR has developed a wide variety of outreach activities. In practice, these are multifaceted, with diverse components integrated in response to complex social needs and expectations that vary along the 8,000 kilometre coast of Brazil, and through time. In many cases, outreach activities go beyond education and simple information transfer, for they form the foundations for alternative livelihood initiatives. However, for the purposes of this paper, the descriptions of these various activities are separated under different headings.

Educational and Training Projects

Our alternatives included not only hiring fishermen to protect the nesting areas and patrol sections of beaches, but also educating local residents to develop environmental awareness, and also to help them deal with nutritional, health, and livelihood needs. The educational campaigns began in 1982, at the time the first field stations were established. Special events were held to emphasise the importance of sea turtle conservation. Images of these animals (photos and drawings) were exhibited simultaneously alongside key slogans such as 'Don't Kill' and 'Conserve'. Over the years, the methods applied for environmental education have included specific courses and various other activities that involve youth groups (for example, community gardening, paper recycling, selective garbage collecting, and ecological mini ecotourism guides).

Visitor Centres. The first and largest visitor centre is at TAMAR headquarters at Praia do Forte, which is now equipped with ten tanks containing between 2,000 and 80,000 litres of seawater, five aquaria and two touch ponds, an average of fourteen information panels (which are changed and updated periodically), a video room, life-size sea turtle models, and outdoor posters of each of the species occurring in Brazil. Since 1997 a small admission fee (equivalent to three US dollars at the 2004 rate of exchange) has been charged for visiting the exhibits (members of the local community are always granted free admission, and from seven thirty until nine in the morning and between six thirty and seven thirty in the evening the facilities are open without charge). From the year 2000, an estimated 500,000 people have visited the Praia do Forte visitor centre annually; of these, approximately ninety-four per cent are Brazilians (Marcovaldi, Marcovaldi, and Lopez 2005).

The experiences and knowledge gained at the Praia do Forte visitor centre are being used at nine other TAMAR stations, where tourism is also prevalent and visitor centres have been established (Figure 1). In all cases these provide opportunities for direct contact between residents, visitors, TAMAR staff, and sea turtles, and are important tools for both education and fund-raising campaigns (see below). A visitor centre typically includes display tanks containing local species of sea turtles in various life cycle stages, hatcheries, aquaria with local marine fauna, natural-size replicas of sea turtles, and other educational displays. Prominent signs and panels explain the basic biology and status of the turtles, as well as programme activities. Shops with various TAMAR trademark products, varying from T-shirts and other clothes to souvenirs, are key elements of visitor centres. Small museums included in the visitor centres may serve multiple purposes, sponsoring activities and functions, such as video clubs, art centres, and school-group presentations (Marcovaldi and Marcovaldi 1999). These interpretive centres must be tailored to local demands according to specific characteristics, ranging from relatively small and rustic structures to more sophisticated constructions capable of accommodating over a thousand tourists daily.

During the nesting season, visitors and the local community have the opportunity to participate in fieldwork. Each year TAMAR receives one and a half million visitors, who are usually guided by trained students or Mini Guides. Since they constitute an important tourist attraction and sources of income, visitor centres are also self-sustaining development instruments (TAMAR 2004).

Mini Guides. The Mini Guides Project trains local youngsters from ten to fifteen years old in basic aspects of sea turtle biology and marine environmental conservation, at the same time involving them in tourism and providing possibilities for future work in areas of environmental conservation and tourism. As an additional stimulus, participants receive a scholarship while they are active in the year-long project: a basic requirement is that they must continue to attend school. Hence, training and educational components are promoted with both immediate and future economic benefits. Since its creation in 1995, about 330 teenagers have graduated from the Mini Guide course (Vieitas, Lopez, and Marcovaldi 1999).

Turtles by Night. This is an example of specialised educational opportunities available at certain visitor centres. Tourists are guided by TAMAR biologists and offered an opportunity to learn, in a select group about TAMAR's conservation activities. This is an additional attraction and way that people can make direct financial

contributions towards turtle conservation for the equivalent of thirty-five US dollars per person. Donors are able to symbolically adopt a sea turtle, and participate in a night-time walk along the nesting beach together with a biologist (Vieitas and Marcovaldi 1997).

Capacity Building for Fishermen. A specialised component of TAMAR's training activities involves the fisheries sector. Technical assistance is provided to fishermen in various communities, for example in oyster culture, fish farms, fisheries management, creation of artificial reefs and other fish attracting devices, and organisation of cooperatives, not to mention training to mitigate negative impacts on sea turtles, as described above.

Health and Nutrition. Since the beginning, TAMAR personnel noted the lack of food in coastal communities and stimulated the creation of communal gardens, aimed to distribute the products and at the same time to implant new, healthier feeding habits throughout the community. Normally youngsters and women from these communities were involved in the production and distribution of food. Demonstration gardens were planted at schools where TAMAR is active, aiming to complement lunch diets and also to teach students how to produce food. Moreover, organic gardens were promoted, without the use of pesticides and other agro-chemicals, and in some cases arrangements were made so that part of the production was sold so that the gardeners could be remunerated for their work and funds made available to cover basic resources needed for maintaining the garden. However, despite the fact that the community gardens were started in most TAMAR field stations, in the end it was realised that the basic objectives were not being met, and the project was abandoned in most bases.

TAMAR works in isolated coastal areas where there are recurring needs for health assistance: many times the field vehicle has served as an ambulance for pregnant women, sick children and people with wounds or other health problems. To improve the situation, programme staff have worked to have basic health services provided by responsible agencies. As a result, ambulances have been donated to coastal communities; and doctors and other health practitioners have been brought to the villages, making it unnecessary to transport patients to urban centres in many cases. In some field stations, such as Regência, there are special initiatives, for example, a dental facility in the visitor centre that was established in partnership with the local authorities and PETROBRAS, and has been attending the community for more than fifteen years.

Kindergarten. Another example of educational and community support activities is the kindergarten located at Praia do Forte. Since its creation in the late 1980s, TAMAR has actively participated in the management of and fund-raising for this facility, which is sponsored by TAMAR and PETROBRAS, as well as through individual donations. Today, 185 boys and girls, ages two through six, from neighbouring towns, as well as Praia do Forte itself, are enrolled at the kindergarten; hence, over the years this facility has supported the care and education of hundreds of children, who might otherwise have been left in unhealthy conditions.

In addition, the majority of TAMAR field stations provide logistic, organisational, and/or fiscal support for diverse initiatives, focused particularly on informal education. This involves activities in kindergartens, schools, and universities, as well as many situations outside of formal educational institutions, such as community centres.

Paper Recycling Workshops. These workshops, at Regência and Ubatuba, include children between the ages of nine and seventeen, all of whom must be enrolled in school to be able to participate. For more than a decade in the case of Regência, and for eight years in Ubatuba, about thirty youngsters per year have participated actively. At the grassroots level, integrating the project into daily life ensures that new generations are raised with a more responsible outlook vis-à-vis their relationship with the environment. In this way, sea turtles act as flagship species, encouraging general ecological sensitivity and concern (see below for details on income generation for these workshops).

Surfing and Other Community Training Activities. TAMAR also develops capacity building for local community members in other activities. For example, at Praia do Forte, Regência, and Ubatuba surfing courses are provided free of charge. These courses, attended mainly by adolescents, not only include instruction in techniques for surfing, the history of the sport, rules of safety and first aid, but also lectures on English, personal hygiene, citizenship and environment, teaching techniques, and entrepreneurship. Hence, it is hoped that the participants will be better informed and trained, and thus, will have greater prospects for employment, such as surf instructors for credited institutions or tourism companies. In Praia do Forte, TAMAR is developing courses for surf instructors in partnership with Centro de Terapia em Surf (Centre of Therapy in Surf), a local surf school. Before their final evaluations, the novice instructors complete the course with a period of on-the-job training, supervised by specialists in hotels of the region, and thereby establish contacts for potential sources of employment.

Professional Training. Aside from developing a sense of environmental awareness among local populations and the general public, TAMAR also works to prepare future conservationists and natural resource managers. It offers practical experience through training activities and internships for students from secondary school, university, and post-graduate programs, and for other trainees. Interns and trainees not only learn about sea turtle biology, but also about the realities and difficulties of organising and implementing conservation programmes.

Courses taught in schools and universities frequently fail to provide skills that are fundamental for developing successful conservation initiatives, such as community interaction, fund-raising, and institutional representation in varying real life situations (Marcovaldi and Marcovaldi 1999). TAMAR interns and trainees are provided stipends for periods of up to one year, although in special cases support has been provided for several years. They work with a broad range of tasks, thereby gaining experience in such extra-curricular activities. Trainees and interns are immersed within the organisational and cultural framework of TAMAR's day-to-day conservation and research programme. This provides a unique opportunity of *learning by doing* while exploring challenges and solutions to various problems that are difficult to adequately portray or appreciate in a purely academic setting (Patiri 2002a). The projects' main objective is to ensure that trainees are capable of mediating conflicting interests deriving from conservation of endangered natural resources, in this case the turtles, while at the same time remaining attentive to the necessities of local populations.

TAMAR receives an average of 150 students and young professionals into its training activities each year, who are distributed among almost all of the twenty-one

field stations (TAMAR 2004). Over the past twenty-five years, more than 1,500 students from different universities and other educational institutions, both Brazilian and international, have participated. Due to the increased number of applications, only five per cent can now be accepted.

The training of new professionals is indispensable for TAMAR itself, providing the organisation with the opportunity to renew and expand personnel. Whenever new position openings are available, trainees are incorporated into the programme's staff. However, many trainees initiate their professional careers in similar programmes or in public organisations involved with environmental conservation, and as a result 'graduates' of TAMAR's training activities are active – often in key administrative positions – in a wide variety of governmental and non-governmental organisations throughout the country.

Communication Projects

TAMAR uses various tools of communication to promote and develop educational and other outreach campaigns. These include marketing (publicity, public relations, special events, and merchandising), mass media (radio, television, newspapers, magazines, and internet), videos, multi-media, flyers, posters, exhibits, oral presentations, debates, and publications regarding programme initiatives. In all of them, sea turtles, mostly in their natural habitat, constitute the main attraction.

Using visual images in publicity campaigns has proved to be effective in capturing public attention: images of female turtles nesting, juveniles diving and foraging, and hatchlings crawling to sea have great visual appeal. They are thus capable of positively influencing public opinion. Additional benefits of strengthening cultural values and self-respect of local community members, who emphasise the familiar images in their own marketing initiatives (Marcovaldi and Thomé 1999), is achieved by: 1) incorporating these images into public events, campaigns, T-shirts, festivals, and handicrafts, while at the same time 2) publicising the idea of conservation and encouraging various sectors of society to support it.

Short institutional videos (five to twenty-five minutes long) focusing on programme aspects and sea turtle biology are effective means of presenting diverse aspects of the TAMAR conservation programme. They are useful in various situations and for a variety of audiences (coastal communities, sponsors, schools, universities, government, and non-governmental institutions). In addition, they provide images for TV channels and independent producers (Marcovaldi, Bellini, and Sanches 1998). In this context, an institutional photo collection has been essential for organising exhibits and talks. It is also useful for compiling teaching materials (for example brochures, posters, and websites), and in providing images for newspapers and magazines.

For this reason, over the years TAMAR has been perfecting its team's skills in the art of image making, building their capacity to make images of sea turtles in their natural habitat. It is important to make full use of TAMAR's field workers, as they are most likely to document natural phenomena. TAMAR's high quality image collection, consisting of thousands of photographs and hundreds of video segments, is produced internally and continually updated. A subset of photographs is available on both the internet[1] and DVDs, while select video footage is also available for edition (TAMAR Image Bank 2004). At the time of writing there are more than 10,000 of photos and around 300 hours of images in the bank.

To further promote communication and public education activities, TAMAR makes use of professionals in computer animation, who edit the images. In this way greater affinity is achieved between the text imagery produced and the sea turtle conservation message. A *press attaché* is also hired, for the same reason, to facilitate the exchange of information between TAMAR and media professionals.

These communication tools are indispensable in the process of diffusing the environmental conservation message. Indeed, many politicians, businessmen, and institutional leaders, among others, possess neither the opportunity, nor the will to learn about conservation programme initiatives, including field activities. Therefore, TAMAR employs the various means described above to bring the sea turtle conservation message to all relevant sectors of society, capitalising on the natural charisma of sea turtles (Marcovaldi and Thomé 1999).

In addition, visitor centres offer lectures, expositions, and museum displays about sea turtles, as well as TAMAR's history and activities. In 2003, for example, 256 lectures were offered, and attended by approximately 15,000 people nationwide. In addition, there were forty expositions viewed by an estimated 780,000 visitors. These facilities are also critical for income generation (see below).

Cultural Valuation

The programme's Cultural Valuation Project was developed to strengthen ties of trust with various communities with whom we interact regularly (see Fukuyama 1995). This project also uses sea turtles as its flagship species, and associates environmental conservation with folklore traditions and other forms of artistic expression that are characteristic or unique to each field station. Despite the differences between communities, their cultural expressions share certain aspects, such as entertainment, leisure, and religious behaviour (Castilhos, Alves, and Silva 1997).

The relative erosion of artistic and cultural expression in rural coastal communities is attributed to a loss of prestige and self-esteem. The Cultural Valuation Project has contributed to the revival of these traditions. The projects developed by TAMAR provide organisational and financial support for regional cultural festivals. This involves solving practical problems, such as availability of physical space for rehearsals and classes; acquisition of stage, costumes and musical instruments; event promotion and promotional appearances; and handling of artists' fees. Additionally, TAMAR subsidises the salaries of local musicians, as well as craft and dance teachers. In the year 2003, at least seven per cent of the programme's operating budget was spent in supporting cultural valuation.

An appreciation for environmental conservation through sea turtle protection has gradually been incorporated into these popular traditions, according to the level of community engagement. References to sea turtles are found, for example, in children's plays, as well as in local art and music. These performances are used during folklore shows as a part of cultural valuation projects, where sea turtles always have a place of note. In Sergipe, for example, there are two distinct sea turtle folklore dance groups (Quadrilha Junina das Tartarugas and Grupo Folclórico Lariô da Tartaruga), each composed of approximately sixty people, including children, young adults, and former turtle egg collectors. A sea turtle related *capoeira*, a traditional Afro-Brazilian dance/martial art group (Grupo de Capoeira Unidos das Tartarugas) is composed of twenty-five youngsters in Bahia. Notably, the TAMAR field station in

Sergipe created, and houses, the 'Culturarte', a cultural festival of about 600 local artists and participants. This annual festival is a forum for presentations by diverse local groups, including handicraft expositions, seminars, and workshops, in addition to those discussed above. In the other states there are also several dance and folklore groups (TAMAR 2004).

Through culture, society generates values to be transmitted to future generations. These include confidence, civic behaviour, and a degree of association considered necessary in the formation of social capital (Kliksberg 2001). Consequently, by giving value to local culture through promotion and construction of links, networks and dissemination, TAMAR has contributed greatly to community social structure (Patiri and Costa 2004).

Generation of Sustainable Economic Alternatives

Brazil's index of social disparity is the fourth highest in the world (Barros, Henriques, and Mendonça 2000), and the country's economic and social situation is in many ways typical of developing nations. Historically the small coastal communities where TAMAR works have faced problems such as social exclusion, lack of professional opportunities, and skewed income distribution. Such problems become sources of tension, capable of disrupting conservation and development efforts. A fundamental -- and continual -- challenge has therefore been to develop ecologically and socially sustainable strategies: to distribute income throughout the communities by creating direct job opportunities and generating economic alternatives, which are essential for neutralising unsustainable anthropogenic pressure on sea turtles (Patiri 2002b).

Through intensive, diverse, and long-term activities in the field, TAMAR has accumulated extensive and detailed knowledge of each unique community with which the programme interacts. This has enabled identification of specific market opportunities; for example, communities with varying degrees of potential for participation in tourism require differing policies and tactics. Strategies for pinpointing economic alternatives are developed with two primary goals in mind: institutional self-support and development of community policies that generate economic alternatives. TAMAR functions as a catalytic agent that generates the synergy crucial for promoting local development, a process that has been shown to be indispensable in a variety of development initiatives (Boisier 1991, 1993, 1997, 1999). The outreach activities described above provide the foundations for developing and maintaining livelihood alternatives.

Stimulation of Community Entrepreneurship

Promoting sustainable economic activities requires promoting a certain amount of entrepreneurship and, to make this viable for the overall programme objectives, a symbiotic relationship is needed so that both the communities and TAMAR benefit. To this end, TAMAR promotes the production and sale of thematic items with appropriate messages and bearing its logo.

TAMAR´s Social Production Chain. To strengthen local economies, TAMAR began a process involving a complete line of production, from raw materials to final products, so that participants in the process can benefit from the aggregation of

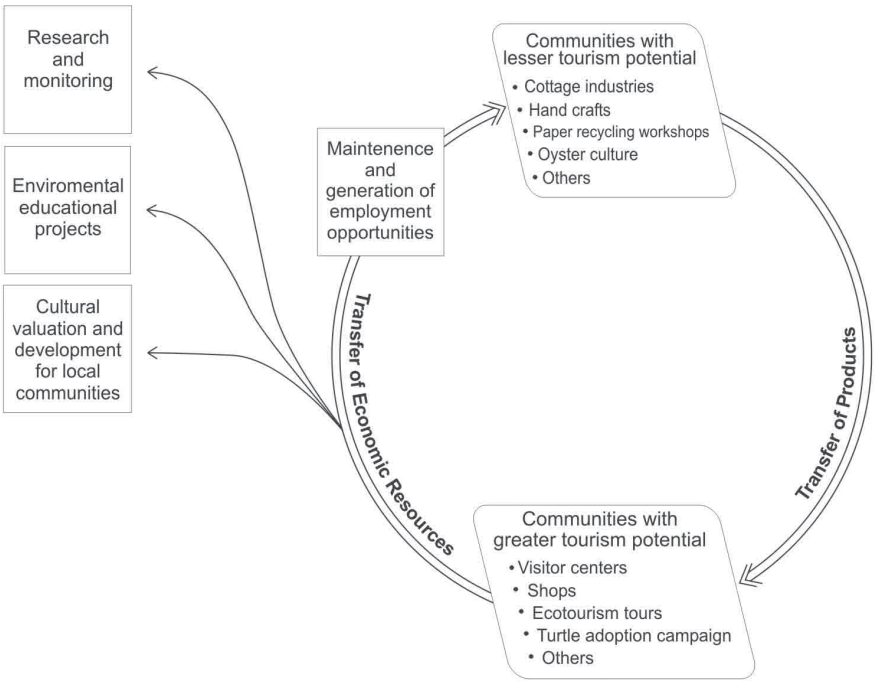

Figure 3. TAMAR's *social production chain, showing the main components of the self-sufficiency initiatives, in which the stations with lesser tourism potential provide products for sale at the stations with greater tourism potential, and those sales provide financial support for the stations with lesser tourism potential through the maintenance and generation of income opportunities, as well as for other activities such as cultural valuation and development, educational programmes, and research and monitoring.*

value, a process often referred to as 'verticalisation' (Schumpeter 1989). This strategy establishes a regular flow of product transfer between different field stations, and consequently among various communities, resulting in the creation of TAMAR's Social Production Chain (Figure 3).

In this way, communities close to the field stations, in areas with limited potential for tourism and sales, became product suppliers for the visitor centres where tourism, with its accompanying sales, is established. At the sales end of the chain is a network with nineteen retail shops, located at visitor centres, information posts in airports (Vitória, Espírito Santo and Salvador, Bahia) and in a shopping mall (Vitória, Espírito Santo). Temporary shops are also set up at TAMAR's travelling exhibits. The visitor centres function, metaphorically speaking, like *anchor stores* in large shopping malls; this is especially the case for Fernando de Noronha, Pernambuco, and Praia do Forte, where visitation rates are high (Patiri 2002b).

This results in a bi-directional flow of products and fiscal resources between field stations: thematic products are transferred from stations located in communities of limited tourism potential – for example, Pirambu (Sergipe), Regência (Espírito Santo), and Almofala (Ceará), to stations with higher tourism potential, such as Fernando de Noronha (Pernambuco), Praia do Forte (Bahia), and Ubatuba (São Paulo) (Figure 3). At the same time, financial resources flow in the opposite

direction. The simultaneous flow of these resources constitutes TAMAR's *Cycle of Self Support*. This promotes opportunities, mainly for the three communities with limited options mentioned above, and, on a smaller scale, for local people at other stations. For example, the TAMAR shop at the visitor centre in Ubatuba sells baskets made by Guarani Indians, passing all money from the sales to the producers. In other cases, the programme markets the various products from coastal communities, giving them a fair price. Presently, 1,200 jobs are maintained through the *Social Production Chain*.

This strategy promotes sustainable development (WCED 1987), since it allows local people to engage in productive activities. The verticalisation strategy promotes sustained commerce and income, hence, sustainability of the various institutions that are involved, as well as the creation and maintenance of economic alternatives for various coastal communities. Local production and sales activities are supported within TAMAR's Social Production Chain, which in 2003 had net sales that totalled 1,467,000 US dollars (fifty per cent of the annual budget of PRO-TAMAR Foundation). Of this income, 620,000 US dollars (twenty-one per cent of the annual budget) were used exclusively to employ residents of local communities, which includes salaries, health, and social security benefits (TAMAR 2004).

The jobs and income generated by the *Social Production Chain* are expected to promote self-esteem and other difficult-to-measure qualities, often referred to as *social capital*. As a result, sale of thematic products using the sea turtle as a logo is an essential financial resource in two respects. It supports research and conservation of sea turtles in Brazil, and also provides the workers with direct benefits – financial and social – from the conservation programme.

Diverse, Ecologically Sound Alternatives

As TAMAR went beyond working on just sea turtle issues in order to build an environmental ethic among coastal populations, various economic alternatives were initiated to respond to needs and opportunities in different sites.

T-shirt Cottage Industry. The first cottage industry was created in 1990 in Regência, Espírito Santo. Since then, both product quality and commercial sales at TAMAR's souvenir shops have improved, and the success inspired the creation five years later of another T-shirt cottage industry in Pirambu, Sergipe. They both produce articles of clothing, especially T-shirts, to supply gift shops in TAMAR visitor centres. All of these products also promote TAMAR's sea turtle conservation message through pictures and short phrases. A total of 127,000 pieces were produced in 2003. Of these, approximately 94,000 (nearly two-thirds) were made in Regência. That year, T-shirt factory sales totalled 329,000 US dollars net, or eleven per cent of PRO-TAMAR Foundation annual budget (TAMAR 2004).

To maintain competitive prices and produce high quality products, TAMAR now hires experts in market trend identification and raw material quality control. Efforts are also made to create thematic print designs that satisfy consumer requirements, and work teams consisting mostly of local community members are trained to work on T-shirt production as well as in TAMAR's shops. There are thirty-five full-time workers in the Regência cottage industry, and nineteen in Pirambu, all from the local communities, and all of whom were incorporated into production after completion of training courses designed and offered by TAMAR. Most of the workers

are the wives or daughters of fishermen who previously had no employment alternatives.

Craft Groups. At the same time, TAMAR encourages about twenty-three craft groups associated with five field stations in five states. These are mainly independent groups. Some are related to local organisations, while others are family-based. To be associated with TAMAR, a group must use the sea turtle image, as well as other elements of nature that are part of their daily lives. These groups produce lace, embroideries, aromatic cushions, caps, paper bags, paper masks, and sachets as well as other handicrafts made of locally available materials including coconut fibres, sand, recycled paper, and *papier-mâché*, among others (Castilhos, Alves, and Silva 1997; Lima and Melo 2001; Lima 2003).

Mini Guides. As well as the educational component described above, this project is a source of income for rural children who receive a scholarship for participating in the yearlong training period at a TAMAR visitor centre. The stipend is equivalent to half the minimum salary established by the federal government (Vieitas, Lopez, and Marcovaldi 1999); in 2004 a monthly stipend of 100 Reais was equivalent to about thirty-five US dollars. As an additional benefit, since 2003 each Mini Guide has received one food basket each month.

Paper Recycling Workshops. As mentioned above, these workshops are active at Regência and Ubatuba field stations, and in addition to the educational component, they have economic importance. With a remarkably high level of production, the youngsters now produce around seven thousand paper bags per month, as well as transforming production leftovers into artisanal paper suitable for manufacturing business cards and other saleable products. Of the collected income derived from bag sales, sixty per cent is distributed according to individual production levels among workshop participants -- who have very few alternatives for income and productive activities. The remainder is used in the purchase of materials necessary for bag production. Over the years, more than 250 youngsters have participated in this project.

Ecotourism and TAMAR's Visitor Centres

TAMAR follows the Brazilian government's national ecotourism policy when carrying out conservation activities in areas with high tourism potential. These principles recommend sustainable use of the country's natural and cultural inheritance, along with fostering consciousness of environmental issues. The latter is achieved by promoting the well being of involved populations (Brazil 1995).

In this context the visitor centres have been constructed in areas adjacent to field stations. Funds are raised through the sale of admission tickets, rental space for restaurant concessions, and other services. The sale of thematic items, such as T-shirts, caps, local handicrafts, and other souvenirs, represents a significant source of additional funding. In 2003, for example, sales and admissions from just the Praia do Forte visitor centre generated 490,000 US dollars net, constituting nearly seventeen per cent of the annual budget of PRO-TAMAR Foundation (TAMAR 2004). Through this income, it has been possible to make improvements, offer better veterinary care for the turtles in the tanks, create new exhibits, and improve maintenance, while simultaneously investing in sea turtle conservation activities. TAMAR now depends financially on proceeds of the visitor centres, which in 2003 provided more than twenty-eight per cent of the annual budget, totaling around 837,000 US dollars.

Products are inspired by sea turtle conservation and impart TAMAR's principle objectives of sea turtle protection and research, so profits are both fiscal and educational (Marcovaldi, Marcovaldi, and Lopez 2005).

Changing Outlooks

As a pioneer in Brazilian marine conservation, there was no pre-conceived model or plan available for the development of TAMAR. Much to the contrary, the programme developed its intervention and community interaction strategies intuitively and responsively. Thus, TAMAR was built with the premise of overcoming the diverse and complex challenges presented by sea turtle conservation. Solutions had to be devised for the management of a resource whose ecology and biology in Brazil had not been described, not to mention the relationship between sea turtles and diverse stakeholders, from small-scale fishing communities to national politicians.

With its distinct functional strategies, TAMAR has promoted a way of thinking both in the communities where it operates, and among visitors from all over the country. Today sea turtles, with their widely recognisable image, have become a symbol for many Brazilian people, a flagship for marine conservation and a responsible relationship between people and their environment. The sea turtle assumes a prominent and inspiring role, and is transformed into a shining example of compatibility between conservation and community development. TAMAR has overcome the problem of isolated conservation programmes that lack public support and thus become fragile and vulnerable.

Thanks to various conservation efforts that have employed sea turtles as flagship species, several marine and coastal protected areas have been created at federal, state, and municipal levels. These areas in turn benefit other species through the protection of their respective habitats. These include, from north to south: Reserva Biológica do Atol das Rocas (Atol das Rocas Biological Reserve) established in 1986 in the state of Rio Grande do Norte; Parque Nacional de Fernando de Noronha (Fernando de Noronha National Park) created in 1988 in the state of Pernambuco; Reserva Biológica de Santa Isabel (Santa Isabel Biological Reserve) established in 1988 in the state of Sergipe; Parque Nacional Marinho de Abrolhos (Abrolhos National Marine Park) created in 1983 in the state of Bahia; and Reserva Biológica de Comboios (Comboios Biological Reserve) established in 1984 in the state of Espírito Santo. In addition, a state park was created in Itaunas (Espírito Santo), and Environmental Protection Areas in Espírito Santo and Bahia were established, while a Municipal Environmental Protection Area was created in Anchieta, Espírito Santo. Every one of these protected areas was created with the primary purpose of protecting sea turtle habitats, but each of them provides multiple additional benefits for the conservation of other, less charismatic species, as well as from employment and income generating opportunities for members of nearby coastal communities.

As has been emphasised throughout this paper, sea turtle conservation has generated services and income for various involved communities, permitting inclusion of local population groups in the formal economy. The interaction between TAMAR and local communities has resulted in new cooperative arrangements and processes of social inclusion and local development, providing opportunities for a

better quality of life by generating jobs, while at the same time increasing community members' sense of citizenship. This result, fundamental for developing countries like Brazil, in turn helps to generate a sustainable future for sea turtle conservation efforts, as well as for civic society, that is, responsible citizens.

The creation of jobs, income, and services for local communities largely eliminated any animosity directed against the programme as a result of its conservation priorities. Local populations were gradually integrated into implementation of institutional activities, actively participating in conservation. At first, social inclusion was linked to sea turtle conservation activities through the local fishermen hired by the programme. Next, it was extended to others working with the creation of economic alternatives. Finally, the establishment of visitor centres included community members working with tourists. Thus, the reconciliation of conservation activities and generation of turtle-friendly economic activities for community members is one of TAMAR's most notable achievements. In other words, endogenous local community development activities were extended by building upon the premise of conserving endangered or threatened natural resources.

TAMAR's experience demonstrates that different activities, such as protection, education, and production, when correctly integrated, can meet the social objectives of providing income and disseminating knowledge and information. These then help to create a new culture in relation to sea turtles and other living marine resources while increasing environmental awareness and preparing a new generation for the future.

A general indication of the public appreciation of TAMAR is the support evident in the result of a nationwide contest to choose one of five endangered species to illustrate two new paper currency notes. Sea turtles won the contest with thirty-five per cent of the vote, and are currently depicted on Brazil's two Reais bill. Other important general indications of appreciation for the programme are the prizes that TAMAR has received. In just 2003 these included the UNESCO prize in the category of environment, the Ernest Young prize for the enterprise of the year, and the Honours to Merit prize from the Regional Council of Biology of Brazil. In 1997 the internationally prestigious J. Paul Getty award of the WWF was granted to the programme (TAMAR 2004).

With time TAMAR has understood the importance of having a structure capable of bringing to the public reliable, interesting, and attractive information about sea turtles and their conservation. This leads to enhanced awareness and a more supportive public for sea turtle protection. TAMAR is a *project* type of organisation and, as such, is in a constant state of transformation. Its organisational activity responds to everyday difficulties and changes in circumstance. It functions as a catalytic element by inducing local development in small coastal communities. Given its *project* form of organisation, its experience, even though successful, cannot be automatically transferred to other locations as a generic model.

Even so, it is important to emphasise that TAMAR's strategy of coordinators residing full-time in local communities, has made it possible to develop a continuous learning process concerning local habits and traditions. Over the years new kinds of relationships between communities and TAMAR have developed, with the goal of creating social capital. This strategy has been essential to consolidating TAMAR's increasingly effective strategies for sea turtle protection.

Today TAMAR is a product of the effort, hard work, and collaboration of numerous people including: the technical team and direct collaborators; the fishermen, their families and community leaders; and the publicists, artists, journalists and media personnel who have always been open to disseminating the efforts to conserve sea turtles in Brazil.

Major challenges for the future include obtaining resources to be able to maintain the levels of operation developed to date and promoting greater self-sufficiency for the programme. TAMAR must also continue to nurture enhanced self-sufficiency in coastal communities, and conduct detailed socio-economic evaluations on the impacts of the various activities of the programme, particularly in relation to education, food security, and health, not to mention cultural factors. The commitment of TAMAR, thus, will remain significant for a long time and always depend on the efforts of Brazilian society, and especially coastal communities, who are the true motivation for and main component of any marine conservation programme.

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Notes

[1] www.projetotamar.com.br

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