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Article abstract

Communities, in particular traditional users of natural resources, are often concerned about threats to their livelihoods and destruction of their environments but do not have the awareness, skills and political power to control the development that comes from the tourism industry. Education and collaborative partnerships are one approach that can help destinations achieve more sustainable tourism. Looking at Chumbe Island, a small island located in the Indian Ocean channel off the coast of the semi-autonomous region of Zanzibar in Tanzania, this paper examines innovative education and multi-stakeholder partnerships that have helped to avoid negative environmental and social impacts on the communities who live in the area. The environmental education programs, employment and capacity building of the Chumbe Island Coral Park Project will be focused upon.

Eco-tourism for Education and Marine Conservation

The Chumbe Island Coral Park in Zanzibar

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ABSTRACT: Communities, in particular traditional users of natural resources, are often concerned about threats to their livelihoods and destruction of their environments but do not have the awareness, skills and political power to control the development that comes from the tourism industry. Education and collaborative partnerships are one approach that can help destinations achieve more sustainable tourism. Looking at Chumbe Island, a small island located in the Indian Ocean channel off the coast of the semi-autonomous region of Zanzibar in Tanzania, this paper examines innovative education and multi-stakeholder partnerships that have helped to avoid negative environmental and social impacts on the communities who live in the area. The environmental education programs, employment and capacity building of the Chumbe Island Coral Park Project will be focused upon.

Key words: Tanzania, sustainability, livelihoods, conservation, management, environment, education.

Sustainable tourism is supposed to be an industry that has a low impact on environment and local culture, while helping to generate income, employment, and conservation of local ecosystems. In many coastal destinations around the world, however, tourism has had negative consequences on the sustainable use of resources, which in turn has had an effect on ecosystem integrity (Gössling, 2001; Kerr, 2005; Graci and Dodds, 2010). Although many coastal communities survive on fishing as their main form of livelihood, many areas have little evidence of traditional coral reef management and conservation. When reefs have been damaged from overfishing, destructive fishing methods and pollution, many third world communities are hoping for tourism to become a source of revenue (as most tourism is from foreign investors) (McClanahan *et al.*, 1999; Svensson *et al.*, 2009; Riedmiller, 1998). While coastal tourism investors are often attracted by healthy ecosystems and have thus an intrinsic interest in marine conservation, tourism proceeds are not often reinvested into sustainability practices and also provide limited benefits to local communities. As a consequence, natural areas often suffer degradation from “conflicting interests between different user groups, particularly traditional users and tourism” (Riedmiller, 1998: 222). Sustainable tourism requires cooperation and concrete

partnerships among actors that include the tourism industry, government at all levels, local communities, protected areas managers and planners, and the tourists themselves (Eagles *et al.*, 2002 : 49). The purpose of this paper is to outline an innovative partnership that has enhanced education and contributed to a sustainable livelihoods approach. The sustainable livelihoods approach (SLA) is a development framework centered on people and their livelihoods. Defined by Chambers and Conway (1992 : 6):

livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term.

According to the Department of Foreign and International Development (Ashley and Carney, 1999: 7), sustainable livelihood principles should be:

- people centered;
- responsive and participatory;

- multi-level;
- conducted in partnership;
- sustainable; and
- dynamic.

A central challenge of tourism, from which many others stem, is finding a balance between increasing the number of visitors while benefiting locals and preserving the uniqueness of the destination (Lebe and Milfelner, 2006). Some see the sustainable livelihoods approach as a more practical approach to tourism development as this approach focuses on people rather than the resources they use, and provides a new perspective on sustainable tourism (Tao and Wall, 2008; Graci and Dodds, 2010). Using the sustainable livelihoods approach principles, this case study will focus on innovations in education and partnerships in sustaining both a tourism destination as well as providing alternative, sustainable livelihoods for local communities.

Research Setting: Chumbe Island Coral Park, Tanzania

The islands of Zanzibar in Tanzania have experienced rapid tourism growth (see table 1), which has put pressure on freshwater and fishing resources, affecting the well being of the local population as well as the tourism industry (Gössling, 2001; Steck *et al.*, 2010). Issues affecting conservation and tourism management in the area include illegal and destructive fishing, pollution problems on land and in the sea, and a lack of management of the coastal and marine area (McClanahan *et al.*, 1999; Svensson *et al.*, 2009; Riedmiller, 1998; Steck *et al.*, 2010).

Overuse of land and natural resources in the region has caused erosion, biodiversity loss and ecosystem impoverishment (Larsen, 2008). In addition, tourism has had considerable impacts on livelihood security of women and men in local communities, as there have been no key institutional changes adopted in order to protect the interests of people in local communities and to make sure that people will benefit from tourism. Furthermore, because people in coastal zones tend to lose access to the coast because of tourism, basic livelihoods become increasingly insecure as property rights are not well defined, acknowledged and protected by governmental institutions (Larsen, 2008; Riedmiller, 1998). There is limited allocated funding for conservation, as well as limited

transparency and accountability on the use of funds, and there is also no tax or other incentives for conservation. The traditional system of reserve administration in Zanzibar has been to deposit revenue accrued from protected areas in the treasury rather than allocating monies for park management and community development (Makame and Boon, 2008). Awareness of conservation issues is also limited. For example, in the national language of Swahili, Kiswahili corals were traditionally referred to as 'rocks and stones'. Coral reef ecology and marine conservation have not traditionally been covered in school syllabi and children, in particular, girls do not learn to swim or snorkel. These problems outline the need for education about conservation and community development as well as about sustainability in general.

Chumbe Island Coral Park

Chumbe Island Coral Park Ltd (CHICOP), a privately established and managed marine park, and ecotourism destination, is located in the Indian Ocean channel off the coast of the semi-autonomous region of Zanzibar. Chumbe is an uninhabited fossil coral island of approximately 22 ha, covered by coral rag forest and bordered on its western shore by a fringing coral reef of exceptional biodiversity and beauty (www.chumbeisland.com).

CHICOP has created a private nature reserve with a 33 ha Reef Sanctuary and 22 ha Forest Reserve. The Chumbe Reef Sanctuary is one of the most pristine in the region, with over 420 fish species and 200 species of hard corals (Nordlund and Walther, 2011). As a tourism destination, the concept for development was to combine simple luxury and environmental education. It offers a high-end yet simple experience with a visitor centre and a small eco-lodge of seven basic bungalows for overnight guests. Nature trails, guided walks to historical sites on the island and guided snorkeling in Chumbe's marine protected area are offered. All buildings and operations are based on state-of-the-art eco-technology aiming at zero impact on the environment (CICP, undated). Local building technologies, materials and spatial designs maximize space and natural ventilation, and composting toilets were installed to avoid sewage. Rainwater is collected and stored to be used for showers, and vegetative grey-water filtration systems absorb nutrients (mainly phosphates and nitrates from showers and dish washing) before the water enters the ecosystem. Hot water and all energy requirements are supplied by solar and photovoltaic panels (Riedmiller, 1998).

CHICOP's objectives are:

to create a model of sustainable conservation area management, where ecotourism supports conservation and education. Profits from the tourism operations are to be re-invested in conservation area management and free island excursions for local schoolchildren (Chumbe Island, 2009).

The success of CHICOP as an example of sustainable conservation area management and tourism is evident from the number of awards that have been won. Over the past 13 years, CHICOP has received international recognition including but not limited to: the Tourism for Tomorrow Awards (1999), The International Coral Reef Initiative 'Good

Table 1: International Visitor Arrivals - Zanzibar.

Year	Total
1985	20 000
1990	42 141
1995	56 415
2000	97 165
2004	92 161
2005	113 237
2007	140 000

Source : Zanzibar Commission for Tourism (2006); and Steck *et al.* (2010: 2).

Practice' Award (2002), Best Institution in the Protection and Conservation of Marine Natural Environment (2004), World's Leading Conservation Company (2009) and Certified Long Run Destination (2011). The achievements of CHICOP have also been widely acknowledged by international conservation organizations, amongst them the World Conservation Union (IUCN), the World Wide Fund for Nature (WWF), UNESCO-Directorate for Environment and Development in Coastal Regions and Small Islands (CSI) and the United Nations Environment Programme (UNEP). Last but not least, the work of CHICOP towards the sustainable management and protection of the Chumbe coral reef has now also been recognized by the UN Secretary General in his report to the General Assembly on Protection of coral reefs for sustainable livelihoods and development, in preparation for the Rio+20 – United Nations Conference on Sustainable Development 4-6 June 2012.

Methodology

This research used a case study approach to determine key factors for success in developing partnerships for sustainable livelihoods in the region. Data for this project was collected using a multi-method research approach with a combination of primary and secondary data including a literature review and stakeholder interviews. A qualitative approach was used in this step, as the subjects of interest are data rich sources of information and opinions about sustainable tourism would not have been adequately captured using a quantitative method. In addition, the aim of this research was to explore the pragmatic reasons why adoption of certain practices did or did not occur and a qualitative approach allowed for some of the subtler issues to be explored. In contrast, a qualitative approach, which requires justification or explanation of responses, was used to draw out these elements. First, an in-depth literature review was undertaken and then interviews were conducted with the project initiator as well as staff on the island to supplement information gained in the literature review. Questions included determining issues and constraints to development and operations as well as initiatives and activities undertaken to work towards sustainable tourism. Specific lessons learned and key criteria for success were also determined. Interviews and research was conducted in 2008 and 2012.

Discussion: Innovations in Education and Partnerships

The sustainable livelihoods approach can provide a new perspective on sustainable tourism as the approach focuses on people rather than resources they use and their constraints are expressed by the people themselves. Sustainable livelihoods have a core focus on the community though in this approach the "stress is on understanding and facilitating the link through from the micro to the macro, rather than working only at the community level" (Ashley and Carney, 1999: 4). CHICOP demonstrates an innovative approach to marine conservation combined with tourism development through a people centered, dynamic, sustainable and multi-level partnership approach.

The project initiator was Sibylle Riedmiller who leased Chumbe Island in 1991 to promote effective marine park management, awareness for marine conservation and sustainable tourism management. Sibylle, a German national who had been working in Tanzania as manager and consultant for donor aid projects from the early eighties, fell in love with the tropical sea and became an enthusiastic sailor, diver and amateur marine biologist. In 1990, after concluding a consultancy on environmental education in Zanzibar, she developed a proposal for a small marine park that would help conserve a pristine coral reef, offer environmental education for both the local population and foreign visitors and generate management funds through genuine ecotourism. Disillusioned with the failure of most aid and conservation programs implemented through government in the country, she felt that the private sector had an important role to play in the future of sustainable nature conservation in Tanzania. Her over 20 years of experience as aid project manager in the education sector helped in program negotiations and management.

Chumbe Island was one of the last relatively pristine and uninhabited coral islands in the region. As fishing was restricted off the western side of the island because small boats under sail would have interfered with the neighboring shipping channel to Dar es Salaam (the capital of mainland Tanzania), fishing pressure was limited and the island thus seemed an ideal place for the creation of a marine park that also provided education to and cooperated with local fishermen.

Sibylle founded CHICOP in 1991, which turned Chumbe Island and its western fringing reef into Tanzania's first marine park. CHICOP is now a financially self-sustaining conservation initiative run by a limited company with non-profit objectives, where income from visitors is re-invested into park management and education programmes (Lanshammar, 2007). Since 2000, the organization is financially sustainable. After ten years of commercial operations, occupancy levels increased from 13% in 1998 to approximately 85% in 2008 and annual turnover has reached about \$ 600,000 USD. Investment needed for CHICOP was approximately 1.2 million US dollars from 1991-1998 (Reidmiller, 2012, personal communications). The project initiator, Sibylle, financed half of the money, 25% were small donor grants for non-commercial project components and the remaining amount was professional work contributed by over 50 volunteers (Riedmiller, 1991 and 1998). From an economic standpoint, the island is also doing well. Though CHICOP employs three times more staff than the international average for ecolodges (IFC, 2004), an occupancy rate of 40% is sufficient to finance park operations.

Participatory Partnerships

The entire concept of CHICOP is based on sustainable park management through environmental education and ecologically and socially responsible tourism. In order to avoid the common conflicts between conservation initiatives and traditional resource users, CHICOP sought partnerships with local communities through village meetings



Figure 1 : Khamis Khalfan, ranger at the Chumbe Island Coral Park is the Environmental Educator and Assistant Head Ranger. He has worked with Chumbe Island for over 10 years and is a key person in our environmental education programme. The crab next to him is a Coconut Crab (*Birgus latro*). Chumbe Island hosts possibly the world's largest known population this giant land crab that is listed as data deficient in the IUCN Red List (source : Courtesy of Chumbe Island Coral Park).

before and during development. Seven departments of the Government of Zanzibar became partners in the four years of negotiations over the investment proposal. An Advisory Committee was formed for long-term partnerships with those Government departments, universities and village representatives, and a Management Plan for the reserve was developed for 1995-2005 (Castle and Mileto, 1995) and updated for 2006-2016 (Carter, 2006), with wide stakeholder participation. Extensive meetings were held with a wide variety of stakeholders including CHICOP staff, the concerned Government departments, representatives of NGO's and other environmental projects, local fishermen and private diving companies.

Constant monitoring and evaluation have also helped report progress. CHICOP issues quarterly and yearly progress reports on park management and business operations to all respective sectoral Government departments. Chumbe also actively monitors the marine park. Studies and reports on fishes, corals, amphibians and reptiles, birds, bats, butterflies and vascular plants have been produced to establish the conservation value and document the terrestrial and marine resources of Chumbe Island species lists for baseline data (Nordlund and Walther, 2011). Research is jointly conducted with the Institute of Marine Sciences of the University of Dar es Salaam and the Departments of Environment, Forestry and Fisheries respectively. Studies are also regularly conducted by visiting researchers from both national and international institutions, and both graduate and Ph.D. studies have used Chumbe as a base (Knudby *et al.*, 2009; Bronstein and Loya, 2011; Knudby and Nordlund, 2011).

Training to increase alternative livelihoods

A livelihood is deemed sustainable when it "can cope with and recover from stresses and shocks and maintain or enhance its capabilities, assets, and activities [...] while not undermining the natural resource base" (Serrat, 2008: 15). CHICOP demonstrates this approach by maintaining a strong connection of the park to neighboring communities by training and employing former fishermen as Park Rangers, as well as offering marine rescue services to local fishermen in distress, e.g. when sails and engines are broken and boats capsize in rough weather. A regular market is also provided for a wide variety of goods and services, e.g. the transport of visitors on land and sea is sourced out to local people. Most staff on the island are Zanzibaris from local fishing communities (see figure 1). CHICOP employs 43 locals, half of them on the island and the other half in the administration headquarters in Zanzibar.

Many former fishermen have been trained over two decades and eight were employed as Park rangers who spend shifts of two weeks on the island and then one week back in their villages (Lanshammar, 2007). When patrolling the borders of the Reef sanctuary around the island, they educate local fishers about the reasons why protecting coral reefs is important for sustainable fisheries. While catches around Zanzibar have been steadily declining in Zanzibar over the past decades due to overfishing and reef degradation, fishers report an increase of harvests in reefs in the vicinity of the Chumbe no-take zone caused by the so-called spill-over effect (Tyler, 2006) which only occurs when no-take-zones are enforced effectively.

Environmental education for the community is also provided through workshops held for the local community. CHICOP collaborates with local NGOs to hold seminars for young fishers in sustainable fishing practices and conservation. For example, sixty young fishers attended a three-day workshop about sustainable fishing practices, laws and regulations regarding fishing practices and marine conservation areas, and the benefits of marine protected areas.

Through their employment with CHICOP, Rangers now manage the protection of the reserve and produce daily reports on any incidents and observations within the Reef Sanctuary and the Forest Reserve. Two of the Rangers have also learned scuba diving and were the first East Africans to witness the nocturnal coral spawning (coral reproduction process) observed in 1994 (Graci and Dodds, 2010).

The Rangers are also involved in numerous research projects conducted on the island and have been trained to guide visitors for snorkeling in the Reef Sanctuary and for educational walks in the intertidal area and the Forest Reserve. Educational materials have been developed and biological reference literature and laminated fish guides for underwater use have been developed. Chumbe guests also form a large part of the education program as they learn about and enjoy a participatory experience of conservation, education and meeting local people that makes Chumbe Island a unique destination. In order to stem the continuing destruction of the coral reefs of Zanzibar, visitors are actively discouraged from buying corals and shells in local markets.

Multi-level education

This environmental awareness creation, education and training initiative within the community to provide skill development served to gain respect from fishermen (as there was no such service in Tanzania) and now Chumbe's Rangers also act as community educators. A key role of the Rangers is to lead school excursions within the Chumbe Education Program (Chumbe Island, 2009).

The Chumbe Education Program uses revenue from tourism to support conservation area management and provide environmental education to local schoolchildren and their teachers (see figure 2). CHICOP sponsors local schools to visit the island. Mainly geared towards passing examinations, school education in Zanzibar is highly academic with few experiential elements relating to the outside world and currently does not yet provide environmental education on marine issues. As extra-curricular activities such as field excursions are rarely organized, and as pupils and teachers also haven't learned swimming and snorkeling, very few children and teachers have ever seen coral reefs (Riedmiller, 1991; Riedmiller, 2003).

The excursions consist of a one-day guided field trip to Chumbe Island where informal, hands on environmental education for schoolchildren is provided, and at the same time give accompanying teachers insight in how to teach practical field based environmental education (Lanshammar, 2007).

Teaching materials are developed to suit the school syllabus and appropriate levels of understanding of participants and students. Teachers provide feedback to the Park rangers

and the CHICOP Education Coordinator by participating in the activities and then filling out the worksheets provided (Lanshammar, 2007). The worksheet has shown to be a great tool for the students as well as the teachers to learn more about coral reef ecology back in the classroom. By 2011, over 5000 school children and 850 teachers had visited Chumbe Island.

The success of this program has spread. In 2001, CHICOP's module on "The Coral Reef" was accepted by the Ministry of Education as an official teaching aid in schools. The program now includes in-service teacher training workshops and evaluation seminars, to enable teachers to link field-learning experiences with the Science syllabi (CICP, not dated, a). Now the teacher training college conducts regular classes on Chumbe Island for all trainee teachers in Zanzibar every year, and the Ministry of Education encourages teachers to introduce environmental education through fieldwork.

Partnerships and collaboration with many stakeholders were decisive. Start up phases received support from the Marine Education, Awareness and Biodiversity Program (MEAB WWF), the Wildlife and Environment Society of South Africa (WESSA), and the US-National Fish and Wildlife Foundation (NFWF). The program was also supported by International Coral Reef Action Network (ICRAN) and the South African Development Cooperation – Reef Environmental Education Program (SADC-REEP) (Chumbe Island, 2009). In 2010, CHICOP implemented an environmental education and conservation expansion project with funding of the European Union regional programme for the sustainable management of the coastal zones of the countries of the Indian Ocean (ReCoMap). In consultation with scientists, experts, educators and government a localised Environmental Education guidebook on 'Environmental Sustainability in Zanzibar' was produced in Kiswahili and English for use in formal and non-formal education in Zanzibar. Furthermore, a community outreach team trained peer educators for a wide range of groups, men and women of different ages, in particular, teachers, seaweed farmers, fishermen, invertebrate collectors, firewood collectors, charcoal makers and people already engaged in conservation activities. These gained more knowledge, skills and understanding to help with environmental awareness and education with children, youth and adults using non-formal education techniques. Ten coastal communities in Southern Zanzibar gained more understanding of environmental issues that affect them and some continue to be actively engaged in some sort of coastal zone management in their communities.

CHICOP started work with the Ministry to develop modules for subjects ranging from Eco-tourism and Biodiversity conservation to Eco-technology, the concept of Sustainability and Climate Change. These will be put together in a course manual of exemplary teaching units for all secondary school teachers in Zanzibar, to advise and provide information about field-based education. The vision is that "this will give teachers and students a concrete model on how to make classroom teaching more relevant to the environment, and create awareness on coral reefs and coral island ecology that is badly needed in Zanzibar" (CICP, not dated, b). This fits within the over-arching goal of CHICOP as educational and



Figure 2 : School excursion program on Chumbe with ranger Khamis Khalfan. Before the school children are taken to the reef, they are taught how to use mask and snorkel, and they also practice how to float with the lifejackets in shallow water. The majority of the kids have never snorkelled before, hence this practical snorkel introduction is important and also very exciting for the kids (can only be topped once they are out in the reef and see fish and corals) (source : Courtesy of Chumbe Island Coral Park).

commercial activities related to the sustainable management and non-consumptive use of the natural resources that are the main mandates.

Conclusion

Through effective conservation area management aided by a sustainable livelihoods approach, CHICOP shows that, through partnership and education, a marine protected area can also become a successful sustainable tourism destination. The Reef Sanctuary has become one of the most pristine coral reefs in the region with over 420 fish species and 200 species of hard corals – 90% of all recorded in East Africa, and the Chumbe reserve is one of the last remaining pristine coral rag forests (Riedmiller, 2005; Fiebig, 1995; Beentje, 1990). Important elements of conservation education are brought to schools and many fishermen have gained awareness and new skills. The Chumbe Education Project revolutionized the way Zanzibari students and the general public learn about and relate to their local environment.

There are a number of lessons that can be learned from CHICOP for other destinations. First, conservation initiatives of biodiversity in Marine Protected Areas will only succeed if they are linked up with broader strategies for sustainable development and local communities and when other key stakeholders are involved in their establishment and management (Francis *et al.*, 2002). Second, extensive work with government agencies in establishing the park has enhanced the understanding of environmental issues among local and national authorities. Third, although investment in conservation and environmentally sound technologies, as well as investment in the employment and training of additional staff for park management and environmental education programs raises costs, it also enhances the guest

experience and is very popular among visitors. CHICOP is now widely acknowledged in the conservation community and tourism industry as a success story and has shown that this model can be fully self-funded. Fourth, conservation area management can be entrusted to non-public and private entities. Private management of a marine reserve and tourism destination can be efficient and cost-effective, and also contribute to sustainable livelihoods and well being of local people. Perhaps most importantly, and to encourage similar investments, a conducive socio-political investment climate as well as conservation-minded investors with a long-term vision, patience and dynamic leadership are required. ■

Note

- 1 Special thanks to Sibylle Reidmiller for her insight and contribution.

References

- ASHLEY, Caroline and Diana CARNEY (1999) *Sustainable Livelihoods: Lessons from Early Experience*. DFID Department for International Development, London, 55 p.
- BEENTJE, H.J. (1990) *A Reconnaissance Survey of Zanzibar Forests and Coastal Thicket*, Report for the Department of Environment, Commission of Lands and Environment, under the Zanzibar Integrated Land Use Project. Finnida-Cole, Zanzibar. 34 p.
- BRONSTEIN, O. and Y. LOYA (2011) Daytime Spawning of *Porites* on the coral reefs of Chumbe Island, Western Indian Ocean (WIO), *Coral Reefs*, vol. 30, n° 2, p. 441
- CARTER, E. (2006) *Chumbe Island Marine Protected Area, Management Plan 2006-2016*, CHICOP, ICRAN, FFI, E&D Consulting, Zanzibar/Tanzania.
- CASTLE, G. and R. MILETO (1995) *Chumbe Island Coral Park: Marine Park & Forest Reserve, Zanzibar: Management Plan 1995-2005*. BESO/CHICOP, Zanzibar/Tanzania.

- CHAMBERS, Robert and Gordon R. CONWAY (1992) "Sustainable Rural Livelihoods: Practical Concepts for the 21st Century", IDS Discussion Paper 296, University of Sussex, Institute of Development Studies, Brighton. 29 p.
- Chumbe Island Coral Park (2009) "The Chumbe Island Coral Park Project in Zanzibar/Tanzania: Saving a Pristine Coral Island for Future Generations", <www.chumbeisland.com>, retrieved on March 01, 2012.
- CICP – Chumbe Island Coral Park (not dated, a) "Chumbe Island Coral Park", Chumbe Island Coral Park, <www.chumbeisland.com>, retrieved on March 1, 2012.
- CICP – Chumbe Island Coral Park (not dated, b) "Teacher training", Chumbe Island Coral Park, <http://chumbeisland.com/education-program/teacher-training/>, retrieved on March 1, 2012.
- EAGLES, Paul F. J.; Stephen F. MCCOOL and Christopher D. HYNES (2002) *Sustainable Tourism in Protected Areas: Guidelines for Planning and Management*. Glands (Switzerland) and Cambridge (UK): IUCN. 183 p.
- FIEBIG, S. (1995) "Fish Species List and Management Report on the Chumbe Reef Sanctuary".
- FRANCIS, Julius; Agneta NILSSON and Dixon WAREUNGA (2002) "Marine Protected Areas in the Eastern African Region: How Successful Are They?", *Ambio*, vol. 31, n° 7-8, p. 503-511
- GRACI, Sonya and Rachel DODDS (2010) *Sustainable Tourism in Island Destinations*. Earthscan, London. 248 p.
- GÖSSLING, Stefan (2001) "The Consequences of Tourism for Sustainable Water Use on a Tropical Island: Zanzibar, Tanzania", *Journal of Environmental Management*, vol. 61, n° 2, p. 179-191.
- IFC – International Finance Corporation (2004) *Ecologies: Exploring Opportunities for Sustainable Business*, International Finance Corporation, Washington DC. 62 p.
- KERR, Sandy A. (2005) "What is Small Island Sustainable Development About?", *Ocean and Coastal Management*, vol. 48, n° 7-8, p. 503-524.
- KNUDBY, Anders; Candace NEWMAN; Yohanna SHAGHUDE and Christopher MUHANDO (2009) "Simple and Effective Monitoring of Historic Changes in Nearshore Environments Using the Free Archive of Landsat Imagery", *International Journal of Applied Earth Observation and Geoinformation*, vol. 12, n° 1, p. 116-122.
- KNUDBY, Anders and Lina NORDLUND (2011) "Remote Sensing of Seagrasses in a Patchy Multi-Species Environment", *International Journal of Remote Sensing*, vol. 32, n° 8, p. 2227-2244.
- LANSHAMMAR, Frida (2007) "Environmental Education in Tanzania – Chumbe Island as a case study", The Nature Conservancy, <http://www.mcatoolkit.org/Field_Projects/Field_Projects_Tanzania.html>, retrieved on March 01, 2012
- LARSEN, Kjersti (2008) "A Case Study on Tourism, Economic Growth and Resource Management in Zanzibar, Tanzania", *The World Bank / WBI's CBNRM Initiative*. <<http://srdis.ciesin.columbia.edu/cases/tanzania-013.html>>, retrieved on March 01, 2012
- LEBE, Sonja Sibila and Borut MILFELNER (2006) "Innovative organization approach to sustainable tourism development in rural areas", *Kybernetes*, vol. 35, n° 7/8, p. 1136 – 1146.
- MAKAME, Makame Kitwana and Emmanuel Kwesi BOON (2008) "Sustainable Tourism and Benefit-Sharing in Zanzibar: The Case of Kiwengwa-Pongwe Forest Reserve", *Journal of Human Ecology*, vol. 24, n° 2, p. 93-109.
- MCCLANAHAN, T. R.; N.A. MUTHIGA; A.T. KAMUKURU; H. MACHANO and R. W. KIAMBO (1999) "The effects of marine parks and fishing on coral reefs of Northern Tanzania", *Biological Conservation*, vol. 89, n° 2, p. 161-182.
- NORDLUND, Lina Mtwana and Anita WALTHER (2010) Chumbe Island Coral Park – Conservation and Education programme, Status report 2010. <http://www.chumbeisland.com/fileadmin/downloads/pdf/Status_report_2010.pdf>, retrieved on March 01, 2012.
- RIEDMILLER, Sybille (1991) "Environmental Education in Zanzibar : Proposals for Action", Department of Environmental, Finnida, Zanzibar.
- RIEDMILLER, Sibylle (1998) "The Chumbe Island Coral Park Project: Management Experiences of a Private Marine Conservation Project". *ITMEMS Proceedings*, p. 222-235
- RIEDMILLER, Sibylle (2003) "Private sector investment in marine protected areas – experiences of the Chumbe island coral park in Zanzibar/ Tanzania", paper submitted at the 5th World Parks Congress, Sustainable Finance Stream. Durban, South Africa.
- SERRAT, Olivier (2008) The Sustainable Livelihood Approach. ADB, *Knowledge Solutions*. Asian Development Bank, Manila. p. 15-19. <<http://www.adb.org/sites/default/files/pub/2008/sustainable-livelihoods-approach.pdf>>, retrieved on March 01, 2012.
- STECK, Birgit; Kenneth WOOD and Julia BISHOP (2010) Tourism, More Value for Zanzibar. Value Chain Analysis, Summary Report. <http://www.snvworld.org/sites/www.snvworld.org/files/publications/tourism_-_more_value_for_zanzibar.pdf>, retrieved on March 01, 2012
- SVENSSON, Patrik; Lynda D. RODWELL and Martin J. ATTRILL (2009) "Privately Managed Marine Reserves as a Mechanism for the Conservation of Coral Reef Ecosystems: A Case Study from Vietnam", *Ambio*, vol. 38, n° 2, p. 72-78.
- TAO, Teresa C. H. and Geoffrey WALL (2008) "Tourism for Marginal Groups: Tourism as a Livelihood Strategy in an Indigenous Community in Taiwan. Sustaining Quality of Life through Tourism", *BEST Education Network Think Tank VIII*, <<http://www.besteducationnetwork.org/ttviii/pdf/Tao%20Wall.pdf>>, retrieved on March 01, 2012.
- TYLER, Elizabeth H. M. (2006) *The Effect of Fully and Partially Protected Marine Reserves on Coral Reef Fish Populations in Zanzibar, Tanzania*, Zoology Department, University of Oxford, Oxford. 430 p.
- ZANZIBAR COMMISSION FOR TOURISM (2006) Zanzibar Tourism Sector Profile, <<http://www.tanzaniainvest.com/tanzania-tourism-and-travel/reports/54-reports/89-zanzibar-tourism-sector-profile>>, retrieved on March 01, 2012.

Personal Communications

- REIDMILLER, Sibylle (2012), Game warden, Chumbe Island Coral Park Ltd, Interviewed on many occasions.