



**UNIVERSIDADE FEDERAL DA BAHIA
INSTITUTO DE BIOLOGIA**



**PROGRAMA DE PÓS-GRADUAÇÃO EM
ECOLOGIA E BIOMONITORAMENTO**

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**ESTUDO INTEGRADO DE AVALIAÇÃO DA CAPACIDADE DE CARGA DO
TURISMO DE OBSERVAÇÃO DE BALEIAS NA PRAIA DO FORTE, LITORAL
NORTE DA BAHIA**



Foto: Luena Fernandes

Salvador – Bahia

Outubro 2016

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NORTE DA BAHIA**

Trabalho apresentado ao Programa de Pós-graduação em
Ecologia e Biomonitoramento da Universidade Federal da Bahia,
como parte dos requisitos para a obtenção do Título de Mestre em
Ecologia Aplicada à Gestão Ambiental.

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Salvador – Bahia
Outubro 2016

Fernandes, Luena

Estudo integrado de avaliação da capacidade de carga do turismo de observação de baleias na Praia do Forte, litoral norte da Bahia / Luena Fernandes. -- Salvador, 2016.

78 f. : il

Orientador: Marcos Rossi-Santos.

Coorientador: Charbel El-Hani.

Dissertação (Mestrado - Profissional em Ecologia Aplicada à Gestão Ambiental) -- Universidade Federal da Bahia, Instituto de Biologia, 2016.

1. turismo de observação de baleias. 2. capacidade de carga. 3. manejo sustentável. 4. baleia-jubarte. I. Rossi-Santos, Marcos. II. El-Hani, Charbel. III. Título.

Dedicatória

Dedico à minha filha Nalu Maitê, na esperança que ela possa sempre desfrutar de momentos incríveis na companhia de baleias e outras maravilhas do mundo natural.

“...There in is the tragedy. Each man is locked into a system that compels him to increase his herd without limit – in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.”

Hardin, G. 1968. *The Tragedy of the Commons*.

“For I believe that the principal gift that whales offer humanity is that they are the only animals that can impress us enough to persuade us to change our minds about the importance of the wild world.”

Payne, R. 1995. *Among Whales*.

Agradecimentos

Sem dúvida alguma o meu amor pelo mundo natural e seus seres incríveis vem dos meus pais, os dois amantes da natureza, cada um do seu jeito. Então agradeço diariamente a eles que me ensinaram a valorizar a vida. Nisto está também incluído meu avô Roger, amante incondicional de todos os seres vivos, botânico, professor e agricultor. Grande exemplo em minha vida!

A minha jornada pessoal e profissional com as grandes baleias-jubarte se iniciou na Praia do Forte, Bahia, junto à equipe do Instituto Baleia Jubarte. Então agradeço a todos que contribuíram para o meu aprendizado e desenvolvimento, em especial Clarêncio Baracho, que me “contagiou” com a paixão pelas baleias, Sérgio Cipolotti, que me passou seu conhecimento e entusiasmo pelo turismo de observação, Enrico Marcovaldi, que sempre acreditou em mim e no meu trabalho, e todos os companheiros de trabalho ao longo desses anos: Fábio Lima, Elitieri Neto, Luciana Leite, Roberta Roveri, os muitos estagiários, ecovoluntários e parceiros.

Agradeço à Márcia Engel, pela oportunidade de desenvolver este estudo e confiança no meu trabalho. A David Lusseau, Milton Marcondes e José Truda Palazzo, pelas conversas produtivas sobre o tema. E Roberta Lana, por todo o apoio administrativo ao trabalho das diferentes equipes do Instituto Baleia Jubarte.

Ao Projeto Tamar, por viabilizar e disponibilizar todo o apoio logístico e financeiro para a realização desta edição do Mestrado Profissional na Praia do Forte. Em especial à Neca Marcovaldi, fonte de inspiração e a quem eu muito admiro, pela oportunidade, confiança, apoio e compreensão. Muito obrigada! A toda a equipe Tamar, em especial Mazinho, Thaís, Gustavo, Flávia, Erika, Gonzalo, que seguraram as pontas na minha ausência para que eu pudesse me dedicar ao Mestrado. Ao Guilherme Maurutto, que sempre nos ajuda com a confecção de mapas e análises de dados.

Ao Programa de Pós-graduação em Ecologia e Biomonitoramento da Universidade Federal da Bahia, em especial a todo o corpo docente do Mestrado Profissional em Ecologia Aplicada à gestão! E a todos os colegas de turma, companheiros dessa jornada de aprendizado, desafios e conquistas!

Ao meu orientador, colega e amigo, Marcos Rossi-Santos, por toda a paciência, amizade, incentivo e contribuição para esta etapa do meu desenvolvimento acadêmico. Muito obrigada! Não teria conseguido sem você.

A todas as equipes das operadoras de turismo de Praia do Forte: Centro Turístico, Bahia Adventure, Porto Mar, Abrolhos Turismo, Base Náutica e EmyTour, pela parceria e por possibilitar a coleta de dados a bordo de suas embarcações para desenvolvimento deste e muitos outros trabalhos ao longo dos anos. A todos os turistas que voluntariamente respondem a questionários sobre sua experiência observando baleias.

À minha mãe, que sempre confiou em mim e me apoiou, de perto ou de longe, nas minhas andanças, e à minha irmã Tania, amor incondicional. Te admiro muito. E, acima de tudo, ao Osmar e à Nalu, meus maiores amores, que sempre acreditam em mim e me apoiam, e suportam minha ausência durante todo este processo. Não teria conseguido sem vocês! **Sou muito grata por tudo e a todos!**

Resumo

O turismo de observação de baleias vem crescendo de forma acelerada nos últimos anos em Praia do Forte, nordeste do Brasil. Este crescimento levanta preocupações sobre as potenciais consequências dos distúrbios causados pelo turismo sobre os indivíduos e população alvo. Para gerir esta atividade de maneira sustentável é importante determinar sua capacidade de carga, o que requer uma compreensão das dimensões biológica, social e económica, bem como a consideração dos vários atores envolvidos e da atual capacidade de manejo e implementação existente em uma localidade específica. Aqui analisamos o estado atual do conhecimento sobre capacidade de carga do turismo de observação de baleias, com exemplos de medidas de regulação desta atividade em diversos países, e propomos uma abordagem integrada para iniciar a sua avaliação na Praia do Forte, nordeste do Brasil. Concluimos que, na Praia do Forte, atualmente esta atividade tem baixo impacto, sem evidência de efeitos biológicos deletérios para a população alvo; é economicamente viável e gera empregos e renda para a população local; tem valor educacional e os níveis de satisfação dos turistas são altos. No entanto, não há envolvimento das autoridades governamentais no manejo e fiscalização desta atividade, que depende de auto regulação por parte das operadoras e colaboração com organizações não-governamentais para o seu manejo. Adicionalmente, não se dispõe de informações específicas suficientes para determinar a capacidade de carga do turismo de observação de baleias em Praia do Forte. Portanto, sugerimos manter a atividade em seus níveis atuais até que mais estudos e capacidade de manejo adequada estejam disponíveis e fazemos recomendações para melhorar a nossa compreensão sobre os impactos desta atividade e o seu manejo sustentável nesta localidade.

Abstract

Whale-watching tourism has increased rapidly in the last few years in Praia do Forte, northeastern Brazil. This increase has raised concerns about the potential consequences whale-watching induced disturbances may have on the targeted individuals and populations. To manage this activity sustainably it is important to determine its carrying capacity, which requires an understanding of the biological, social and economic dimensions involved, as well as consideration for all stakeholders and the current management capacity in place at a specific locality. Here we analyse the current literature on whale-watching carrying capacity, with examples of whale-watching management measures from different countries, and we propose an integrated framework to begin its assessment in Praia do Forte, northeastern Brazil. We conclude that whale-watching in Praia do Forte is currently a low impact activity, with no evidence of negative biological impacts on the target whale population; it is economically viable and generates employment and income for the local community; it has educational value and visitor satisfaction levels have remained high over the years. However, there is a lack of involvement from the government agencies in law enforcement and management of this activity, which relies on self-regulation by the tourist operators and collaboration with non-governmental organizations for its management. Additionally, the information currently available is insufficient to determine the carrying capacity of whale-watching tourism in Praia do Forte. Therefore, we suggest maintaining the activity at its current level until more studies and adequate management capacity are available and make recommendations to improve our understanding of this activity's impacts and sustainable management in this locality.

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Introdução geral

O turismo é uma atividade global que vem crescendo ininterruptamente desde a década de 1950 e deve continuar aumentando cerca de 3,3% ao ano para alcançar 1,8 bilhões de chegadas internacionais ao redor do Mundo até 2030 (UNWTO, 2015).

Pelo seu potencial para contribuir com o desenvolvimento socioeconômico dos destinos, o turismo é considerado “chave para o desenvolvimento, prosperidade e bem-estar”, que gera empregos e renda e contribui para melhorias na infraestrutura (UNWTO, 2015, p.2). No entanto, o turismo também pode exercer pressão sobre ecossistemas frágeis, causando degradação ambiental e distúrbios à vida selvagem, assim como impactar o bem-estar e a cultura das populações locais (BRUMATTI, 2013; UNEP AND UNWTO, 2005) e, por isso, passou-se a discutir a sustentabilidade dessa atividade.

O turismo sustentável é definido como: “Turismo que leva em consideração os seus impactos econômicos, sociais e ambientais presentes e futuros, considerando as necessidades dos turistas, da indústria, do meio ambiente e das comunidades” (UNEP and UNWTO, 2005, p.12). O turismo pode ter um papel significativo no desenvolvimento sustentável pois proporciona a interação entre os visitantes, as populações locais e o meio ambiente, promovendo uma maior consciência sobre as questões ambientais e as diferenças culturais, o que pode afetar as atitudes e preocupações das pessoas quanto à sustentabilidade, não apenas durante a viagem mas em suas vidas (HIGHAM; CARR, 2002; ZEPPEL; MULOIN, 2008). Mas, para isso, não é necessário apenas mitigar os impactos negativos da indústria, mas também buscar formas de geri-la e controlá-la de forma a trazer benefícios econômicos e sociais para as

populações locais, aumentar a consciência ambiental e apoiar a conservação dos recursos naturais (UNEP AND UNWTO, 2005).

Ao longo das últimas décadas, nesta busca por um turismo mais consciente, cada vez mais os turistas se interessam em aprender sobre história, cultura e vida selvagem (LÜCK, 2016). A procura por oportunidades para interagir com a natureza e animais selvagens em seu habitat natural também vem crescendo (ORAMS, 2001), seja pelo aumento na frequência com que os assuntos ambientais são abordados pela mídia, ou pela dissociação da natureza que as nações industrializadas vêm experimentando (REYNOLDS; BRAITHWAITE, 2001). Dentro deste contexto surgiu o Ecoturismo, definido como: “Viagem responsável a áreas naturais que preserva o meio ambiente, sustenta o bem-estar das comunidades locais e envolve interpretação e educação” (THE INTERNATIONAL ECOTOURISM SOCIETY, 2015). Uma das práticas turísticas coerente com esta proposta é o turismo de observação da vida selvagem. Esta modalidade tem um papel significativo e crescente na indústria do turismo e gera benefícios econômicos diretos e indiretos para muitas populações, especialmente em países em desenvolvimento (TAPPER, 2006).

O turismo de observação da vida selvagem envolve a observação ou interação com animais selvagens. Refere-se exclusivamente a atividades não extrativas, como a observação, fotografia, interação ou, em alguns casos, toque ou alimentação dos animais, ao contrário de outras formas de turismo de vida selvagem que envolvem o consumo, como a pesca ou caça (adaptado da definição da Convenção sobre Espécies Migratórias 1979). Neste contexto, o turismo de observação de baleias vem se desenvolvendo como uma forma de ecoturismo, alternativa sustentável à caça destes

animais, e com o potencial para apoiar as economias locais e promover a educação ambiental e conservação das baleias (WEARING et al., 2014).

O turismo de observação de baleias, ou *whale-watching* em inglês, é definido como: “Qualquer atividade comercial que permita ao público observar cetáceos (baleias, golfinhos e toninhas) em seu ambiente natural” (HIGHAM; BEJDER; LUSSEAU, 2009; IWC, 1994). Teve seu início na década de 1950, na costa da Califórnia, Estados Unidos (HOYT, 1995), e vem crescendo de forma acelerada em demanda e números de visitantes desde os anos 1980 (HOYT, 1995, 2001, 2007). De acordo com as estatísticas mundiais mais recentes, a atividade de observação de baleias rende cerca de US\$2,1 bilhões por ano, envolve 13 milhões de turistas, ou observadores de baleias, anualmente e gera cerca de 13.000 empregos (O’CONNOR et al., 2009).

Na escala global, esta atividade vem crescendo uma média de 3,7% ao ano, pouco abaixo do crescimento global do turismo (4,2% ao ano); mas na escala regional, por exemplo, na América do Sul, este crescimento tem sido bem superior ao do turismo em geral, com cerca de 10% ao ano (O’CONNOR et al., 2009). Quase todos os países deste continente desenvolvem a observação de baleias e o Brasil é um dos principais destinos, recebendo cerca de 200.000 observadores de baleias por ano (O’CONNOR et al., 2009).

No Brasil, o turismo de observação de baleias começou no arquipélago dos Abrolhos, extremo sul do estado da Bahia, nos anos 1990, onde operadoras de mergulho que levavam turistas para o arquipélago começaram a explorar a presença das baleias-jubarte, *Megaptera novaeangliae* (Borowski, 1871) (Cetacea, Balaenopteridae), durante o inverno (MORETE et al., 2000). Na mesma época, no estado de Santa Catarina, em especial no litoral sul do estado, a atividade se desenvolveu através da observação por terra (com binóculos) de baleias-franca-do-sul, *Eubalaena australis* (Desmoulins, 1822)

(Cetacea, Balaenidae), espécie mais frequente na região (MOREIRA et al., 2011). Em 1999, surgiu a primeira operadora especializada em observação embarcada de baleias, licenciada pelo Ibama para esta atividade e reconhecida pela Embratur (GROCH, 2001; PALAZZO JR.; GROCH, 2007).

Ambas espécies foram alvo de intensa captura na costa brasileira e em todo o Atlântico Sul durante o século XX, o que as levou à beira da extinção (FINDLAY, 2001; PALAZZO JR.; CARTER, 1983). Este cenário de quase obliteração da maioria das espécies de grandes baleias no mundo levou à declaração de uma moratória internacional de caça às baleias em 1986 (IWC, 2014). No Brasil, a primeira legislação especialmente direcionada à proteção dos cetáceos foi a portaria SUDEPE N° N-11 (BRASIL, 1986), aprovada em 21 de fevereiro de 1986, para proibir, nas águas sob jurisdição nacional, a perseguição, caça, pesca ou captura de pequenos cetáceos (golfinhos e toninhas), pinípedes (focas e leões marinhos) e sirênios (peixes-boi). Em 18 de dezembro de 1987, essa legislação foi estendida, através da lei federal N° 7.643 (BRASIL, 1987), para todas as espécies de cetáceos, garantindo, dessa forma, o fim da caça comercial de baleias no Brasil.

A primeira legislação criada especificamente para proibir qualquer forma de molestamento intencional a toda espécie de cetáceo em águas brasileiras foi a portaria IBAMA N° 2.306, de 22 de novembro de 1990, que estabeleceu as primeiras regras para a observação de cetáceos (BRASIL, 1990). Em 1996, esta portaria foi reformulada, através da portaria IBAMA N° 117, de 26 de dezembro (BRASIL, 1996). A nova portaria estabeleceu, entre outras, normas para a operação de embarcações de turismo no interior de unidades de conservação da natureza (UCs). Em 2002, esta portaria foi

alterada pela portaria IBAMA N°24, de 8 de fevereiro (BRASIL, 2002), estabelecendo novas diretrizes para a aproximação de embarcações a grupos de cetáceos (Anexo A).

No mesmo ano em que a caça comercial de baleias foi proibida no Brasil, durante os trabalhos de implantação do Parque Nacional Marinho dos Abrolhos (BRASIL, 1983), foi redescoberta a presença de uma pequena população remanescente de baleias-jubarte e, subsequentemente, o Banco dos Abrolhos passou a ser reconhecido como principal “berçário” da espécie no Oceano Atlântico Sul Ocidental (ANDRIOLO et al., 2006, 2010; ENGEL; ADES, 1996; MARTINS et al., 2001).

O Parque Nacional Marinho dos Abrolhos é a principal unidade de conservação marinha brasileira para a proteção das baleias-jubarte. No interior desta UC, as embarcações são cadastradas e existe determinação do número máximo de barcos permitido ao mesmo tempo na área. O Plano de Uso Público da Unidade encontra-se em discussão e, quando implementado, conterá normas específicas para a observação de baleias. Similarmente, no estado de Santa Catarina, a Área de Proteção Ambiental (APA) da Baleia Franca foi criada em 1999 para harmonizar as atividades humanas com a presença das baleias-francas e promover, de forma sustentável e ordenada, o turismo de observação de baleias (BRASIL, 2000).

Com a recuperação da população brasileira de baleias-jubarte desde a proibição da caça comercial (WARD et al., 2011; ZERBINI et al., 2011), as avistagens desta espécie no litoral norte do estado da Bahia vêm se tornando cada vez mais frequentes, sugerindo a reocupação de antigas áreas de reprodução da espécie ao longo do litoral brasileiro (ROSSI-SANTOS et al., 2008), o que incentivou o início do turismo de observação de baleias na região, mais especificamente na Praia do Forte, em 2001. Desde então o Instituto Baleia Jubarte, organização da sociedade civil sem fins lucrativos

que desenvolve atividades de pesquisa e conservação da espécie no Brasil desde 1988, vem desenvolvendo um trabalho em parceria com as operadoras de turismo locais que envolve a capacitação periódica dos profissionais envolvidos, a provisão de informações interpretativas para os turistas em palestras pré-embarque e durante os passeios, a coleta de dados científicos a borda das embarcações e o monitoramento contínuo da atividade.

Em 2003, a Área de Proteção Ambiental (APA) da Plataforma Continental do Litoral Norte foi criada para proteger a biodiversidade marinha e promover a melhoria da qualidade de vida das populações que usufruem da área (BRASIL, 2003). Segundo o seu decreto de criação, a administração da APA fica a cargo da Secretaria de Estado do Meio Ambiente e Recursos Hídricos (SEMARH), responsável por, entre outros, promover a formação de um Conselho Gestor da unidade e elaborar o seu Plano de Manejo, assim como apoiar a fiscalização da área e promover a participação de organizações não-governamentais e outros segmentos sociais interessados no desenvolvimento sustentável da área. No entanto, 13 anos após a sua criação, esta UC permanece sem Conselho Gestor ou Plano de Manejo.

Apesar de o turismo de observação de baleias ser promovido como uma atividade benigna, de uso não-letal das baleias, capaz de gerar benefícios socioeconômicos e promover a conservação das baleias e oceanos, existe uma crescente preocupação no meio científico sobre os potenciais impactos negativos desta atividade nas populações alvo (ex. PARSONS, 2012; ROSSI-SANTOS, 2016). Por exemplo, no arquipélago de Abrolhos, a exposição a embarcações de turismo causa alterações no comportamento de fêmeas com filhotes (MORETE; BISI; ROSSO, 2007) e de machos cantores, podendo interferir com o comportamento reprodutivo dessa espécie, como corte e acasalamento

(SOUSA-LIMA; CLARK, 2009). No entanto, existe ainda dificuldade em determinar se as mudanças comportamentais de curto prazo causadas por embarcações de turismo poderão ter efeitos de longo prazo na viabilidade das populações de cetáceos (ex. BEJDER et al., 2006).

O litoral norte do estado da Bahia faz parte de uma importante área de reprodução e cria das baleias-jubarte, que migram anualmente de suas áreas de alimentação, próximas às ilhas Geórgia e Sanduiche do Sul, para acasalar, parir e amamentar seus filhotes nas águas quentes do litoral baiano (ENGEL et al., 2008). A Praia do Forte está inserida nesta área e é a localidade onde o turismo de observação de baleias tem apresentado o crescimento mais acelerado (BRUMATTI, 2008; CIPOLOTTI et al., 2005). A atividade nesta localidade é favorecida em parte pelo grande aporte de turistas pela proximidade da capital do estado, Salvador, um dos destinos turísticos mais procurados no Brasil, e em parte pela proximidade da costa com que as baleias podem ser observadas, devido aos hábitos costeiros da espécie e o estreitamento da plataforma continental nesta região. Grupos de fêmeas com filhotes de baleia-jubarte têm especial preferência por águas mais rasas (próximas à costa) e, portanto, a pressão do turismo de observação é maior sobre estes grupos (CIPOLOTTI, 2013).

No entanto, até hoje, não se conhecem os efeitos de longo-prazo do turismo de observação sobre os misticetos (baleias com barbatanas). WEINRICH; CORBELLI (2009) não acharam nenhum efeito de longo-prazo das embarcações de turismo sobre a taxa de nascimento ou sobrevivência de filhotes de baleia-jubarte. Alguns autores, porém, antecipam que os efeitos do turismo de observação possam afetar o sucesso reprodutivo das espécies meses depois e em locais muito distantes da fonte de distúrbios (CHRISTIANSEN; LUSSEAU, 2014). ROSSI-SANTOS (2016) desenvolveu um

estudo sobre a ecologia acústica das baleias-jubarte na Praia do Forte e apresentou evidências de que os sons produzidos pela indústria do turismo de observação de baleias têm o potencial de impactar seu comportamento reprodutivo, tanto pela sobreposição de faixas de frequências semelhantes ao canto da baleia como também pela aproximação das embarcações que, ocasionalmente, podem interromper a atividade de grupos engajados em um mesmo comportamento.

Desta forma, de acordo com o princípio da precaução (UNITED NATIONS, 1992), e diante do seu crescimento acelerado, faz-se necessário e urgente o manejo sustentável desta atividade dentro da APA da Plataforma Continental do Litoral Norte, com base na análise da sua capacidade de carga, e devidamente embasado na pesquisa ecológica (CURTIN, 2003). Um plano de manejo sustentável deve limitar os distúrbios às baleias e seu habitat, promover uma apreciação das baleias e da sua conservação por parte dos turistas e maximizar os benefícios para a população local. A literatura relativa ao manejo sustentável do turismo de observação de baleias vem crescendo (ex. BERROW, 2003; CHION et al., 2012; GILES; KOSKI, 2012; HIGHAM et al., 2015; HOYT, 2005, 2007; JEFFERY; POSTLE; SIMMONS, 1994; LUSSEAU; HIGHAM, 2004; NEW et al., 2015). A importância de se limitar o crescimento desta atividade é tema comum (ex. CORKERON, 2006; HIGHAM; BEJDER; LUSSEAU, 2009), porém, informações sobre a capacidade de carga do turismo de observação são escassas (BERROW, 2003) e não foi ainda proposta uma metodologia específica para calcular a capacidade de carga do turismo de observação de baleias para uma determinada localidade.

A legislação brasileira vigente determina que quando as embarcações de turismo comercial operam no interior de unidades de conservação (UC) nas quais ocorre a presença regular de cetáceos, como é o caso da APA da Plataforma Continental do

Litoral Norte, cabe à UC em questão determinar o número máximo de embarcações que terão permissão para operar simultaneamente dentro dela, assim como as rotas e velocidades para trânsito dessas embarcações no interior da mesma. Além disso, a legislação exige também que sejam fornecidas aos passageiros, em caráter permanente, informações sobre as baleias e sua conservação. Para tanto, deveria existir um programa de licenças para as embarcações de turismo de observação de baleias e o número de licenças de operação emitidas deveria se basear em resultados de pesquisa social (a análise do perfil dos turistas, incorporando aspectos da satisfação, nível de conhecimento, percepções sobre as experiências vividas, sobre os impactos ambientais e a efetividade das ações de educação e interpretação ambiental (HIGHAM; BEJDER; LUSSEAU, 2009), e biológica (monitoramento de estimativas populacionais, estrutura populacional, taxas reprodutivas e comportamento) (LUSSEAU, 2004). O monitoramento contínuo das operações comerciais deve também ser feito, observando número de viagens realizadas, número de visitantes, monitoramento das rotas e interações através de dados de posicionamento global (GPS), ruídos dos motores e, em áreas antropizadas, outras atividades humanas, recreativas ou industriais, para avaliar impactos cumulativos (HIGHAM; BEJDER; LUSSEAU, 2009).

Diante do potencial de crescimento do turismo de observação de baleias na Praia do Forte, da ausência de envolvimento do poder público na implementação e fiscalização da legislação vigente, e da obrigatoriedade, segundo a legislação que rege a atividade no Brasil, de que esta atividade seja licenciada e monitorada quando realizada dentro de uma UC, este estudo tem como objetivo propor um modelo integrado para análise da capacidade de carga desta atividade para as embarcações que operam dentro da APA da Plataforma Continental do Litoral Norte da Bahia, a partir do porto de Praia do Forte.

O presente estudo será apresentado em formato de capítulo de livro, que abordará a história do turismo de observação, o contexto local, os impactos da atividade sobre a população de baleias alvo da atividade, o conceito de capacidade de carga, e os diferentes atores envolvidos, levando em consideração aspectos biológicos, sociais e econômicos. Espera-se que este modelo contribua para o ordenamento da atividade na Praia do Forte, e possa ser aplicado em outras localidades.

Capítulo 1

(Submetido à *Coastal Research Library/Springer International Publishing*; livro "*Advances in Marine Vertebrate Research in Latin America: Technological Innovation in Ecology and Conservation*")

An Integrated Framework to Assess the Carrying Capacity of Whale-Watching Tourism in Praia do Forte, Northeastern Brazil

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Abstract

Whale-watching tourism has been growing in recent years in Praia do Forte, northeastern Brazil and to manage this activity in a sustainable manner it is important to determine its carrying capacity. However, an assessment of whale-watching carrying capacity requires an understanding of the biological, social and economic dimensions, as well as consideration of the several stakeholders involved and the current management capacity in place at a specific locality. Here we analyse the development of this activity in Brazil and Praia do Forte in recent years, the current state of knowledge about the potential impacts of whale-watching on humpback whales and the concept of tourism carrying capacity as it applies to whale-watching. We then bring all of these components together to propose an integrated framework to begin its assessment for Praia do Forte, northeastern Brazil. We conclude that whale-watching in Praia do Forte is currently a low-impact activity, with no evident deleterious biological effects on the target population although we still lack all necessary information to establish its carrying capacity. Therefore, we suggest limiting the activity to its current level, until more data and management capacity become available, and make recommendations to improve our understanding of the impacts of this activity and its sustainable management in this locality.

1. Introduction

Whale-watching is defined by the International Whaling Commission (IWC) as “any commercial enterprise which provides for the public to see cetaceans (whales, dolphins and porpoises) in their natural habitat” (IWC 1994). This activity started in California in the 1950s (Hoyt 1984; Hoyt 2009) but has been expanding rapidly worldwide since the 1980s (Hoyt 1995; Hoyt 2001), when the International Whaling Commission called a moratorium on all commercial whaling (IWC 2014). Since then, whale-watching has been largely promoted by businesses and NGO’s as an economically viable and sustainable use of cetaceans (Woods-Ballard et al. 2003), recognized as having significant social, economic and educational benefits (e.g. Duffus and Dearden 1990; Forestell 1993; Hoyt 2001; Stamation et al. 2007; Brumatti 2013).

The most recent statistics (O’Connor et al. 2009) revealed that 119 countries worldwide develop whale-watching, involving 13 million tourists, and generating \$2.1 billion year⁻¹ and an estimated 13,200 jobs. This activity has been growing globally at an average 3.7% year⁻¹, however, on a regional scale, for example in South America, whale-watching has been increasing an average 10% year⁻¹ and is now developed by the majority of countries in the continent, with Brazil alone receiving 200,000 tourists in 2008.

This rapid development, however, has been raising concerns over its impacts on cetacean populations (e.g. Parsons 2012; Rossi-Santos 2016) and its long-term sustainability, since its growth has outpaced management in several locations (Forestell 2007; Higham et al. 2015; New et al. 2015).

Although legislation, guidelines and codes-of-conduct have been developed around the globe in an attempt to reduce the potential negative impacts of whale-watching (see Carlson 2012), these are often voluntary and thus largely ineffective (Allen et al. 2007; Wiley et al. 2008), or unenforced, resulting in non-compliance (Scarpaci et al. 2003; Lusseau 2005; Kessler and Harcourt 2013).

In Brazil, there has been specific legislation to avoid the intentional molesting of cetaceans and regulate whale-watching tourism in Brazilian waters since 1990. However, these rules are generally unenforced and cases of non-compliance have been documented (Instituto Baleia Jubarte, unpublished data).

To be genuinely sustainable, whale-watching must be ecologically, socially and economically sustainable, and this requires an integrated approach to its management, based on the precautionary principle and considering it as a non-lethal consumptive activity (Berrow 2003; Higham et al. 2015). In this context, when the number of operators and vessels is limited through a permit system, there is greater potential for the sustainable management of whale-watching (Berrow 2003). As suggested by Higham et al. (2009), a permit system must be based on the scientific

assessment of the carrying capacity for that location, and include regular assessment and reapplication. However, obtaining adequate scientific data for this purpose is not an easy task (Ahn et al. 2002).

In Brazil, most studies on humpback whale behaviour (e.g. Petta et al. 2002; Morete 2003a; Bisi 2006; Morete 2007) and interaction with whale-watching tourism (e.g. Morete et al. 2000; Morete 2003b; Morete et al. 2007) have been carried out in the Abrolhos National Marine Park, southern Bahia state, for its ecological importance (Martins et al. 2013). In fact, whale-watching in Brazil started in the Abrolhos region but it is on the state's northern coast, specifically in Praia do Forte, that this activity has shown the greatest increase in recent years (Cipolotti et al. 2005; Brumatti 2008). Therefore, there is an urgent need for more studies to subsidize the management of this activity in this region.

To begin to understand and address the issue of whale-watching carrying capacity in Praia do Forte, we will look at the development of the activity in this location and its impacts on the whales, the tourists and the local operators. Then we analyse the concept of carrying capacity as it applies to whale-watching.

By bringing all these components together, we propose an integrated framework to assess the carrying capacity of commercial whale-watching tourism in Praia do Forte, northeastern Brazil, taking into account the biological, social and economic aspects involved.

2. From Whaling to Humpback Whale-Watching in Brazil

Modern commercial whaling during the 20th century killed over 200,000 humpback whales (*Megaptera novaeangliae*) in the southern hemisphere (Findlay 2001; Rocha et al. 2014). The southwestern Atlantic humpback whale population, classed as southern Atlantic breeding stock A (IWC 2005), was depleted to less than 4% of its pre-exploitation size in the late 1950s (Zerbini et al. 2011). In 1966, the IWC prohibited commercial humpback whaling. The currently available global humpback whale population estimate is 60,000 individuals (Reilly et al. 2008).

By the time Brazil permanently banned whaling in 1987 (Brasil 1987), humpback whales were considered extinct from Brazilian waters, as a direct result of decades of commercial whaling along the Brazilian coast and the Southern Ocean. However, shortly after the whaling prohibition, a small remnant humpback population was 'discovered' by scientists working in the Abrolhos National Marine Park, southern Bahia state (IBAMA/NEMA 1990), and, in 1988, the Projeto Baleia Jubarte (Humpback Whale Project) was created to study this population and promote its recovery, setting up its headquarters in the former whaling town of Caravelas. Subsequently, Abrolhos was recognised as the most important humpback whale breeding ground in the southwestern Atlantic Ocean (Engel and

Ades 1996; Martins et al. 2001; Andriolo et al. 2006; Andriolo et al. 2010). In the early 1990s, humpback whale-watching started in the Abrolhos region as an opportunistic activity carried out by dive operators taking tourists to the archipelago during the winter months (Morete et al. 2000) (Fig. 1).



Fig. 1 – Humpback whale-watching started in the Abrolhos region, the species' main breeding ground in the southwestern Atlantic ocean (Photos: Enrico Marcovaldi/Instituto Baleia Jubarte).

Since the whaling moratorium this population has been recovering from exploitation at an estimated 7.4 to 15.2% annual rate (Ward et al. 2011; Wedekin 2011; Zerbini et al. 2011). As a result of this recovery and reoccupation of former

breeding range along the Brazilian coast (Mas-Rosa et al. 2002; Pacheco de Godoy et al. 2005; Baracho et al. 2006; Rossi-Santos et al. 2008), from the early 2000s sightings of this species became increasingly frequent along the northern coast of Bahia state. In order to widen its study area and monitor the humpbacks in this region the Projeto Baleia Jubarte installed its second station in the coastal village of Praia do Forte, northern Bahia, in 2001.

Although it was recently down-listed to Near Threatened category in Brazil (ICMBio 2014), this population remains a fraction (17,000 individuals; Instituto Baleia Jubarte, unpublished data) of its hypothesized size prior to commercial whaling (22,000-28,000; Zerbini et al. 2011) and, therefore, demands continued conservation efforts.

2.1. Humpback Whale-Watching in Praia do Forte

The first whale-watching operation in Praia do Forte began in 2001, in a partnership between the Projeto Baleia Jubarte and a local tourism operator (Cipolotti et al. 2005). Praia do Forte has since become a strong whale-watching destination. This is partly due to its proximity to the state capital Salvador (55 Km), one of the most sought after tourist destinations in Brazil, and partly because the whales occur very close to the shore, due to a narrowing of the continental shelf in this region (Rossi-Santos et al. 2008; Wedekin et al. 2010; Baracho-Neto et al. 2012) (Fig. 2). Since then, the activity has spread along the coast of Bahia and is now carried out in more than ten localities, however, Praia do Forte is where the activity has shown the fastest growth in recent years (Brumatti 2008).



Fig. 2 – Praia do Forte is an excellent whale-watching destination because humpback whales can be watched very close to shore, due to a narrowing of the continental shelf in this region and the whales' preference for shallower waters (Photo: Luena Fernandes/Instituto Baleia Jubarte).

Additionally, the northern coast of Bahia is considered to have the greatest tourism development potential in the state (Limonad 2007). Increasing visitation to Praia do Forte in the coming years is thus very likely to increase the demand for whale-watching and, consequently, the number of operators, creating the need to manage the number of whale-watching boats operating in the area in order to avoid biological damage to the whale population and maintain tourist satisfaction.

In 2003, the North Coast Continental Shelf Protected Area (Área de Proteção Ambiental da Plataforma Continental do Litoral Norte) was created to safeguard the region's rich marine biodiversity, promote the development of economic activities within acceptable limits of change of the ecosystems and improve the quality of life of the coastal communities using the area (Brasil 2003). This Protected Area (PA) covers approximately 3,622.66 km² from Itapuã (Salvador) to the border with Sergipe state, from the high tide line to the 500 m isobaths (Fig. 3). The main characteristic of this PA is a narrow continental shelf, approximately 15 km wide, with average depths of 50 metres (DHN 1995).

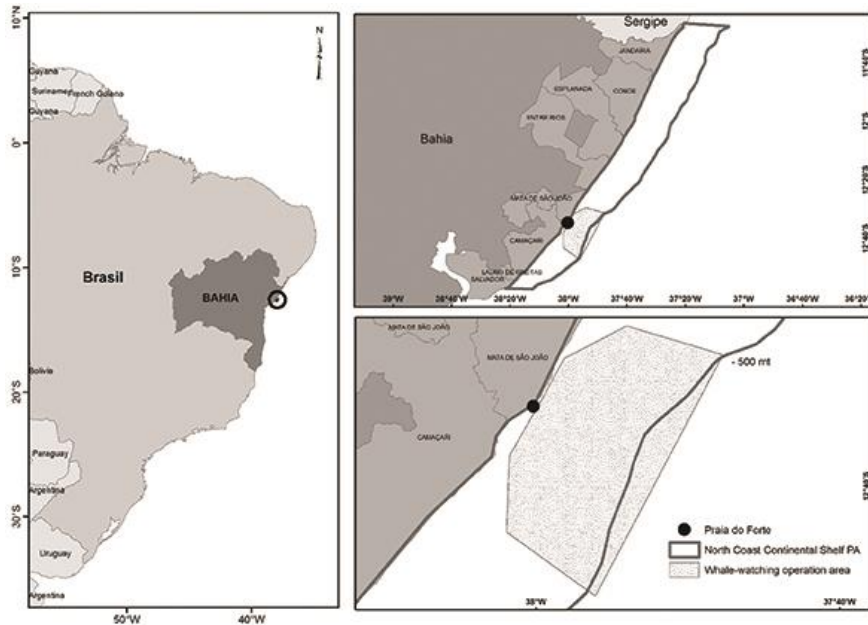


Fig. 3 – Map showing the state of Bahia, northeastern Brazil, and the port of Praia do Forte, within the North Coast Continental Shelf Protected Area. The shady polygon represents the operation area of the whale-watching vessels departing from the port of Praia do Forte (adapted from Cipolotti 2013).

Whale-watching vessels departing from the port of Praia do Forte operate within the North Coast Continental Shelf PA (Fig. 4). The vessels depart at different times during the day, usually between 8 am and 2 pm and typically navigate for two to three hours. Trips do not normally exceed four hours in duration and vessels tend to navigate out in a straight line for a maximum 15 km and then turn north or southwards, depending on wind conditions, stopping to observe any whale groups spotted on the way, before returning to port. The shady polygon in Fig. 3 comprises the area covered by the whale-watching vessels operating from Praia do Forte recorded between 2003 and 2012 (Cipolotti 2013). The polygon corresponds to 475 km², is 15 km wide and 30 km long parallel to the coastline between Porto de Sauípe to the north (12°50') and Guarajuba to the south (12°60'), and water depths within this area vary between 10 and 500 m, but 37% of the area is within 40 to 50 m depth (DHN 1995).



Fig. 4 – The port of Praia do Forte, northern Bahia, is the departure point for whale-watching vessels during the humpback whale season (July - October) and an important tourist destination in northeastern Brazil. The creation of the North Coast Continental Shelf Protected Area in 2003 aimed to protect the region's rich ecosystems and promote sustainable economic activities, such as whale-watching tourism (Photo: Enrico Marcovaldi/Instituto Baleia Jubarte).

Between 2001 and 2004, only one operator carried out commercial whale-watching from Praia do Forte. From 2005 onwards, the number of operators gradually increased but varied over the years, oscillating between two and five operators. In order to characterize the present whale-watching activity in Praia do Forte, operators were asked to answer questionnaires about their operation, results obtained over the years and their expectations for the future of the activity. During 2016, four operators offered the activity in Praia do Forte, using a variety of vessels (Fig. 5) and engine types (Table 1). The schooners tend to operate one daily trip and the speedboats two, although, depending on demand, some speedboats make up to three trips daily. Multiplying the number of boats conducting whale-watching per day (fleet size) by the usual number of daily trips per boat, the tourism intensity in Praia do Forte is thirteen boat trips per day. According to data provided by the four whale-watching companies, 284 whale-watching trips were carried out with 3,117 tourists during the 2015 humpback whale season.



Fig. 5 – Examples of different boat types operating humpback whale-watching in Praia do Forte, northeastern Brazil: catamaran (A), wooden schooner (B) and fiberglass speedboat (C and D). (Photos: A and C - Luena Fernandes, B and D – Instituto Baleia Jubarte).

Table 1: Summary of whale-watching boats operating from Praia do Forte, northeastern Brazil, during the 2016 humpback whale season (operator, vessel name, body type, size, engine type and power (hp) and tourist capacity).

Operator	Vessel Name	Boat Type	Size (m)	Engine Type	Engine Power (hp)	Capacity (tourists)
Portomar	Parasail	Fibreglass speedboat	8.90	Outboard	170	5
	Cannes	Wood schooner	17.75	Inboard	140	65
EmyTour	Fishing	Fibreglass speedboat	8.6	Outboard	300	7
Carcará Ecotours	Água Viva	Fibreglass catamaran	8	Outboard	2 x 150	10
Base Náutica	Fenix	Fibreglass speedboat	8	Outboard	200	6
	Catamaran	Fibreglass catamaran	8	Outboard	2 x 150	14

Currently all five companies operating whale-watching in Praia do Forte have voluntary cooperation agreements with the Instituto Baleia Jubarte (IBJ) for the provision of specific training for their staff, interpretative information for their tourists, monitoring and collection of scientific data on-board their vessels (Fig. 6). This agreement also involves the operators making a financial contribution for each tourist to support the research and conservation activities developed by IBJ.



Fig. 6 - Instituto Baleia Jubarte provides specific training for whale-watching operator staff (A), interpretative information for tourists, and monitoring and collection of scientific data on-board whale-watching vessels (B) (Photos: Enrico Marcovaldi/Instituto Baleia Jubarte).

The Instituto Baleia Jubarte has been monitoring visitor profile and feedback since 2003 by means of questionnaires answered voluntarily by the tourists on the return from their whale-watching trips. In 2015, 50% of tourists interviewed stated the experience fully satisfied their expectations and 96% said they would go whale-watching in Praia do Forte again in the future (Instituto Baleia Jubarte, unpublished data). Additionally, when asked to rate different aspects of the operations, 76% rated the boat conduct excellent, 69% rated the explanations provided boat staff excellent and 69% rated the information provided by the IBJ staff excellent (Instituto Baleia Jubarte, unpublished data).

For the purpose of this study, in order to characterise the whale-watching activity in Praia do Forte, the operators were also asked to answer questionnaires. The five whale-watching operators in Praia do Forte employ a total of 39 permanent staff and an additional 14 temporary staff during the whale-watching season, of which 26 employees are from the local communities. One operator stated that the income from the whale-watching operation provides full employment year round for all the company's staff, some of which would be only temporary otherwise.

When asked whether their tourists were satisfied with their whale-watching experience, four out of five operators answered they were fully satisfied and one

answered the vast majority of tourists were satisfied. When asked whether they consider the whale-watching activity as financially viable and profitable for their companies, all operators answered positively and declared they expect the activity to expand in future years.

When asked what would be an acceptable limit for whale-watching in Praia do Forte, three out of five operators believe there could be more boats operating in Praia do Forte and only one believes it should remain at its current level (6 boats). Suggested levels were two large boats for up to 50 passengers and three to five speedboats for up to 10 passengers operating from Praia do Forte. Two operators mentioned the growth of the activity, and the number of boats, would ultimately be limited by tourist demand, which determines the financial viability for boat owners.

Another factor pointed out by all operators is the absence of involvement or support from public authorities in the development, marketing or management of this activity. This situation has not changed over the years as, previously, Brumatti (2008) also noted the absence of participation by the public authorities and the local communities in the planning and implementation of whale-watching in Bahia. The local governments, environmental agencies and tourism bodies recognise the whale-watching activity and its potential for local tourism development but do not participate or take an active role in its management.

3. The Negative Impacts of Whale-Watching on Humpback Whales

An increasing body of evidence suggests that whale-watching can negatively impact individual cetaceans and populations (e.g. IWC 2004; Parsons 2012; Scarpaci and Parsons 2014; Senigaglia et al. 2016), though most studies have only been able to show short-term behavioural responses to observation by whale-watching vessels. Understanding the long-term effects of these responses on individuals and populations, in terms of non-lethal or sub-lethal impacts, is essential to assess the long-term sustainability of whale-watching (Berrow 2003; Lusseau 2004; Lusseau 2014; Parsons et al. 2015).

However, cetaceans are long-lived and hard to study and thus only three studies to date have been able to demonstrate long-term effects of whale-watching on cetacean vital rates, mainly a decrease in female reproductive success, and all on odontocetes (Bejder et al. 2006; Fortuna 2006; Lusseau et al. 2006). For mysticetes, the long-term effects of whale-watching disturbance are still unknown (Christiansen and Lusseau 2014). Weinrich and Corbelli (2009) looked at calving rate and survival of humpback whales exposed to whale-watching boats in New England and found no long-term effects. Nonetheless, several studies have detected whale-watching induced alterations in the behaviour of humpback whales exposed to

observation. Responses include changes in respiration rate, direction of travel, time spent on the surface and dive behaviour (Baker and Herman 1989; Corkeron 1995).

In their breeding grounds, humpback whales have been shown to react to the approach of whale-watching boats by increasing speed significantly, reducing blows per minute, moving more erratically, increasing breach frequency, decreasing resting behaviour and adopting a more direct path after the boat's departure (Scheidat et al. 2004; Morete et al. 2007; Avila et al. 2015). A study of the behavioural reactions of wintering humpback whales to biopsy sampling in Abrolhos, northeastern Brazil, found that groups involved in social and resting activities usually change these states to travel in response to disturbance from vessel approach (Cantor et al. 2010). Close vessel approach during biopsy sampling and whale-watching also result in behavioural reactions such as 'fluke slaps' (personal observation) (Fig. 7).



Fig. 7 – A ‘fluke slap’ reaction from a humpback whale (*Megaptera novaeangliae*) in response to close vessel approach during biopsy sampling in Abrolhos (A) and whale-watching in Praia do Forte (B), northeastern Brazil (Photos: Enrico Marcovaldi/Instituto Baleia Jubarte).

A study in New Caledonia detected significant behavioural changes in over 80% of humpback whales approached by boats at less than 335 m, mostly changes in path predictability, and increased swim speed and dive time (Schaffar et al. 2013).

During migration, groups with calves in Hervey Bay, Australia, also had their behaviour altered in the presence of vessels within 300 m of them, particularly a reduction in surface behaviour and increased diving (Corkeron 1995). Stamation et al. (2010) observed horizontal avoidance and longer dive times in the presence of vessels, as well as a reduction on some surface behaviours. They also found pods with calves to be more sensitive to the presence of vessels than non-calf pods.

In feeding grounds, behavioural responses of humpbacks to tour boats include horizontal avoidance, higher frequencies of some surface activities and changes in blow intervals, indicating possible shifts of behavioural patterns (from foraging to travelling) (Corbelli 2006). Baker and Herman (1989) found that humpback whales responded to vessels operating at distances of up to 4,000 metres. Changes in behaviour were correlated with the speed, size, distance, and numbers of vessels and included shorter blow intervals, longer dive times and swimming away from the vessel’s path. They also found a reduction in aerial behaviours in response to closer vessel approaches.

Whale-watching vessels also produce underwater noise that can interfere with whale communication. Sousa-Lima and Clark (2009) studied the acoustic interactions between tourism boats and humpback whales in Abrolhos and found the noise produced by approaching vessels caused male singers to stop singing and abandon the area. If, as suggested by Bejder et al. (2006), only the individuals less sensitive to boat disturbances would remain in the area, female choice and consequently the distribution of breeding success among the males of this population could be affected, with unknown long-term effects on the structure of this population (Sousa-Lima and Clark 2009).

Au and Green (2000) studied the effects of whale-watching boat noise on humpback whales in west Maui, Hawaii, and found that boats with outboard engines produced sounds at a greater level than the ambient background noise produced by chorusing humpback whales. Similarly, Rossi-Santos (2016) described the underwater noise originated from whale-watching vessels in Praia do Forte (Fig. 8) and presented evidence that the noise produced by the whale-watching industry can impact the reproductive behaviour of humpback whales, either by masking some humpback song components, or by causing the animals to change their behaviour

upon vessel approach or sudden departure. A masking effect was also suggested by Dunlop (2016).



Fig. 8 – A long-term study on the acoustic ecology of humpback whales (*Megaptera novaeangliae*) in their breeding ground off northeastern Brazil, collected behavioural and acoustic data during whale-watching boat approaches in Praia do Forte and indicated impacts on the whales’ surface and underwater behaviour, as well as potential masking of important biological sounds (Photos: Enrico Marcovaldi/Instituto Baleia Jubarte).

Although all types of vessels produce underwater noise, which may cause alterations or induce avoidance behaviour in whales, studies with humpback whales reported only minor behaviour changes to larger whale-watching boats when compared to smaller vessels with outboard engines, which cause greater cavitations and produce more sound than the inboard engines of larger boats (Au and Green 2000).

Apart from singing, humpback whales also communicate through vocal sounds and non-vocal sounds originating from surface behaviours, for example breaching and tail or pectoral slapping. Studies have shown that when wind noise increases humpbacks respond by increasing the level of vocal sounds and switch to using surface-generated sounds, but this response does not occur in reaction to increased vessel noise, suggesting humpback whales might not be as prepared to cope with anthropogenic noise as they are to deal with natural noise (Dunlop 2016).

4. The Sustainable Management of Whale-Watching

A variety of regulations, voluntary and legislative, have been developed around the world in an attempt to manage whale-watching in a sustainable manner (see Wiley et al. 2008; Carlson 2012). There is a general view that voluntary guidelines and codes of conduct may not be enough to safeguard the whales (e.g. Garrod and Fennell 2004; Allen et al. 2007; Wiley et al. 2008; Kessler and Harcourt 2013; Tyne

et al. 2014). Instead, regulations and permit systems provide the greatest level of management certainty and control (IWC 2004). For many places, therefore, ensuring that commercial whale-watching can only be undertaken by a limited number of permitted (licensed) operators is the essential first step to sustainable management. Ideally, the number of permits available should be based on a scientific assessment of the carrying capacity for that location and the system should include regular evaluation and renewal of permits (Higham et al. 2009).

Different locations have established varying guidelines for limiting the number of whale-watching permits issued (see Carlson 2012). In Kaikoura, New Zealand, permits are limited by tourist activity, so the company running swim-with-dolphin programmes cannot also run whale-watching trips. Hervey Bay, in Australia, implemented, within two years of the industry's start in 1987, a spatially explicit management scheme, with defined management goals and that started with a mathematical model for the number of permits issued (Jeffery et al. 1994; Smith et al. 2006). The management scheme also provided for the transfer of licences (individual transferable quotas) and included enforcement.

One of the most advanced permit systems for whale-watching operators is in South Africa, where permits are generally limited to one per location. The system is founded on the principles of 'continuous criteria' and 'permit re-application', whereby operators are required to provide evidence of their high standard of responsible whale and dolphin watching in order to successfully retain a permit on reapplication every 5 years (Schalkwyk 2008). Examples of the evidence provided include cooperation with researchers, equality within the workforce, and involvement in educational programmes.

The guidelines for commercial cetacean-watching activities in the ACCOBAMS area (Black and Mediterranean Sea) recommend permits to be granted by the appropriate authorities and issued by area, to restrict the number of commercial vessels operating in an area on any given day. Issuing of permits should be based on a strict set of criteria to avoid conflicts with the conservation, management or protection of the cetaceans concerned and guarantee the proposed operators have sufficient experience with cetacean tourism (Carlson 2012).

In Peninsula Valdés, Argentina, the current whale-watching regulations resulted from a series of workshops organised by the Tourism Board (see Sironi et al. 2005). The main aspects of the resulting Provincial Law 5714 from Chubut include the issuing of official whale-watching permits by the Enforcement Authority through public bidding for a period of no less than six years, and determines a tax that whale-watching companies must pay to the Province. The Enforcement Authority can grant between four and six official permits to commercial whale-watching operations and each whale-watching company is allowed to operate with only one boat at any one time with a maximum capacity of 70 passengers. A whale-watching

Advisory Committee chaired by the Enforcement Authority with members from the operating companies was created to suggest improvements to the activity and guarantee the principles for resource conservation and sustainable development. Fines are also predicted for infractions to the Law.

In Chile, commercial cetacean-watching activities can only be carried out under a permit granted by the appropriate authority, with a restricted number of one commercial vessel operating in any given area and permits must be renewed every three years after a compliance review process (Carlson 2012).

In the Azores (Portugal) whale-watching companies must also apply for permits to operate. The number of permits issued for the different zones is based on the carrying capacity calculated as a relationship between the relative abundance of cetaceans and the number of vessels operating in the area as such: $N_{\text{whale sightings/day}} \times N_{\text{vessels allowed with each group}}$ (Magalhães et al. 2002). If an average 10 groups are sighted in an area on a daily basis and the number of vessels allowed simultaneously with each group is two, then the carrying capacity for that area would be 20 vessels. This particular study used a combination of land station and in water observations to determine cetacean abundance.

The first legislation designed specifically to prohibit any form of intentional harassment to all species of cetacean in Brazilian waters was ordinance IBAMA N° 2.306, of November 22nd 1990, which established the first whale-watching rules. In 1996, this was reformulated by ordinance IBAMA N° 117, of December 26th. The new regulation imposed, among other rules: a minimum distance of 100 m from any species of whale for boats; a minimum altitude of 100 m from cetaceans for any aircraft; the maximum limit of 30 minutes to observe any group of whales; a minimum distance of 50 m for diving or swimming in the vicinity of any species of whale; and standards for the operation of tourism vessels within Protected Areas (PAs). These standards include the registering of all vessels operating within the PA, the determination of the maximum number of vessels allowed to operate within the PA simultaneously and of the routes and speeds allowed, in addition to the permanent provision of interpretative information on cetaceans and their conservation (Brasil 1996). In 2002, ordinance IBAMA N° 24, from February 8th, altered this ordinance, specifically to establish that boats must keep their engines idle when observing humpback whales, and turned off or idle for other species of cetaceans, and establish the limit of two vessels allowed to approach an individual or group of whales simultaneously.

In 2000, the Right Whale Environmental Protection Area (Área de Proteção Ambiental da Baleia Franca) was created in the state of Santa Catarina, southern Brazil, to protect the main concentration area of a southern right whale (*Eubalaena australis*) wintering ground off Brazil; to promote the sustainable use of the natural resources; and to manage the tourist and research activities and the local vessel and

aircraft traffic (Brasil 2000). Whale-watching activities have been conducted in this region since 1999 and, in 2005, in accordance with ordinance IBAMA N° 117, this PA established a methodology for registration and monitoring of all boats involved in this activity. Additionally, six area closures were established in the PA, taking into account scientific and management issues, to allow the monitoring of the short and long-term effects of boat-based tourism in the PA, and the design and implementation of adequate management measures to ensure both the species' survival and the sustainability of the whale-watching industry (Palazzo Jr. and Groch 2007).

The Abrolhos National Marine Park, in southern Bahia state, is the primary marine protected area (MPA) for the protection of Brazilian humpbacks. Within the Park, all vessels are registered and its Management Plan (MP) determines the carrying capacity for some areas of the Park. For example, in the Abrolhos archipelago and Parcel, the carrying capacity was established at 15 medium-sized boats (35ft/10 passengers) at any one time, based on the protection offered to the boats by the southerly and northerly wind anchoring sites (IBAMA 1991). The MP also establishes that each vessel can carry up to 15 adult passengers plus 3 children under the age of ten into the Park's interior. Concerning whale-watching, the MP determines a carrying capacity of up to three vessels approaching the same group of cetaceans simultaneously, based on these animals' susceptibility to stress, particularly of nursing females with calves. However, according to the ordinance IBAMA N° 24, only two vessels are allowed to approach any group of whales at the same time. Therefore, the park's Public Use Plan, currently under discussion, when implemented, will contain specific rules for the practice of whale-watching (Krob 2003).

The North Coast Continental Shelf Protected Area, in northern Bahia state, was created in 2003 to promote sustainable economic activities, such as whale-watching tourism, however, to date, this PA remains unimplemented and without a Management Plan.

In Brazil, any individual with a certified vessel and appropriate boat handling qualifications may offer commercial whale-watching tours. There are no restrictions to new entrants and no regulations relating to the types or numbers of boats used. This means the range of vessels used and the experience and knowledge of the operators are highly variable. A study in Australia found that new operators have a more limited understanding of how to run a 'good' whale-watching operation and are less concerned about the whales themselves than the more experienced operators (Lalime 2005). Similarly, the collaborative relationships that exist in Praia do Forte between the operators and the Instituto Baleia Jubarte are shaken up every time a new operator begins whale-watching activities. As a result, the operators move to a more competitive approach.

With the increasing number of commercial whale-watching operators in Praia do Forte, management measures need to be implemented in order to mitigate the potential impacts on whales (Fig. 9). One such measure is the requirement for permits to operate whale-watching commercially. The introduction of a permitting system could be used to manage cumulative effects of increasing vessel numbers and ideally would include training in boat handling around whales for new operators and refreshment courses for existing ones (Kessler and Harcourt 2013).

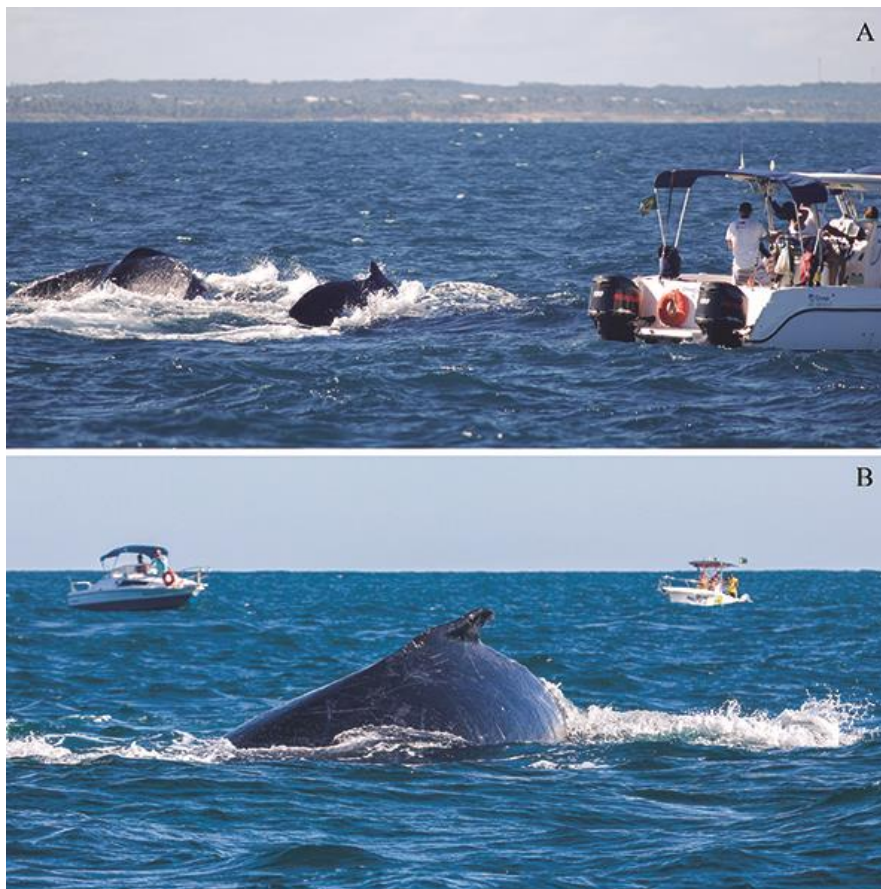


Fig. 9 – Whale-watching vessel approach in Praia do Forte has been observed to cause whales to change swimming course (A). Additionally, groups of whales are often observed by more than one vessel simultaneously and for long periods of time (B): the legislation stipulates the maximum observation time for each individual vessel but does not prohibit vessels from immediately approaching the group as

soon as others depart (Photos: A – Luena Fernandes and B - Enrico Marcovaldi/Instituto Baleia Jubarte).

To ensure that the current regulations are successful in minimizing harm to the whales, it is necessary to enhance the levels of enforcement, which are virtually non-existent in Praia do Forte, besides the monitoring carried out by the Instituto Baleia Jubarte, which is a non-governmental organization with no enforcement authority and that can only report infractions at the best.

Because the long-term consequences of whale-watching interactions are unknown, management of the humpback whale-watching industry should adopt a conservative approach. Improved knowledge of long-term impacts of multiple exposures to vessels is required to inform management of whale-watching (Higham et al. 2009; Stamation et al. 2010). Additionally, determining the carrying capacity of whales to whale-watching is one of the greatest challenges for the sustainable management of whale-watching, although little information is available on how to calculate it (Berrow 2003).

5. Limiting Growth and the Concept of Carrying Capacity

The concept of carrying capacity has its origins in the pastoral and wildlife management sectors, where it was used to calculate the maximum number of individuals an area could sustain without compromising their reproductive potential or to determine the size of an animal population a specific habitat could support (Berrow 2003; Curtin 2003). Applied to tourism, the concept of carrying capacity assumes a positive relation between the number of tourists and the impact of tourism on a destination and has been criticized in the tourism literature for being subjective, misleading and ineffective as a management tool (e.g. McCool and Lime 2001).

Determining carrying capacity can be a complex process and researchers seem to agree that there is no single number but rather a combination of factors such as management objectives, the biological nature of the resource, the preference and tolerances of the users, all of which must be considered together to determine a carrying capacity for a specific area (Heberlein 1977). Several methodologies have been proposed to regulate visitor management in protected areas, including Visitor Impact Management (Graefe et al. 1990), Limits of Acceptable Change (Stankey et al. 1985) and Tourism Carrying Capacity (Cifuentes 1992).

The concept of Tourism Carrying Capacity (TCC) includes mainly ecological and social parameters and can be defined as: “*The maximum number of visitors an area can sustain without unacceptable deterioration of the physical environment and without considerably diminishing user satisfaction*” (Salerno et al. 2013). TCC has been challenged by the idea of *Sustainable Tourism* but many of the issues

outlined for this new concept are similar and, clearly, the basic element remains the need to limit the growth of the tourist activity and determine which social and environmental changes can be accepted (Butler 1999; Liu 2003). Nonetheless, however criticized this concept may be (McCool and Lime 2001) it remains in use and has evolved to consider ecological, economic, social and perceptual aspects of tourism (Needham et al. 2011; Filby et al. 2015).

However, according to Heberlein (1977), resource managers tend to over-emphasize biological capacity. The problem is that, as is the case for whale-watching impacts, although demonstrable, numbers are often limited to trivial biological impact, or no impact at all can be documented. As such, in the absence of information on the biological carrying capacity, in order to maintain the activity's sustainability, important decisions about other sorts of capacity, such as the social capacity for example, should not be delayed. For example, if tourist satisfaction is very low, then the activity may be over its carrying capacity.

An interesting approach to the theme of tourism carrying capacity has been presented in a study conducted by IBAMA and WWF-Brazil in the National Marine Park of Fernando de Noronha, northeastern Brazil (Mitraud 2001). In this study, the concept of TCC (Cifuentes 1992) is used in conjunction with the Visitor Impact Management (Graefe et al. 1990) and the Limits of Acceptable Change (Stankey et al. 1985). According to Cifuentes (1992), the TCC in protected areas should also take into account the conditions available for the adequate management of the area, which will ultimately determine its real carrying capacity.

Similarly, whale-watching carrying capacity must be assessed with basis on a set of variables related to the three spheres of sustainable management, namely the impact on whales (Biological), on tourist experience (Social) and whale-watching companies (Economic) (Chion et al. 2012), as well as management capacity.

5.1. Social Carrying Capacity – the Tourists

The social carrying capacity relates to visitor experience on whale-watching boats, including the time spent observing whales, time spent alone with the whales and satisfaction (Lime and Stankey 1971; Chion et al. 2012).

There are many studies that measured the satisfaction of whale-watching tourists (e.g. Avila-Foucat et al. 2013; Filby et al. 2015; Sitar et al. 2015). Generally, tourists prefer when whale-watching trips have educational elements (Bentz et al. 2016a), licensed boat operators, and boat operators that follow whale-watching regulations (Orams 2000) and are concerned about minimizing harm to whales (Kessler et al. 2014).

The Instituto Baleia Jubarte has been monitoring visitor profile and satisfaction on-board whale-watching trips in Praia do Forte since 2003. This is achieved by

asking tourists to answer questionnaires upon return from their whale-watching trips (Fig. 10).



Fig. 10 – The Instituto Baleia Jubarte monitors visitor satisfaction on-board the whale-watching vessels in Praia do Forte in partnership with the local operators since 2003 (Photos: Enrico Marcovaldi/Instituto Baleia Jubarte).

Crowding is another potential indicator of social carrying capacity that can influence the probability of tourists returning to a site and has been increasingly applied to assess marine wildlife tourism carrying capacity (Finkler and Higham 2004; Needham et al. 2011; Avila-Foucat et al. 2013; Bentz et al. 2015).

5.2. Biological Carrying Capacity – the Whales

Animals perceive tourism as a risk and may respond to interactions in the same way they would respond to predators (New et al. 2014). This can result in disruptions of their activity budget, displacement from the area and other sub-lethal effects that can lead to long-term consequences for the populations (Pirodda et al. 2014). Methods of boat approach, boat behaviour around the animals and the number of vessels present have all been shown to change humpback whale behaviour (Corbelli 2006; Stamation et al. 2010).

Avoidance of disturbance is one of the most commonly used behaviour measures of disturbance, but there are other forms of behavioural responses to disturbance, for example increased levels of vigilance, reduction in parental care or amount of time spent resting, that could potentially affect survival or fecundity (Gill et al. 2001).

Short-term effects of individual interactions between whale-watching boats and cetaceans are unlikely to result in any long-term effects for the animals, since they may be able to compensate the effects of the disturbance once it is absent (Christiansen and Lusseau 2014). The problem is that the effects from whale-

watching disturbance may be cumulative when they become more frequent or target individuals within a population, certain areas, behaviours or age classes more frequently.

Responding to disturbances has associated energetic consequences. One way to evaluate the energy cost of human disturbances is to analyse the amount of time the animals dedicate to different energy-relevant activities, such as swimming, feeding and resting, in the presence or absence of tourist vessels (Christiansen and Lusseau 2015).

Lusseau (2004) suggests population estimates, structure, reproductive rates and behaviour budgets should be included in a whale-watching monitoring program. To assess the carrying capacity of a population to whale-watching the most sensitive parameter must be determined and its limits assessed to manage the activity within these.

The most biologically significant impact of whale-watching, when performed in a breeding ground, is the interruption of reproductive behaviour, including courtship and parental care. Therefore, if disturbance to female and calf pairs is the most sensitive variable, the number of vessels or time they spend with these groups should be limited to avoid impacts (Berrow 2003).

Future research should consider how soon whales come to rest after disturbance, as an additional indication of the strength of avoidance and whether this is likely to be biologically significant (Kessler et al. 2013).

5.3. Economic Carrying Capacity – the Whale-Watching Companies

This aspect of whale-watching carrying capacity refers to the economic contribution the activity makes to coastal economies around the world (Parsons et al. 2003; O'Connor et al. 2009; Cisneros-Montemayor et al. 2010; Mustika et al. 2012). It creates jobs and income for local communities. However, with the increase in numbers of operators in a specific locality, competition may lead to decreased economic viability, for example. So, in analysing this aspect of carrying capacity, factors such as number of jobs created as a result of whale-watching tourism, total income generated from tourism in the region and for the whale-watching operators can be considered (Parsons et al. 2003).

If tourist demand exceeds the capacity of the existing operators, then the activity is below carrying capacity. If, on the other hand, there are more operators than tourists wanting to go whale-watching, then the economic carrying capacity is exceeded. An evaluation of the demand for whale-watching in Praia do Forte region could contribute to the assessment of the economic carrying capacity (Brumatti 2008).

5.4. Management Carrying Capacity – the Enforcement Authorities

The management carrying capacity was proposed by Cifuentes (1992) and refers to the existence of policies, equipment, personnel, funding, infrastructure and facilities available in a protected area to support the sustainable and effective management of the area and activities carried out within it. This author defines optimal management carrying capacity as “*the best state or conditions the administration of a Protected Area should have to develop its activities and reach its goals*”. In Praia do Forte, within the North Coast Continental Shelf PA, northeastern Brazil, the management carrying capacity can be considered one of the main limiting factors of whale-watching carrying capacity.

6. An Integrated Framework to Assess Whale-Watching Carrying Capacity

Based on the concepts presented herein we suggest an integrated framework to guide the assessment of whale-watching carrying capacity that takes into account the different elements of sustainable management and the main stakeholders involved in any commercial whale-watching activity (Fig. 11). As proposed by Higham et al. (2009), four key stakeholder groups were included: the commercial tourism operators, the social sciences (visitors), the natural sciences (whales) and planning/management agencies. The use of such frameworks, illustrated as models to facilitate understanding and interpretation, is common throughout the whale-watching management literature (e.g. Duffus and Dearden 1990; IFAW 1995; Curtin 2003; Higham et al. 2009; New et al. 2015).

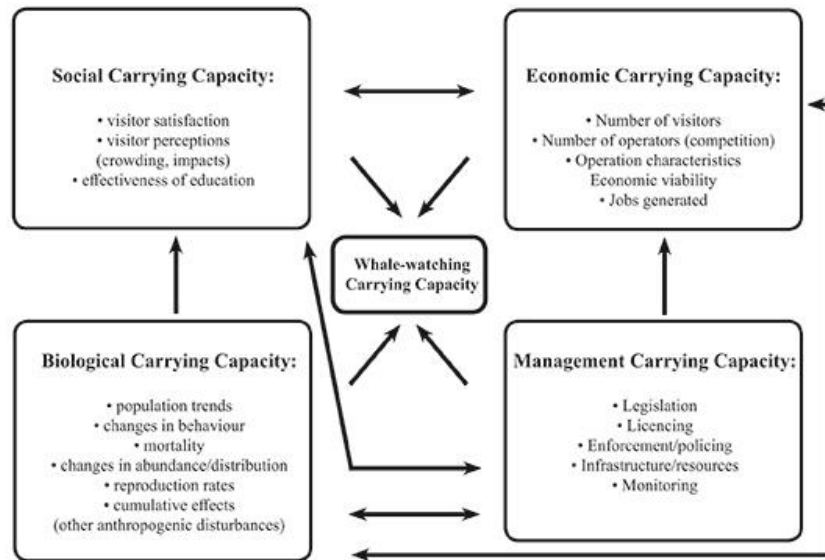


Fig. 11 – An integrated framework model for the assessment of whale-watching carrying capacity.

This framework intends to guide the assessment of whale-watching carrying capacity (CC) in a specific location. Four elements of carrying capacity are included. The biological CC refers to the level of interactions the target population can sustain before significant behavioural alterations or population effects are observed. The biological CC influences the social CC as a reduction in numbers of whales in an area will affect visitor satisfaction. It also influences the economic CC since less whales, for example, will reduce profits and the economic viability of the activity, and is influenced by the economic CC since more operators, for example, can result in more competition amongst operators for access to less individuals, resulting in unsustainable pressure on the animals. It also influences and is influenced by the management carrying capacity since adequate policies, based on scientific data, and adequate management will maintain the biological CC and, on the other hand, changes in the populations will demand active management decisions. The social CC, translated into visitor experience and perceptions, is directly influenced by the economic CC, as the services and products provided by the operators, such as naturalist guides, and the conduct of the operator, often influenced by increased competition, all influence visitor experience. On the other hand, social CC, translated into numbers of tourists, demand and willingness to pay, all influence economic CC. Finally, the management CC, translated into a permit

scheme, limited permits or permit conditions, for example, affect the economic CC and the social CC. All four elements of CC and the interactions amongst them must be considered when assessing the carrying capacity of whale-watching in a specific location.

7. Discussion

To date, the Instituto Baleia Jubarte (IBJ), a non-governmental organisation, has taken responsibility for the management and monitoring of the whale-watching activity in Bahia. The operators in Praia do Forte see the collaboration with the IBJ as a means of contributing to whale conservation and adding value to their product, attributing a social and environmental responsibility image to their business.

An in depth analysis of the social impacts and benefits of whale-watching for the local community of Praia do Forte is beyond the scope of this study. However, previous studies on this subject have suggested a greater articulation between the local authorities and the tourism operators is needed to promote community engagement and the better distribution of the economic and social benefits generated by the whale-watching tourism industry (Brumatti 2008). Garrod and Fennell (2004) discuss the fact that whale-watching management measures are more likely to be followed if participants have been involved in their development.

In Praia do Forte, humpback whale-watching is performed on whales involved in breeding ground activities, such as courtship, mating and nursing. Cipolotti (2013) investigated the distribution patterns and habitat use of humpback whales in relation to depth based on data collected by the Instituto Baleia Jubarte on-board whale-watching vessels operating from Praia do Forte during the breeding season (July to October) between the years 2003-2012. He found that 52% of the whale groups were sighted within 40-50 m depths. Additionally, groups with calves were found to concentrate on shallower waters, closer to shore and therefore easier to reach during whale-watching trips, making them more likely to be observed and thus suffer greater pressure from this activity. He also found the occurrence of groups with calves peaked during September and October and groups without calves and competitive groups decreased towards the end of the breeding season (September-October) when compared with the beginning of the season (July-August). This can be explained by the fact that these whales' migration is age structured, females with new calves being the final cohort (Chittleborough 1965; Dawbin 1966), so in the later stages of the whale-watching season the activity concentrates on females with calves.

However, for boat interactions to affect the vital rates of individual baleen whales in Praia do Forte, they would have to significantly disrupt the breeding or nursing process. In the case of females with calves, any lost nursing opportunities

or decreased lactation due to the energy cost of displacement in response to whale-watching disturbance, can be easily compensated at a later moment (Lusseau 2014), since the legislation only allows 30 minutes of observation and the number of vessels is low. Additionally, humpback whales in the area are able to avoid disturbance from whale-watching vessel approach because they have plenty of alternative sites to go to, since the whale-watching activity currently operates over a limited area (Figure 3).

However, calf growth tends to peak towards the end of the breeding season (Whitehead and Payne 1981), time during which calves need the most energetic investment from their mothers in order to increase lactation (Lusseau 2014), coinciding with a peak in the proportion of time females spend resting (Thomas and Taber 1984), the activity state in which nursing takes place.

As such, this concentration of whale-watching interactions with female and calf groups towards the end of the breeding season, a critical period in calf development, could compromise calf growth, leading to increased mortality or decreased survival probability as they undertake the long migration to the feeding grounds (McMahon et al. 2000).

However, the northern coast of Bahia is not as important a breeding ground as the Abrolhos Bank, in southern Bahia, since a smaller proportion of individuals observed is of new-born calves (Pacheco de Godoy et al. 2005; Lunardi et al. 2008). Additionally, the northern coast is the area along Bahia that shows the smallest annual population growth rate (Wedekin 2011). As such, the whale-watching activity is less likely to impact calf birth or survival rates here than in Abrolhos, which is one of the main ways in whale-watching can have any long-term impacts on cetacean populations (Christiansen and Lusseau 2014). Additionally, data collected on-board whale-watching vessels for over 10 years in Praia do Forte show an increase in numbers of groups with calves sighted in the region, also a consequence of population growth, suggesting the activity is not having a negative impact on calving rate (Cipolotti 2013).

Another noteworthy aspect is that the whales show low site fidelity and occupancy rates on the north coast of Bahia, remaining in the same area for an average 5.5 days only, contrasting with 15 days in the Abrolhos Bank (Baracho-Neto et al. 2012). There are also significant differences in the concentration and distribution patterns of different social groups between the northern coast of Bahia and Abrolhos. Although these two regions comprise distinct concentrations of humpback whales, with intrinsic environmental differences, behaviour patterns are quite similar, suggesting these are not sub-populations and that differences in behaviour are due to the groups that use each area, groups with calves preferring the shallow and protected waters around Abrolhos (Lunardi et al. 2008).

The presence of coral reefs around the Abrolhos archipelago provide greater protection for calves, different from the straight and narrow continental shelf along Praia do Forte, where the female and calf groups use more extensive areas along this coast (Rossi-Santos et al. 2008). Zerbini et al. (2006) showed humpback whales to be extremely transient, moving around 42 km per day within their breeding grounds and Wedekin et al. (2010) found whales off the Brazilian coast to travel up to 600 km within the same breeding season.

As such, it can be anticipated that the pressure from whale-watching observation on individual groups of females and calves will be less in Praia do Forte than in Abrolhos, where the activity concentrates around the archipelago.

Another way in which whale-watching disturbance can affect humpback whale behaviour and reproduction is through acoustic interferences. Rossi-Santos (2016) observed good compliance by the local operators with the limits imposed by the Brazilian whale-watching regulations (minimum distance of 100 meters and maximum 30 minutes permanence time with each group). However, he also observed that whale-watching operations produce a frequency range similar to the song of the humpback whale, which may result in masking of this important breeding display during boat approach.

The strong growth in the humpback whale population, utilising the waters off Bahia, including Praia do Forte, however, suggests that any changes to behaviour resulting from interactions with whale-watching vessels to date have not been biologically significant, i.e. population growth is not inhibited. However, the increasing popularity of whale-watching means assessment and management of interactions must be ongoing and responsive to changes.

From a conservation perspective, human disturbances are only of concern if they affect survival or fertility, consequently decreasing population size (Gill et al. 2001). As previously mentioned, the Brazilian humpback whale population is demonstrating a consistent growth. Thus, in the absence of evidence of these long-term impacts, and bearing in mind all the important educational, social and economic benefits of whale-watching in Praia do Forte, and the important opportunities for scientific research it offers, the minor short-term levels of disturbance incurred from whale-watching may be considered acceptable (Fig. 12). As argued by Gill et al. (2001), without knowing whether behavioural changes do in fact result in population decline or distribution changes, there is a risk of limiting human access to wildlife, such as whale-watching, with all its associated benefits, in order to protect species which have their behaviour altered by human presence but suffer no other impacts.



Fig. 12 – Whale-watching in Praia do Forte, as a partnership between the IBJ and local operators, offers important awareness raising and education opportunities for the local community (A), tourists (C) and through the media (B), since whales are charismatic animals, capable of inspiring people to care about the oceans (D) (Photos: Enrico Marcovaldi/Instituto Baleia Jubarte).

8. Recommendations

Based on the information presented in this study, we consider the current level of knowledge of both the impacts on the whales and the quality and effectiveness of the services provided for the whale-watching tourists in Praia do Forte is insufficient to allow the calculation of carrying capacity for the activity. We can, however, make recommendations on aspects that should be taken into consideration and specific studies that should be developed in order to gather adequate information for the future determination of whale-watching carrying capacity in Praia do Forte, the North Coast Continental Shelf PA and other localities along the coast of Bahia:

- Maintaining the long-term monitoring of this activity, implementing specific studies to assess the impacts of whale-watching on the whales, in particular: behavioural studies from a land station (speed changes, path linearity, inter-breath intervals, activity budgets) (e.g. Lusseau et al. 2009;

Christiansen et al. 2013a; Christiansen et al. 2013b), cumulative exposure (encounter rate) (e.g. Christiansen et al. 2015) and bioacoustics studies to assess the potential effects of whale-watching vessel noise on the whales communication and reproduction (e.g. Au and Green 2000; Dunlop 2016)

- Maintaining the long-term monitoring of visitor feedback, implementing specific studies to evaluate visitor perception, educational value and attitudinal changes (e.g. Needham et al. 2011; Bentz et al. 2015; Bentz et al. 2016a; Bentz et al. 2016b)
- Implementing studies to assess the cumulative anthropogenic impacts of whale-watching and other human activities in the area (see Wright and Kyhn 2015)
- Revising the existing national whale-watching legislation to include: a reduced observation time of up to 15 minutes for groups containing calves; a 300 m buffer zone within which vessel speed must be gradually reduced and no sudden changes of speed or direction must be made; make compulsory the presence of a trained naturalist guide and the provision of interpretative information on whale biology and conservation on all whale-watching operations; make compulsory specific training for all staff involved in whale-watching activities
- Developing and implementing a Management and Public Use Plan for the North Coast Continental Shelf PA, involving different stakeholders, such as NGO's, tourism operators, local community and government authorities. The Management Plan, according to ordinance N° 117, must: determine the maximum number of vessels allowed to operate simultaneously and the routes and speed these vessels can operate in inside the PA. We also suggest the delimitation of areas where whale-watching is allowed, taking into account where the activity is already in place, such as Praia do Forte, and where it has potential to develop, and establishing closure areas to allow for long-term monitoring through control sites. Additional management measures could include the use of specific boat and engine types, as well as regular maintenance requirements, to reduce the amount of noise around the whales
- Establishing a whale-watching operators association could improve the activity's self-regulation and promote shared management, with initiatives as the implementation of standard procedures and prices, permit and passenger sharing to reduce the amount of vessels in the water when demand is below capacity and the adoption of well-established certification schemes such as Blue Flag or Whale Heritage Sites
- Implementing data collection in areas where the whale-watching activity can potentially develop in the near future along the Brazilian coast, such as

Vitoria/ES, to obtain baseline data and to allow the observation of changes over time as the activity develops (New et al. 2015)

9. Final Considerations

In this study, we examined the current literature on the sustainable management of whale-watching tourism and on tourism carrying capacity, in an attempt to assess the whale-watching carrying capacity for Praia do Forte, northeastern Brazil. We proposed an integrated framework to assess whale-watching carrying capacity, taking into account biological, social and economic factors, as well as management considerations.

By analysing the whale-watching industry in Praia do Forte under the light of this integrated framework, we concluded that: whale-watching in Praia do Forte is currently a low-impact activity, with no evident deleterious biological effects on the target population. It is economically viable, produces income, and jobs for the local community. It has a high educational value and visitor satisfaction levels are high.

However, there is a total lack of involvement from the government authorities in the management and enforcement of this activity, which relies mostly on self-regulation and on the collaboration with a non-governmental organisation for its management. As such, although we currently lack all necessary information to establish its carrying capacity, we suggest limiting the activity to its current level until more data and management capacity become available. Additionally, we make recommendations to improve our understanding of the impacts of this activity and its sustainable management in this locality.

Acknowledgements

This chapter is part of the first author's Master's degree in Ecology applied to Environmental Management at Universidade Federal da Bahia, Brazil. We are most grateful to the entire Instituto Baleia Jubarte team, especially to Sergio Cipolotti and Márcia Engel, for her support and encouragement. We are grateful to Milton Marcondes, José Truda Palazzo and David Lusseau for constructive discussions. We thank Guilherme Maurutto for his help with the map and Enrico Marcovaldi for the use of his photographs. We are grateful to PETROBRAS for the continued financial support of Projeto Baleia Jubarte.

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Conclusão geral

O turismo de observação de baleias é importante para a economia local de Praia do Forte, criando empregos e renda alternativa para os operadores de turismo durante a temporada baixa. A satisfação dos turistas com a atividade é elevada, apesar do seu crescimento na Praia do Forte ao longo dos anos. Ao mesmo tempo, as embarcações de turismo de observação de baleias representam uma importante plataforma de oportunidade para o estudo científico desta população e a coleta de dados científicos a bordo das embarcações de turismo na Praia Forte tem permitido o monitoramento a longo prazo dessa atividade.

Os movimentos longos e baixa fidelidade local demonstrados pelas baleias-jubarte na área de reprodução brasileira podem minimizar os impactos locais do turismo de observação de baleias que se concentra em determinadas regiões, como a Praia do Forte (BARACHO-NETO et al., 2012; WEDEKIN et al., 2010). No entanto, atualmente dispomos de informações científicas insuficientes sobre os impactos que essa atividade pode ter sobre os indivíduos que frequentam a área de Praia do Forte. Ainda assim, até estes dados estarem disponíveis a partir de estudos especificamente projetados para avaliar os impactos do turismo de observação na região, e em consonância com o princípio da precaução, recomendamos limitar o crescimento desta atividade até que mais informações estejam disponíveis e até que seja desenvolvida uma capacidade de manejo adequada para esta atividade.

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Anexos

A – Legislação brasileira

**MINISTÉRIO DO MEIO AMBIENTE, DOS RECURSOS HÍDRICOS E DA AMAZÔNIA LEGAL
INSTITUTO BRASILEIRO DO MEIO AMBIENTE E DOS RECURSOS NATURAIS
RENOVÁVEIS**

**PORTARIA Nº 117, DE 16 DEZEMBRO DE 1996
(Alterada pela Portaria nº 24, de 8 de fevereiro de 2002)**

O PRESIDENTE DO INSTITUTO BRASILEIRO DO MEIO AMBIENTE E DOS RECURSOS NATURAIS RENOVÁVEIS - IBAMA, no uso das atribuições previstas no artigo 24 da Estrutura Regimental anexa ao Decreto nº 78, de 5 de abril de 1991, e pelo artigo 83, inciso XIV, do Regimento Interno, aprovado pela portaria GM/MINTER nº 445, de 16 de agosto de 1989, e o que consta do processo nº 02001.4424/90-25;

- Considerando a necessidade de reformulação da Portaria nº 2306, de 22 de novembro de 1990, que define normas para evitar o molestarmento intencional de cetáceos em águas jurisdicionais brasileiras, de forma a possibilitar sua aplicação a toda espécie de cetáceo;
- Considerando a existência de diversas espécies de cetáceos que ocorrem regularmente no interior de Unidades de Conservação que permitem o acesso público e a necessidade de garantir sua proteção contra o molestarmento intencional;
- Considerando o crescente desenvolvimento do turismo voltado para observação de cetáceos em águas jurisdicionais brasileiras e a necessidade de seu ordenamento, de forma a garantir a adequação desta observação às necessidades de conservação desses animais; resolve:

Art. 1º - Fica definido o presente regulamento visando prevenir e coibir o molestamento intencional de cetáceos encontrados em águas jurisdicionais brasileiras, de acordo com a lei nº 7643, de dezembro de 1987.

Art. 2º - É vedado a embarcações que operem em águas jurisdicionais brasileiras:

- a) aproximar-se de qualquer espécie de baleia (cetáceos da Ordem *Myticeti*; cachalote *Physeter macrocephalus*, e orca *Orcinus orca*) com o motor engrenado a menos de 100m (cem metros) de distância do animal mais próximo, devendo o motor ser obrigatoriamente mantido em neutro, quando se tratar de baleia jubarte *Megaptera novaeangliae*, e desligado ou mantido em neutro, para as demais espécies;
- b) reengrenar ou ligar o motor para afastar-se do grupo antes de avistar claramente a (s) baleia (s) na superfície a uma distância de, no mínimo, de 50m (cinquenta metros) da embarcação;
- c) perseguir, com motor ligado, qualquer baleia por mais de 30 (trinta) minutos, ainda que respeitadas as distâncias supra estipuladas;
- d) interromper o curso de deslocamento de cetáceo(s) de qualquer espécie ou tentar alterar ou dirigir esse curso;
- e) penetrar intencionalmente em grupos de cetáceo(s) de qualquer espécie, dividindo-o ou dispersando-o;
- f) produzir ruídos excessivos, tais como música, percussão de qualquer tipo, ou outros, além daqueles gerados pela operação normal da embarcação, a menos de 300m (trezentos metros) de qualquer cetáceo;
- g) despejar qualquer tipo de detrito, substância ou material a menos de 500m (quinhentos metros) de qualquer cetáceo, observadas as demais proibições de despejos de poluentes previstas em Lei;
- h) aproximar-se de indivíduo ou grupo de baleias que já esteja submetido à aproximação de, no mesmo momento, de pelo menos, duas outras embarcações.

Art. 3º - É vedada a prática de mergulho ou natação, com ou sem o auxílio de equipamentos, a uma distância inferior a 50m (cinquenta metros) de baleia de qualquer espécie.

Art. 4º - Quando da operação de embarcações de turismo comercial no interior de Unidades de Conservação, nas quais ocorram regularmente a presença de cetáceos, caberá à Unidade em questão determinar:

- a) o cadastramento das embarcações que operem regularmente na Unidade de Conservação, devendo constar o seu registro competente junto ao Ministério da Marinha, nome, tamanho, tipo de propulsão e lotação de passageiros da embarcação, bem como qualificação e endereço do seu responsável ou responsáveis;
- b) o número máximo de embarcações cuja operação simultânea seja permitida no interior da Unidade de Conservação;
- c) quando da existência de áreas de concentração ou uso regular por cetáceos, a(s) rota(s) e velocidade(s) para trânsito de tais embarcações no interior e/ou na proximidade de tais áreas.

Art. 5º - Para a operação de embarcações de turismo comercial no interior de Unidades de Conservação nas quais ocorrem regularmente a presença de cetáceos, é obrigatória a provisão, em caráter permanente, de informações interpretativas sobre tais animais e suas necessidades de conservação, aos turistas transportados até aquelas Unidades.

Art. 6º - Para efeito do disposto nesta Portaria, considera-se embarcação de turismo comercial aquela que transporta passageiros com finalidade turística, mediante pagamento.

Art. 7º - É proibida a aproximação de quaisquer aeronaves a cetáceos em altitude inferior a 100m (cem metros) sobre o nível do mar.

Art. 8º - O IBAMA, ouvido o grupo de Trabalho Especial de Mamíferos Aquáticos, instituído pela portaria nº 2097, de 20 de dezembro de 1994, poderá permitir, em caráter excepcional e restrito a aproximação de embarcações e aeronaves a cetáceos em condições distintas das estabelecidas nos art. 2º, 3º e 7º, exclusivamente para finalidades científicas.

Art. 9º - Os infratores das normas estabelecidas nesta Portaria estarão sujeitos às penalidades determinadas pela Lei nº 7643, de 18 de dezembro de 1987, e demais normas legais vigentes.

Art. 10 - Esta Portaria entrará em vigor na data de sua publicação, revogadas as disposições em contrário, especialmente a Portaria nº 2306, de 22 de novembro de 1990.

EDUARDO DE SOUZA MARTINS

Presidente

(Publicada no Diário Oficial da União de 27 de dezembro de 1996, emendada pela Portaria nº 24/2002, assinada pelo então presidente do IBAMA, Sr. HAMILTON NOBRE CASARA, e publicada no DOU 13 de fevereiro de 2002.)

B - Questionário entregue aos turistas na Praia do Forte pela equipe do Instituto Baleia Jubarte

Turismo de Observação de Baleias: Observando a Vida!!!

Sua participação é a principal ferramenta para a conservação, colabore com sua informação:

Data: / /20_____

01 – Origem: País _____ Estado _____

02- Sexo do entrevistado: A-() Masculino B-() Feminino

03- Qual a sua idade? A-() 15 a 21 B-() 22 a 30 C-() 31 a 40 D-() 41 a 50 E-() 51 a 59
F-() acima de 60

04-Em que local está hospedado para fazer este passeio?

A-() Praia do Forte C-() Costa do Sauípe

B-() Imbassai D-() Salvador

E-() Outra: _____

05- Qual o meio de hospedagem utilizado quando permanece neste município?

A-() Hotel D-() Casa de parentes e amigos

B-() Pousada E-() Outros: _____

C-() Acampamento

06- Você costuma fazer as refeições em:

A-() Restaurantes C-() Bar/Lanchonetes/Similares

B-() No próprio local onde está hospedado D-() Não utiliza estes lugares

07- Qual o principal motivo desta viagem?

A-() Trabalho/Negócios B-() Visita a parentes/amigos

C-() Turismo/Lazer D-() Observar baleias E-() Estudos e pesquisa

F-() Outros: _____

08- Antes desta viagem, onde o Sr(a) se lembra de ter visto ou ouvido alguma coisa sobre as baleias dessa região ?

A-() Jornal D-() Revista G-() Não tinha conhecimento

B-() Rádio, TV E-() Agência de viagem

C-() Amigos F-() Outros: _____

09- Voltaria em outra oportunidade?

A-() Sim B-() Não Motivo: _____

10 - Pontue os itens abaixo relacionados ao serviço oferecido, de acordo com o seu grau de satisfação (de 0 a 5).

Qualidade da operadora	0	1	2	3	4	5	0 = Pésimo 1 = Ruim 2 = Regular 3 = Bom 4 = Muito bom 5 = Excelente
Preço	0	1	2	3	4	5	
Segurança oferecida	0	1	2	3	4	5	
Pontualidade	0	1	2	3	4	5	
Duração do passeio	0	1	2	3	4	5	
Satisfação das suas expectativas	0	1	2	3	4	5	
Conduta da embarcação segundo as normas de aproximação de baleias	0	1	2	3	4	5	
Explicações do guia naturalista da operadora durante o passeio	0	1	2	3	4	5	
Explicações do biólogo durante a palestra no Instituto Baleia Jubarte	0	1	2	3	4	5	
Infra-estrutura oferecida pelo Centro de Visitantes do IBJ	0	1	2	3	4	5	

Comentários e Sugestões:

11- Quantos dias pretende permanecer na cidade em que está hospedado? _____

12- Costuma visitar este local? A-() 1ª vez B-() 2ª vez C-() Mais de 2 vezes
D-() Mensalmente E-() Anualmente

13- Caso já tenha vindo a essa região anteriormente o que observou?

A-() mudanças positivas B-() mudanças negativas C-() nenhuma mudança

14- Como está viajando? A-() Sozinho B-() Em família C-() Com amigos

Nº de pessoas na família: ____ Adultos ____ Crianças

15- Qual o meio de transporte utilizado na viagem?

A-() Carro de passeio próprio C-() Avião E-() Ônibus de regular
B-() Carro de passeio locado D-() Ônibus fretado F-() Outros: _____

16- Quanto o Sr(a). gastou ou pretende gastar (estimativa em R\$) nesta viagem entre:

Hospedagem (diária): _____ Alimentação (por dia): _____

Souvenirs: _____ Passeios: _____

Transporte (incluir aéreo): _____ Outros (por dia): _____

17- Qual (is) atrativo(s) achou mais interessante nesta região?

A-() Praias C-() Manifestações culturais E-() Patrimônio histórico

B-() Baleias D-() Bens e serviços turísticos F-() Comunidade local

G-() Projeto Tamar Outros: _____

18- Quanto o Sr(a). gastou aqui no passeio de observação das baleias?

A- Saída de barco: _____ C- Souvenirs: _____

B- Alimentação: _____ E- Outros: _____

19- Já tinha feito observação de baleias anteriormente? () Não

() Sim n. de vezes _____ lugar _____

- 20- Se tivesse oportunidade, quanto estaria disposto a pagar para observar baleias novamente?
A - () nada B - () de 0 a 30 reais C - () de 30 a 60 reais D - () de 60 a 90 reais E - () de 90 a 120
F - () acima de 120
- 21- O Sr. (a) já contribui de alguma forma para a conservação ambiental? () Não
() Sim, De que forma? _____
- 22 - Se houvesse oportunidade, o Sr. (a) estaria disposto a contribuir para a conservação das baleias?
() Não
() Sim, De que forma? _____
- 23- Por favor, indique seu grau de escolaridade:
A- () 1º Grau incompleto C- () 2º Grau incompleto E- () Superior incompleto
B- () 1º Grau completo D- () 2º Grau completo F- () Superior completo
G - () Outro _____
- 24- Qual sua renda mensal (salários mínimos)? A- () até 2 salários mínimos B- () de 2 a 4
C- () de 5 a 6 D- () de 7 a 8
E- () de 9 a 10 F- () acima de 10

Muito obrigado pela sua colaboração!!!

C - Questionário entregue às operadoras de turismo de observação de baleias

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

Prezado Senhor (a):

Acreditando na importância do turismo de observação de baleias como ferramenta de conservação destes animais e seu ambiente natural, podendo contribuir para o crescimento econômico, geração de empregos e renda para as comunidades locais, o (a) convidamos a participar, como voluntário, desta pesquisa a qual pretende levantar informações sobre o perfil, as motivações e a satisfação das agências de turismo envolvidas com a observação de baleias. No caso, de aceitar fazer parte da mesma, você responderá a um questionário.

Sua participação será de grande importância para contribuir com o incentivo e o desenvolvimento sustentável da atividade de observação de baleias. Você terá liberdade para pedir esclarecimentos sobre qualquer questão e, se desejar, desistir de participar da pesquisa em qualquer momento, não haverá nenhum tipo de penalidade. Como responsável por este estudo, ressalto que tenho o compromisso de manter em segredo todos os dados confidenciais, bem como de indenizá-lo, caso você sofra algum prejuízo físico ou moral por causa do mesmo. Assim, se está claro para o senhor (a) a finalidade desta pesquisa e se concorda em participar, peço que responda as questões, sendo que não haverá nenhum tipo de identificação pessoal. Meus sinceros agradecimentos por sua colaboração,

Luena Fernandes

Pesquisadora Responsável

Contato: luena.fernandes@baleiajubarte.org.br

Local e data:

Assinatura:

Ressaltamos que as informações sobre sua empresa ou organização serão confidenciais. Se não tiver certeza de suas respostas, por favor indique uma estimativa ou deixe o espaço em branco.

Nome do entrevistado:

Cargo:

Nome da empresa:

Tipo de prestadora de serviços turísticos (agência, operadora, etc.):

Cidade:

E-mail:

Telefone:

Website:

01 – Desde quando sua empresa trabalha com turismo nesta localidade?

02 – Quais os passeios ou atividades turísticas sua empresa oferece? Por favor, indique quais os períodos em que são oferecidas.

03 – Desde quando sua empresa oferece o turismo de observação de baleias?

04 - Qual o número de funcionários fixos de sua empresa?

05 – Quantos funcionários trabalham diretamente com o Turismo de observação de baleias? Se houver, quantos deles são contratados apenas na temporada de baleias?

06 - Quantos destes funcionários pertencem à comunidade local onde sua empresa opera?

07 – Por favor, indique ou estime o número de saídas de observação de baleias e o número de turistas ao longo dos anos de operação:

08 – Qual o valor pago pelos turistas para observar baleias com sua empresa, ao longo destes anos?

09 – Por favor, indique o número, tipo (tamanho, motor, etc.) e capacidade (passageiros, tripulação) das embarcações utilizadas e os diferentes serviços oferecidos (palestra pré-embarque, guia naturalista, material interpretativo, alimentação/bebidas, etc.).

10 – Quantas saídas são realizadas por dia e qual a duração do passeio?

11 – Na sua opinião, qual o maior atrativo turístico de sua localidade, durante e fora da temporada de baleias? Qual passeio é mais vendido e apresenta um maior retorno?

12 – Como o estado de conservação das baleias-jubarte é vista pelo (a) senhor (a) e pela sua empresa? Qual a sua importância?

13 - Quais suas expectativas quanto a atividade de observação de baleias? Tem trazido bons resultados? Acredita que seus turistas ficam satisfeitos?

14 - Quais os fatores positivos (êxitos) e negativos (dificuldades) desta atividade para sua empresa?

15 - Você acredita que existe potencial de crescimento para esta atividade na Praia do Forte? Qual seria na sua opinião um limite aceitável para esta atividade (número de operadoras/barcos/saídas por dia/turistas por ano)?

16 - Considera esta atividade financeiramente viável e rentável para a sua empresa? Qual sua expectativa em relação a isto?

17 - Existe alguma forma de apoio do poder público no desenvolvimento/monitoramento desta atividade? Qual? E em relação a iniciativa privada, quem são os parceiros?

18 - Acredita que há concorrência neste mercado? Quais os principais concorrentes? Qual o diferencial de sua empresa?

19 - Sua empresa apoia a conservação das baleias? De que forma?

20 - Alguma consideração final sobre o turismo de observação de baleias? (Dificuldades, sucessos, intenções, objetivos da empresa, comentários)?

Caso sua empresa / organização queira ter conhecimento dos resultados desta pesquisa, por favor indique abaixo o melhor contato: