Understanding the social dimensions of tiger conservation in India

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Abstract

Tiger conservation represents many of the challenges facing biodiversity conservation internationally. It requires the protection of a potentially-dangerous predator in forested ecosystems, which are also utilized by some of the poorest human populations for survival and livelihoods. In such contexts, establishing exclusive protected areas for tiger conservation can antagonize local stakeholders, yet their support is crucial to successfully managing the protected areas. This thesis presents exploratory research into the social dimensions of tiger conservation in India, and ultimately informs policy and management of biodiversity conservation in a variety of contexts.

Conservation policy and management is known to be affected by the viewpoints of professionals, often realized through advocacy coalitions. A quantitative study combining the Q-Method with a traditional survey of conservation professionals in India revealed five dominant viewpoints of tiger conservation: 1) community-centered; 2) tiger-centered; 3) science and tourism-led; 4) instrumental approach; and 5) moral-centred. The results offer insight on areas where conservation professionals agree, and may help to frame more effective tiger conservation policy discourse in India.

Focussing on Corbett Tiger Reserve, India, a qualitative study explores the socio-political process through which local stakeholders articulate their concerns regarding tiger conservation, in order to elicit desired reactions from park management. The results provide insight to the local-level socio-political processes which make tiger conservation outcomes susceptible to local pressures.

A quantitative assessment of the social capital that exists within three villages located around Corbett Tiger Reserve offers important insights on the ways in which social capital is affected by tiger conservation, and the extent to which this can affect the potential for collective action for, or against, tiger conservation objectives.

A qualitative study into the social and ecological impacts associated with intensive wildlife tourism on a village bordering Corbett Tiger Reserve sheds light on the linkages between the ecological, socio-economic and institutional aspects affecting tiger conservation objectives. Rapid and unplanned tourism expansion has created financial disparity among the village residents, affecting their solidarity and creating perverse challenges for village institutions seeking to reduce conflict, highlighting the local-level complexity of tiger conservation.

This research considers the politics, policy and practice of tiger conservation in India. The results will be useful in both administering short-term solutions within the existing policy framework, and in devising long-term trajectories for tiger conservation policy and management in India. The results may also assist policy makers to frame more appropriate conservation policies, by better projecting the potential socio-political implications of tiger conservation.

Résumé

La conservation du tigre présente de nombreux défis qui sont ceux de la conservation de la biodiversité au niveau international. Elle exige la protection d'un prédateur potentiellement dangereux dans des écosystèmes forestiers, qui sont également utilisés par certaines des populations les plus pauvres pour leur survie et leurs moyens de subsistance. Dans de tels contextes, l'établissement de zones protégées exclusives pour la conservation du tigre peut contrarier les parties prenantes locales. Néanmoins leur soutien est crucial pour réussir à gérer ces zones protégées. Cette thèse présente une recherche exploratoire sur les dimensions sociales de la conservation du tigre en Inde, puis illustre comment les prendre en comptes dans la politique et la gestion de la conservation de la biodiversité dans une variété de contextes.

La politique de conservation et de gestion souvent réalisée par des coalitions de plaidoyer est connue pour être affectée par les points de vue des professionnels. Une étude quantitative, combinant la Q-Méthode avec une enquête traditionnelle de professionnels de la conservation en Inde, a révélé cinq points de vue dominants concernant la conservation du tigre: 1) centrée sur la communauté, 2) centré sur le tigre, 3) dirigé par la science et le tourisme, 4) approche instrumentale; et 5) centrée sur la morale. Les résultats permettent de comprendre les aspects sur lesquels s'accordent les professionnels de la conservation, et peuvent ainsi aider à encadrer davantage le discours d'une politique efficace de conservation du tigre en Inde.

En prenant l'exemple de Corbett Tiger Reserve en Inde, une étude qualitative explore le processus socio-politique par lequel les parties prenantes locales exprime leurs préoccupations en ce qui concerne la conservation du tigre, afin de susciter les réactions

souhaitées dans la gestion du parc. Les résultats permettent de saisir des processus socio-politiques au niveau local qui rendent les résultats de la conservation du tigre sensibles aux pressions locales.

Une évaluation quantitative du capital social qui existe dans les trois villages situés autour de Corbett Tiger Reserve offre des renseignements importants sur la manière dont le capital social est affecté par la conservation du tigre, et dans quelle mesure cela peut affecter le potentiel de l'action collective en faveur ou contre les objectifs de conservation du tigre.

Une étude qualitative sur les impacts sociaux et écologiques associés au tourisme intensif de la faune sur un village bordant Corbett Tiger Reserve met en lumière les liens entre les aspects écologiques, socio-économiques et institutionnels affectant les objectifs de conservation du tigre. L'expansion du tourisme rapide et non planifiée a créé une disparité financière entre les habitants du village qui affecte leur solidarité et engendre des défis pervers pour les institutions villageoises qui cherchent à réduire les conflits, soulignant la complexité au niveau local de la conservation du tigre.

Cette recherche examine la politique et la pratique de la conservation du tigre en Inde. Les résultats seront utiles à la fois pour la mise en œuvre de solutions à court terme dans le cadre de la politique existante, et pour concevoir des trajectoires à long terme concernant la politique de conservation et de gestion du tigre en Inde. Les résultats peuvent aussi aider les décideurs à élaborer des politiques de conservation plus appropriées, par une meilleure prise en compte des potentielles implications socio-politiques dans la conservation du tigre.

Contributions to knowledge

Chapter 2

- Linking the literature from several disciplines, I present a detailed review that underlines the inherent dilemma facing tiger conservation: tiger conservation requires large (and exclusively managed) protected areas, and yet, these protected areas can antagonize local communities, whose support is instrumental for effective management outcomes. Such antagonism often creates local-level challenges, which have led to the disappearance of the tiger from at least two Tiger Reserves in India.
- To address this challenge we need to better understand the social dimensions of tiger conservation to improve the effectiveness and sustainability of policy and management interventions.

Chapter 3

- The worldviews of advocacy coalitions are known to be a driver for policy-making, yet we know little about how viewpoints drive tiger conservation policy in India.
- I identify that conservation professionals in India have five dominant viewpoints on tiger conservation: 1) community-centred; 2) tiger-centred; 3) science and tourism-led; 4) instrumental approach; and 5) moral-centered.
- Although discourse among conservation professionals is often overwhelmed by disagreement among the 'tiger-tribal' viewpoints, I found potential for agreement.

Chapter 4

- While local-level stakeholder interactions directly affect tiger conservation measures, the available evidence is largely anecdotal. I provide a theoretical model of the local-level socio-political processes affecting tiger conservation in India.
- For Corbett Tiger Reserve (India), I identify the socio-political process through which local stakeholders articulate their concerns regarding tiger conservation, in order to elicit desired reactions from park management.

Chapter 5

- Local communities are known to affect the management of tiger conservation. However, the potential role of social capital in determining impact has not been assessed in the context of tiger conservation.
- Assessing the social capital of communities in Corbett Tiger Reserve (India), I found that the unmanaged growth of intensive wildlife tourism has increased financial disparity in local village communities, affecting social capital and trust among villagers.
- I found that individuals with high levels of social capital were more likely to create collective action in response to a tiger-related incident. This underlines that communities with high social capital can have significant implications for reserve management objectives, through their ability to act collectively to support or oppose conservation initiatives.

Chapter 6

- Although tourism is regarded as a means of engaging local communities in conservation, relatively little empirical evidence exists on the effects of wildlife tourism on local communities bordering Tiger Reserves in India.
- Focussing on a village adjacent to Corbett Tiger Reserve (India), I found that the unregulated growth of wildlife tourism rapidly impacted village structure, solidarity and institutions, decreasing the potential of the local community to support conservation management objectives.

Contributions of co-authors and remarks on style

This thesis follows a manuscript-based format. As a result, there is some repetition in the text.

I am the primary author of all the chapters of the thesis. Chapter 2, 3, 4, and 6 are co-authored with Dr. Gordon M. Hickey, Dr. Ruchi Badola and Dr. S A Hussain. Chapter 5 is co-authored with Dr. Gordon M. Hickey and Sneha Thapliyal. Chapter 2 has been published in the *Journal of Environmental Management* (2012). Chapter 3 has been published in *Biological Conservation* (2013). Chapter 4 is under review at *Environmental Management.* Chapter 5 is in preparation for submission to an international peer-reviewed journal. Chapter 6 has been submitted to *Land Use Policy* and is under review.

Dr Gordon M. Hickey provided academic supervision, intellectual input, methodological and theoretical development, funding and writing support for all chapters. Dr Ruchi Badola and Dr S A Hussain provided feedback, supervision, and institutional support, particularly during fieldwork related to Chapters 3, 4, and 6. Sneha Thapliyal provided academic input and assisted with the statistical analysis for Chapter 5.

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List of Abbreviations

ACF	Advocacy Coalition Framework
CNP	Corbett National Park
CTR	Corbett Tiger Reserve
FQRSC	*Fonds de recherche sur la société et la culture*
IAD	Institutional Analysis and Development
IUCN	International Union for Conservation of Nature
NTCA	National Tiger Conservation Authority
MoEF	Ministry of Environment and Forests
PA	Protected Area
SCAT	Social Capital Assessment Tool
SC-IQ	Integrated Questionnaire for the Measurement of Social Capital
TCF	The Corbett Foundation
TR	Tiger Reserve
WII	Wildlife Institute of India
WPA	*Wildlife (Protection) Act 1972*

CHAPTER 1: GENERAL INTRODUCTION

1.1. Background

There is debate among scientists on the efficacy of using top predators as umbrella species for conservation (Rodrigues et al. 2004; Ozaki et al. 2006). Nevertheless, it remains that conservation managers have found the tiger (*Panthera tigris*) very useful in conserving large areas of habitat. For example, despite the economic issues facing India in the 1970s, the Indian government launched Project Tiger, the largest conservation program in Asia at the time (Panwar 1982; Lewis 2005). Project Tiger, and the subsequent legislation that was enacted, allowed for the establishment of a series of protected areas across India. As a result, India now has one of the largest and most important populations of wild tiger in the world (Jhala et al. 2011; Mondol et al. 2009). While the recent literature makes a strong case for a more extensive network of protected areas for tiger conservation, tiger habitats continue to decrease (Lynam et al. 2007; Dinerstein et al. 2006). Recent studies have found tigers occupying only seven percent of their historical range (Wikramanayake et al. 1998; Dinerstein et al. 2006). This situation clearly demonstrates how crucial the existing protected areas are for achieving tiger conservation objectives internationally. However, tiger conservation efforts can create regional issues. For example, demands for strict protected conservation areas often disturb the traditional lifestyles of local communities, and upset the societal goal of equitable development (Lele et al. 2010; Wilshusen et al. 2002). As a result, there has been increasing attention paid to including local communities in protected area management (Dressler et al. 2010) and increasing collaboration among various

conservation agencies promoting tiger conservation efforts (Kawanishi and Seidensticker 2010). Importantly, the formal control of protected areas in India is vested in the central governments. Other stakeholder[1] groups such as academia, media, civil society organisations, industrial lobbies, political groups and donor agencies, can also wield significant influence in protected area management (Jamal and Stronza 2009; Grimble and Chan 2009; Reed et al. 2009). Furthermore, distant authorities, such as the Supreme Court of India, can exert great influence on habitat protection efforts. Finally, broad public concern for conservation has led to heated public debate in the Indian media, which can also affect the management of protected areas (Karanth and Karanth 2012). Despite the significant role that these stakeholder groups play on the efficacy of tiger protection efforts in India, there has been little research to date on how social dimensions are affecting the management of protected areas for tiger conservation.

1.2. Motivations for the research

At the time of starting this PhD research in 2008, the tiger had recently disappeared from Sariska Tiger Reserve, and later from the Panna Tiger Reserve (Ali 2009; Reddy 2008). There were real concerns in the conservation community that India's tiger populations may not have long to survive. The Prime Minister's Tiger Task Force subsequently published a report that divided the conservation community regarding the role of local communities (Project Tiger 2005). Although conservationists differed on the precise role that communities should play in tiger conservation, this role could not be ignored. There were global summits to deliberate over protecting the tiger (e.g. the International Tiger

[1] Brugha and Varvasovszky (2000) defined stakeholders as 'individuals, groups and organizations who have an interest (stake) and the potential to influence the actions and aims of an organization, project or policy direction'.

Conservation Forum meeting in November 2010 in St. Petersburg, Russia), with high-profile international effort to save the remaining populations (for example, Global Tiger Initiative launched in June 2008; see, http://www.globaltigerinitiative.org). Many crucial forms of support to tiger conservation were reinforced: large-scale government support, financial resources, international support, available research and expertise (Anon 2010). Yet, the threats to India's tiger populations were not reduced. The fundamental driver for this Ph.D. research was to better understand why these conservation efforts are not satisfactorily protecting the tiger, despite concerted and long-term efforts. The aim of this work was to shed light on socio-ecological interactions affecting tiger conservation objectives with a view to informing tiger conservation policy and management discourse in India.

Tiger conservation represents an ideal example of the complex challenges facing international biodiversity conservation efforts. The tiger is a symbol that enables the conservation of a range of ecosystems, and is now a global imperative for numerous agencies. However, the tiger is also a large and potentially dangerous predator, found mostly in regions that have the largest, densest and poorest human populations, leading to severe conflict with local communities (Rangarajan 2001; Dinerstein et al. 2007). Such issues often result in negative outcomes for tiger conservation (Project Tiger 2005). While the scientific literature on tiger conservation stresses the need to create a "political will" for conservation, little work has actually been done to examine the critical social dimensions involved in the implementation of tiger conservation measures (Dinerstein et al. 2006).

Through this PhD dissertation, I propose substantive theory on the socio-political dimensions of tiger conservation efforts at local, regional and national levels in India—an area not sufficiently explored in the tiger conservation literature. The research outcomes are directed to help policy makers, donor agencies, and conservationists to make informed decisions on conservation initiatives, by generating grounded theory for management of Tiger Reserves in India. The research aims to provide a strong theoretical foundation from which decision-makers can improve tiger conservation outcomes in India and biodiversity conservation internationally.

1.3. Research objective

The objective of this research was to better understand how social factors affect tiger conservation policy and practice in India. More specifically, the research aimed to:

1. Provide a detailed review of the literature to better understand and frame the socio-ecological challenges facing tiger conservation in India;
2. Identify and assess the diverse viewpoints of conservation professionals in India regarding tiger conservation;
3. Describe the local-level political processes that can affect the implementation of tiger conservation measures;
4. Assess the social capital in local communities located around a tiger reserve and consider the implications of this for tiger conservation efforts; and
5. Critically examine the social impacts associated with intensive wildlife tourism on a village bordering a tiger reserve in India.

1.4. Theoretical approach

This research was developed using a post-positivist worldview (Creswell 2007), recognizing that science is not directly translated into policy without input from other social spheres (Sarewitz 2004). Further, tiger policy is intimately affected by the policy subsystems operating at each level (Howlett and Ramesh 1995), affected by social actors depending upon their attributes, such as inclination, interests, value systems, resources, leadership, and alliances with other groups (Schmeer 2000). The research was informed by the constructivist paradigm, which *"... assumes a relativist ontology (there are multiple realities), a subjectivist epistemology (knower and respondent co create understanding), and a naturalistic (in the natural world) set of methodological procedures"* (Denzin and Lincoln 2005).

1.5. General methodological approach

Grounded theory (Glaser and Strauss 1967) was the predominant theoretical approach used in this research. Following this methodology, priority was placed on the phenomena of study, with both the data and analysis being created from shared experiences and relationships with participants and other sources of data (Charmaz 2006). This allowed me to learn how, when and to what extent the studied experience was embedded in larger (often hidden) positions, networks, situations and relationships (Charmaz 2006). Grounded theory has previously generated useful models for protected area management (Stoll-Kleemann 2001). Research findings were triangulated and validated through the research design, described further in each individual chapter.

1.6. Organization of the thesis

This research was carried out through a series of connected research steps, designed to progressively inform the research question (refer Figure 1-1 and Table 1-1). The thesis follows a manuscript-based format and is written as a series of papers, each of which are at various stages of publication in international peer-reviewed journals (Table 1-1).

In Chapter 2, I present the results of a detailed literature review to understand the biological requirements for tiger conservation, the requirement of protected areas, the issues associated with these protected areas and the potential for reconciliation among the different branches of literature. Through the review, I propose a dilemma inherent in tiger conservation, and identify important knowledge gaps regarding tiger conservation in India.

In order to better understand the societal drivers and motivations for tiger conservation, we need to explore the professional worldviews that inform tiger conservation policy and practice. In Chapter 3, I present a Q-method analysis and survey of conservation professionals in India to ascertain their viewpoints on tiger conservation. This exploratory analysis identifies potential conflicts and areas of agreement for tiger conservation policy development and implementation.

The remaining three results chapters present case study research carried out in Corbett Tiger Reserve, India.

In Chapter 4, I describe the ways in which local stakeholders interact and organize to elicit desired reactions from the management of Corbett Tiger Reserve. The results provide insight to the local-level socio-political processes which make tiger conservation outcomes susceptible to local pressures.

Building on this analysis, Chapter 5 examines the capacity of local communities to act collectively. Using a survey to assess the social capital that exists within three villages around Corbett Tiger Reserve, I sought to better understand the ways in which social capital is affected by tiger conservation and the extent to which this can affect collective action for, or against, tiger conservation objectives.

In Chapter 6, I present the results of a qualitative study into the social and ecological impacts associated with intensive wildlife tourism on a village bordering Corbett Tiger Reserve. The results provide important insights on the linkages between the ecological, socio-economic and institutional aspects of the socio-ecological system. I also describe perverse challenges facing village institutions seeking to reduce conflict, highlighting the complexity of tiger conservation.

In Chapter 7, I present a general discussion and conclusion to the thesis, including future research directions.

Methodologically, the results chapters alternate between qualitative and quantitative data collection and analysis. Further, I have aimed to apply diverse branches of science, including psychometrics, social science, natural resource management, conservation biology, policy studies, political science and development studies (refer, Table 1-1). Each chapter provides insights on how social dimensions affect tiger conservation from progressively more refined levels: literature, national, protected-area, community, and village levels. Taken together, this thesis presents complex and multi-scalar perspectives on the social dimensions affecting tiger conservation in India.

References

Ali FM (2009) Indian tiger park 'has no tigers' BBC News. http://news.bbc.co.uk/2/hi/south_asia/8150382.stm. Accessed August 18 2009

Anon (2010) World leaders back tiger summit rhetoric with recovery plan, seed money. WWF. http://wwf.panda.org/what_we_do/endangered_species/tigers/news_pubs/?197152 . Accessed February 19 2013

Brugha R, Varvasovszky Z (2000) Stakeholder analysis: a review. Health Policy and Planning 15 (3):239-246. doi:10.1093/heapol/15.3.239

Charmaz K (2006) Constructing grounded theory : a practical guide through qualitative analysis. Sage Publications, London ; Thousand Oaks, Calif.

Creswell JW (2007) Qualitative inquiry & research design: Choosing among five approaches. 2nd edn. Sage Publications, California, London, New Delhi

Denzin NK, Lincoln YS (eds) (2005) The SAGE handbook of qualitative research. 3rd edn. Sage Publications, Thousand Oaks

Dinerstein E, Loucks C, Heydlauff A, Wikramanayake E, Bryja G, Forrest J, Ginsberg J, Klenzendorf S, Leimgruber P, O'Brien T, Sanderson E, Seidensticker J, Songer M (2006) Setting Priorities for the Conservation and Recovery of Wild Tigers: 2005-2015. A User's Guide. WWF, WCS, Smithsonian and NFWF-STF, Washington, D.C. - New York

Dinerstein E, Loucks C, Wikramanayake E, Ginsberg J, Sanderson E, Seidensticker J, Forrest J, Bryja G, Heydlauff A, Klenzendorf S, Leimgruber P, Mills J, O'Brien TG, Shrestha M, Simons R, Songer M (2007) The Fate of Wild Tigers. BioScience 57 (6):508-514. doi:doi:10.1641/B570608

Dressler W, Buscher B, Schoon M, Brockington D, Hayes T, Kull CA, McCarthy JD, Shrestha K (2010) From hope to crisis and back again? A critical history of the global CBNRM narrative. Environmental Conservation 37 (01):5-15. doi:doi:10.1017/S0376892910000044

Glaser BG, Strauss AL (1967) The discovery of grounded theory: strategies for qualitative research. Aldine Pub. Co., Chicago

Grimble R, Chan M Stakeholder analysis for natural resource management in developing countries. In, 2009. John Wiley & Sons, pp 113-124

Howlett M, Ramesh M (1995) Studying public policy: policy cycles and policy subsystems. Oxford University Press, Toronto

Jamal T, Stronza A (2009) Collaboration theory and tourism practice in protected areas: stakeholders, structuring and sustainability. Journal of Sustainable Tourism 17 (2):169-189

Jhala YV, Qureshi Q, Gopal R, Sinha PR (eds) (2011) Status of the Tigers, Co-predators, and Prey in India, 2010. National Tiger Conservation Authority, Govt. of India, New Delhi, and Wildlife Institute of India, Dehradun,

Karanth KK, Karanth KU (2012) A Tiger in the Drawing Room. Can Luxury Tourism Benefit Wildlife? Economic & Political Weekly XLVII (38):38-43

Kawanishi K, Seidensticker J (2010) Collaborations and Partnerships Are Essential to Sustain Wild Tiger Populations. In: Tilson R, Nyhus PJ (eds) TIGERS OF THE WORLD: The Science, Politics, and Conservation of *Panthera Tigris*. Second Edition edn. Academic Press, London, Burlington, San Diego, pp 175-184

Lele S, Wilshusen P, Brockington D, Seidler R, Bawa K (2010) Beyond exclusion: alternative approaches to biodiversity conservation in the developing tropics. Current Opinion in Environmental Sustainability 2 (1-2):94-100

Lewis M (2005) Indian science for Indian tigers? Conservation biology and the question of cultural values. J Hist Biol 38 (2):185-207. doi:10.1007/s10739-004-1486-8

Lynam AJ, Laidlaw R, Noordin WSW, Elagupillay S, Bennett EL (2007) Assessing the conservation status of the tiger Panthera tigris at priority sites in Peninsular Malaysia. Oryx 41 (4):454-462. doi:10.1017/s0030605307001019

Mondol S, Karanth KU, Ramakrishnan U (2009) Why the Indian Subcontinent Holds the Key to Global Tiger Recovery. PLoS Genet 5 (8):e1000585

Ozaki K, Isono M, Kawahara T, Iida S, Kudo T, Fukuyama K (2006) A mechanistic approach to evaluation of umbrella species as conservation surrogates. Conserv Biol 20 (5):1507-1515. doi:10.1111/j.1523-1739.2006.00444.x

Panwar H (1982) What to do when you've succeeded: Project Tiger 10 years later. Ambio 11 (6):330-337

Project Tiger (2005) Joining The Dots: The Report of the Tiger Task Force Union Ministry of Environment and Forests, Government of India, New Delhi

Rangarajan M (2001) India's wildlife history : an introduction. Permanent Black in association with Ranthambhore Foundation : Distributed by Orient Longman, Delhi

Reddy G (2008) Lessons from Two Local Extinctions: Sariska and Kailadevi (Ranthambhore) in Rajasthan, India. Conservation & Society 6 (3):256-262

Reed MS, Graves A, Dandy N, Posthumus H, Hubacek K, Morris J, Prell C, Quinn CH, Stringer LC (2009) Who's in and why? A typology of stakeholder analysis methods for natural resource management. Journal of environmental management 90 (5):1933-1949

Rodrigues ASL, Andelman SJ, Bakarr MI, Boitani L, Brooks TM, Cowling RM, Fishpool LDC, da Fonseca GAB, Gaston KJ, Hoffmann M, Long JS, Marquet PA, Pilgrim JD, Pressey RL, Schipper J, Sechrest W, Stuart SN, Underhill LG, Waller RW, Watts MEJ, Yan X (2004) Effectiveness of the global protected area network in representing species diversity. Nature 428 (6983):640-643. doi:10.1038/nature02422

Sarewitz D (2004) How science makes environmental controversies worse. Environmental Science & Policy 7 (5):385-403

Schmeer K (2000) Stakeholder Analysis Guidelines. In: Policy Toolkit for Strengthening Health Sector Reform. Regional Office of the World Health Organization, Washington, D.C. ,

Stoll-Kleemann S (2001) Barriers to nature conservation in Germany: A model explaining opposition to protected areas. Journal of Environmental Psychology 21 (4):369-385

Wikramanayake ED, Dinerstein E, Robinson JG, Karanth U, Rabinowitz A, Olson D, Mathew T, Hedao P, Conner M, Hemley G, Bolze D (1998) An ecology-based method for defining priorities for large mammal conservation: The tiger as case study. Conserv Biol 12 (4):865-878

Wilshusen PR, Brechin SR, Fortwangler CL, West PC (2002) Reinventing a Square Wheel: Critique of a Resurgent "Protection Paradigm" in International Biodiversity Conservation. Society & Natural Resources 15 (1):17-40

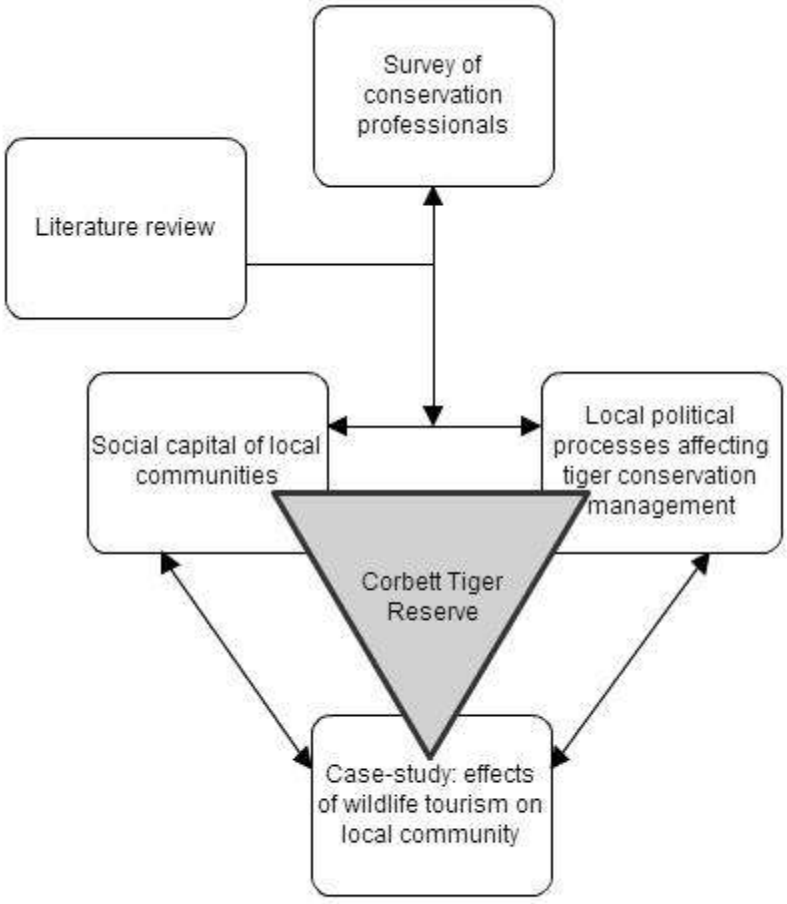

Figure 1-1 Conceptual organization of the thesis

Table 1-1 Organization of the thesis.

Chapter	Scope of analysis	Dominant methodological discipline					Major analytical method	Qualitative/ Quantitative	Targeted journal
		Interdisciplinary review	*Psychometrics*	*Political science*	*Economics*	*Social sciences*			
2	Literature						Literature Review	Qualitative	Journal of Environmental Management*
3	National						Q-method and online survey	Quantitative	Biological Conservation*
4	Protected-Area						Institutional Analysis and Development Framework	Qualitative	Environmental Management+
5	Community						Social Capital survey	Quantitative	Society and Natural Resources×
6	Village						Grounded Theory and Case-Study Research	Qualitative	Land Use Policy±

* Published
+ Revised and resubmitted
± Under review
× In preparation

CHAPTER 2: SAVING THE SUPERSTAR: A REVIEW OF THE SOCIAL FACTORS AFFECTING TIGER CONSERVATION IN INDIA

Abstract

Tiger conservation in India represents an excellent case study of the many challenges facing conservation programs internationally. It is well understood that tigers are sensitive to human disturbances and large areas of habitat need to be protected for their conservation. Such protected areas in India are managed by the governments using an exclusionary approach. However, this approach is known to create several issues with local communities, including historical, legal, livelihood and management issues; with a volume of literature suggesting the inclusion of local communities in management. Yet, other evidence suggests that inclusion of communities in tiger conservation may lead to anthropogenic disturbances that can jeopardize tigers. The gravity of the situation is reflected in the recent disappearance of tigers from two key protected areas in India, the Sariska and Panna Tiger Reserves.

This review paper connects the key literature from conservation biology, environmental history, management sciences, policy and political sciences to underline the gridlock of tiger conservation: it needs exclusive protected areas that antagonize communities, and it depends on the support of the same communities for success. We examine the possibility of reconciliation between these disciplines, and assert that research on tiger conservation needs to allow for an increasingly interdisciplinary approach. We call for a more integrated approach to tiger conservation, to examine the values inherent in conservation and to shed more light on the social factors that affect tiger conservation schemes.

2.1. Introduction

The global loss of biodiversity continues despite all recent efforts (Hoffmann et al. 2010; Schipper et al. 2008). Parties to the Convention on Biological Diversity have recently agreed to "take effective and urgent action to halt the loss of biodiversity", and Protected Areas (PAs) have been the most important instruments available (Myers et al. 2000; Pimm et al. 2001; Prendergast et al. 1993). A key challenge for PAs is that they often create disagreements and conflicts with local communities (Wells and Brandon 1993; Wilshusen et al. 2002). Such conflict can jeopardize biodiversity values and create antagonism towards conservation efforts. This issue is particularly relevant in developing countries, which often have a high degree of biodiversity, large human populations, an acute dependence on natural resources, and high rates of poverty (Guha 1989; Wells 1992; Grimble and Chan 1995).

International efforts to conserve dwindling tiger (*Panthera tigris*) populations offer an excellent example of these issues in practice. The tiger is a "potentially dangerous predator", found in parts of the world with some of the highest density, and poorest human populations (Karanth and Madhusudan 1997; Dinerstein et al. 2006). In these contexts, legally protecting the tiger through PAs can become a significant political challenge (Karanth 2005b). It has been argued that such political challenges are best dealt with by democratic governments, considered the most legitimate for reflecting the concerns of their citizens (Li and Reuveny 2006). Although worldwide resources have been directed towards tiger conservation, tigers recently disappeared from two PAs in India, the Sariska and Panna Tiger Reserves (Project Tiger 2005). How, then, has the world's most populous democracy worked to protect the world's largest population of

wild tigers, and what are the key challenges? To help answer this question, we present a detailed review of the literature to better understand tiger conservation challenges in India. We begin by reviewing the biological requirements for tiger conservation, underlining the importance of establishing exclusive PAs. We then examine the critique of this approach, with a particular emphasis on implementation in India, and then review the alternatives to this approach. Finally, the dialogues between various branches of literature are reviewed while synthesising the literature from different disciplines with a view to examining the potential for reconciliation of the various arguments and identifying the ongoing challenges facing tiger conservation efforts in India and beyond.

2.2. Tiger Research and Conservation Needs

Following pioneering work by Schaller (1967), researchers have tried to understand the ecology, behaviour, and more recently, macro-ecology and evolutionary patterns of tigers (Karanth and Chellam 2009). While a number of scientific studies have discussed aspects like the number of tiger subspecies (Mountfort 1974; Kitchener 1999; Luo et al. 2004), conservation priority has shifted to remnant landscapes and populations (Walston et al. 2010b; Wikramanayake et al. 2011). Recent reviews of the science on tiger conservation and biology include Seidensticker, Christie et al. (1999), Karanth (2003, 2006), Tilson and Nyhus (2010) and Seidensticker (2010) and this section relies heavily on these papers.

The IUCN estimates there to be about 2,150 breeding tigers in protected "source sites" and about 4,000 individuals spread across thirteen countries across Asia: Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Russia, Thailand and Vietnam (Chundawat et al. 2011; Walston et al. 2010a; Jhala et al.

2011b). North Korea may also have a small number of tigers. Importantly, there has been a sharp decline in the historic range of tigers over time (Dinerstein et al. 2007; Sanderson et al. 2006). Many authors have identified the various factors that are affecting tiger populations, summarized in Table 2-1 using the Driver-Pressure-Status-Impact-Response (DPSIR) framework (European Environment Agency 1999). This framework considers a causal chain between the 'Drivers' (D) of change, which create 'Pressures' (P) on the environment because of activities, affecting the 'Status' (S) of the system. The changes in 'Status' (S) then have 'Impacts' (I) on the system, and desirable 'Responses' (R) can be identified for policy makers (Elliott 2002). (For examples on the use and criticism of the framework, refer Svarstad et al. 2008; Jago-on et al. 2009; Ojeda-Martínez et al. 2009; Atkins et al. 2011). Although our DPSIR analysis omits many nuances of the complex challenges facing tiger conservation, it is clear that the emphasis of the tiger conservation literature and actions has been on securing habitat and providing adequate protection to tiger populations. Other strategies, for example artificial breeding of tigers or reintroduction, have also been discussed by authors (Mitra 2005; Mitra 2006; Morell 2007; Gratwicke et al. 2008; Kirkpatrick and Emerton 2010; Lynam 2010). Yet, PAs emerge as the central requirement for tiger conservation (Table 2-1).

2.2.1. Protected Areas are Key

The requirement for PAs is reinforced by several factors. The tiger requires large areas of habitat to maintain minimum viable populations. This is due to the relatively high food intake, up to 3,000 kg of wild ungulate meat for an average male tiger per year, which necessitates individuals' ranges of up to several hundred square kilometres across

the landscape, to secure prey resources, and find undisturbed places for breeding (Karanth et al. 2004; Karanth and Stith 1999).

Additionally, scientists have justified the establishment of large PAs because, a) they translate into the conservation of a host of associated species in a wide variety of ecosystems (Karanth 2003; Linkie 2007; Seidensticker 2010; Walston et al. 2010b), and b) such areas provide essential ecosystem services such as water regulation for a large part of the globe (Wikramanayake et al. 2011). Many authors have emphasized the protection of the wide variety of tiger habitat across ecosystems, rather than focusing specifically on genetic variation within tiger populations (Dinerstein et al. 1997; Dinerstein et al. 2006; Sanderson et al. 2006; Chundawat et al. 2008). However, this approach has led to conservation efforts spreading "thin" across the landscape (Sanderson et al. 2006; Walston et al. 2010b). As a result, more recently the scientific emphasis has been on the protection of tiger ranges that are already protected and have the best chance of restoring tiger populations, coupled with the landscape perspective, managing populations in the core areas, buffer zones, and corridors in a mosaic of land-use patterns (Seidensticker 2010; Wikramanayake et al. 2011). Therefore, the emphasis on habitats that are already designated PAs has only increased (Wikramanayake et al. 2004; Sanderson et al. 2006; Karanth and Chellam 2009; Walston et al. 2010b).

However, despite the scientific evidence in support of formal and exclusive PAs, tigers have recently become locally extinct from two Tiger Reserves in India: Sariska and Panna (Project Tiger 2005; Ali 2009). In the following section, we examine the problems of the exclusive PAs approach, which can help us understand some of the challenges facing tiger conservation.

2.3. India and its Protected Areas

India offers a unique and important context within which to understand the challenges associated with tiger conservation. India is thought to have the largest population of wild tigers across the global range of the species, with about 1,410 individuals estimated in 2006 (range 1,165-1,655, excluding the population in Indian Sunderbans) (Jhala et al. 2008). More recent surveys conducted between 2009 and 2010 estimate wild tiger populations in India at 1,706 with a range of 1,571-1,875 (Ministry of Environment and Forests et al. 2011). Although the reliability of these numbers remains debated (Karanth et al. 2011), the population represents more than half the extant genetic diversity of tigers worldwide (Mondol et al. 2009). A recent study that compiled various sources of data identified only five sites in the world that contained tiger populations close to their estimated carrying capacity, and all of these are in India (Walston et al. 2010a). India also has a strong commitment to tiger conservation, demonstrated by its large financial contribution to conservation efforts (Walston et al. 2010b). While many other tiger-range countries are dealing with challenges of development and stable governments, India can claim to be a liberal and open democracy (Guha 2007) where successive legitimate governments since the 1970s have encouraged or tolerated the conservation of tigers. Also, India has experienced a high degree of economic growth in the last two decades. Therefore, it is likely that India's experiences with establishing and managing PAs offer insights and lessons that will be relevant across various political and social contexts in conservation science.

2.3.1. The Institutional Context

The modern network of PAs in India was significantly strengthened with the enactment of the *Wild Life (Protection) Act 1972*. This Act (including the amendments) prescribes many categories of PAs, including Tiger Reserves, National Parks and Wildlife Sanctuaries, together covering nearly 5% of India's geographic area (Wildlife Institute of India 2007). National Parks and Wildlife Sanctuaries are managed by the state governments, and out of these, 39 PA are designated Tiger Reserves, managed by a federal authority, the National Tiger Conservation Authority (Damayanti 2007). These PAs remain exclusively controlled by distant authorities with no role for local communities in day-to-day management activities (Badola 1999). This approach to conservation management has also been referred to as the 'preservationist', 'authoritarian conservationist', or the 'exclusionary' approach in the literature. For the purpose of our review, we refer to the 'exclusionary approach' because it prescribes management by a central authority and does not include communities in management (Guha 1989; Ghate 2003).

2.3.2. Why the Exclusionary Approach?

It is generally argued that the exclusionary approach was brought into India by a group of "urban wildlife enthusiasts, voluntary groups and preservation-minded foresters" who, led by naturalist Salim Ali, won over "powerful, highly-placed decision-makers" and the most influential political leader, Prime Minister Indira Gandhi in the 1960s-70s and 1980s (Rangarajan 2001; Lewis 2003). The groups that pursued the establishment of PAs included urban and foreign tourists, the elite section that equated charismatic species with "national prestige", international bodies working on conservation, certain sections of the

forest and wildlife departments, and biologists, who believed that species and pristine areas ought to be protected for 'science' (Guha 1989, 2003). Many of them drew inspiration from the American philosophical movements of Deep Ecology and wilderness preservation (Guha 2006; Lewis 2003; Lewis 2005). These movements stressed the biocentric view (with humans being merely one among the species) over the then predominant anthropocentric view (where nature exists to be managed for human consumption) (Glasser et al. 2001). Many of these schools of thought drew inspiration from the likes of John Muir and Aldo Leopold, and emphasized the protection of wilderness from gross human interference—a precursor of exclusive PAs (Norton 1987; Leopold 2001; Guha 1989; Hott et al. 1992).

2.3.3. Criticism of the Exclusionary Approach

Since its implementation, the critique of the exclusionary approach has burgeoned (West et al. 2006; Igoe et al. 2010; Adams and Hutton 2007; Lele et al. 2010). In particular, 'developing' countries have significantly different socio-economic and ecological contexts than the 'developed' countries, making the exclusionary approach unfit and undesirable in many cases. The approach has been termed elitist and called an "ecologically updated version of the White Man's Burden" while being equated to 'imperial domination' when seen from the perspectives of local communities (Wilshusen et al. 2002; Guha 1989, 2003). Further, the approach has been described as simplistic in overlooking the intricate relationship between communities and their ecosystems (White Jr 1967; Leopold 2001; Wilshusen et al. 2002). Philosophically, the overarching criticism of the approach is that the real cause of general environmental degradation is not the subsistence of the poor, but consumption by the rich, industrial and commercial pressures

(Kothari et al. 1995a; Ghate 2003; Madhusudan and Mishra 2003; Gadgil and Guha 2004). Yet, such conservation projects direct the global costs onto local communities, often creating more poverty by curtailing traditional livelihoods (Ghate 2003; Negi and Nautiyal 2003; Borrini-Feyerabend et al. 2004; Mawdsley 2006). Further, as India is very densely populated and largely an agrarian country, it may not be feasible to create exclusive habitats for either humans or wildlife (Madhusudan and Mishra 2003). Despite the strong and growing arguments against excluding communities, PAs in India continue to be managed without the inclusion of local communities.

2.4. Issues Associated with Exclusive Protected Areas in India

With more than a billion people, India is very densely populated and land is a prized resource. In a land-strapped context, the process of 'locking-up' areas for conservation, and legally turning them into PAs, raises many issues. Indeed some of these issues were responsible for the local extinction of tigers from certain PAs. While all of the issues can be considered as interconnected, for the sake of organization, we discuss them as historical, legal, ecological, livelihood and management issues.

2.4.1. Historical Issues

Historically the colonial government, and subsequently the post-independence governments, have taken control of India's forestlands for industrial supplies and to establish State control over non-private lands (Gadgil and Guha 1993; Guha 2006; Sarin 2005). Often, the government took control of large areas by suspending the existing use and control of communities (Saxena Undated). After independence in 1947, many forests

owned by princely estates and community ownership were also slowly brought under the control of the government (Sarin 2005; Rastogi 2007).

However, despite many forests being officially designated as government property, communities continued to use them as hunter-gatherers, shifting cultivators, forest dependent tribal and nomadic pastoralists, among other uses, because the process of recording and settling their rights was not followed (Sarin 2005). In fact, many areas were declared forestlands without surveys, turning resident communities into encroachers (Sarin 2005). This issue was acknowledged by the Government of India recently, when it promulgated the *Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006*. The preamble of this Act states that:

> *"*[T]*he forest rights on ancestral lands and their habitat were not adequately recognised in the consolidation of State forests during the colonial period as well as in independent India resulting in historical injustice to the forest dwelling Scheduled Tribes and other traditional forest dwellers who are integral to the very survival and sustainability of the forest ecosystem".*

When declaring PAs on previously notified forestlands, it is often assumed that the rights of communities would have been duly recorded and settled, as stipulated by the law. However, this assumption is not necessarily valid, and often not clear to government researchers and officials (Kothari et al. 1995b; Damayanti 2007). The lacunae in the process of recording community rights have led to PAs where communities have historical rights, but are legally considered to be encroachers. Examples include the Buxa Tiger Reserve, where labour colonies were established by the colonial government in the 19th century, but their rights were not recorded (Project Tiger 2005). In such PAs, neither

were the communities given civic amenities, nor the forest the requisite protection (Project Tiger 2005). This historical context is a major source of conflict between communities and PAs (Damayanti 2007) that can translate into legal issues.

2.4.2. Legal Issues

As previously mentioned, resident communities in PAs often have historical rights that have yet to be recognized because of inaccuracies in the process of declaring forestlands. From the perspective of management, the communities did not exist in these areas, and the communities often do not have proof to corroborate their stand (Damayanti 2007). The situation becomes legally complicated because of several factors. First, there is dissonance between laws pertaining to conservation, community rights, and the use of resources (such as mining and fishing), with the latter generally stronger at the expense of the former two (Singh 1996; Sundar 2001; Sarin 2005). Second, many areas are managed as PAs, but the legal formalities for their declaration have not been completed. In fact, of the 92 National Parks in India, 77% have not completed the formal process for establishment, and thus have no legality. These National Parks do not have adequate legal grounds to eject communities (Damayanti 2007). Third, matters have been made more complicated in the years following 1996, when the Supreme Court of India assumed a more central role in forest conservation in India (Rosencranz and Lélé 2008). For example, in 2000 the Supreme Court of India restrained state governments from removing deadwood from PAs. Though this order was passed to control tree-felling in PAs for commercial purposes, it was interpreted by the government to control all rights in the PAs. This *inter alia* resulted in ousting of communities from PAs (Lasgorceix and Kothari 2009). The Supreme Court has continued to assume unprecedented powers and

this has further complicated the already complex forestry laws in India (Project Tiger 2005; Rosencranz and Lélé 2008).

2.4.3. Livelihood issues

The establishment of PAs has also been reported to change livelihood patterns by introducing the use of artificial fertilizers and cash crops, resulting in loss of traditional practices and local biodiversity (Maikhuri et al. 2002; Negi and Nautiyal 2003). To make matters worse, often carefully-governed community use is banned and highly extractive industrial use of the forest is allowed—legally or not. There are records of cases where villagers and communities have petitioned the courts to resist (government-approved) mining in PAs, and other cases where they have joined forest departments against mining (Kothari et al. 1995a). Rangarajan (2001) documents cases where paper mills were allowed to extract bamboo from wildlife sanctuaries while local artisans were not, and where housing estates were preferred over small-scale cultivation. Sekhsaria (2007) lists many such other examples.

The exclusive approach for PAs incorrectly equates community use with industrial and urban pressure (Negi and Nautiyal 2003), and discourages them both. By disrupting traditional access to proximate forests, the establishment of formal PAs negatively impacts the traditional livelihood practices of local communities. Further, PAs generate little or no new opportunities for employment, and communities generally cannot partake in development and amenities (Ghate 2003). Detailed studies in the Himalayas demonstrate the changes in a community following the establishment of a PA (Maikhuri et al. 2002; Negi and Nautiyal 2003). These studies show that the exclusionary approach necessitated that agrarian and herder communities abandon traditional cropping practices

and switch to cultivating cash crops. These cash crops provided little fodder for livestock, and needed artificial fertilizer, which harms the ecosystem in the long run.

2.4.3.1. Human-Wildlife Conflict

Human conflict with wildlife becomes a delicate issue around PAs. Conflicts with large mammals—tigers, leopards, elephants, wild pig, blue bulls, wolves, black bears, monkey, and several other animals—have been serious across India (Madhusudan and Mishra 2003; Khan 2009; Mukherjee 2009). Large mammals require more food and have large territories, and as a result, are more implicated in this issue (Madhusudan and Mishra 2003; Inskip and Zimmermann 2009). An agrarian community, with already limited livelihood options, can suffer serious losses after their crop or cattle are lost to wild animals. Subsequent retaliation from communities often harms wild animals, and both communities and wildlife suffer equally in the process (Madhusudan 2005). In cases of severe conflict around exclusively managed PAs, communities often regard the animals to be a responsibility of the management and feel outraged when "their" (the State's) animals damage "our" livelihoods (Rastogi et al. 2009). Matters are made worse when the process for compensation doesn't exist, or is too long and frustrating and the compensation too little—sometimes as little as 4% of the value of livestock (Gadgil and Guha 1993; Maikhuri et al. 2002; Madhusudan and Mishra 2003; Kandpal 2006). The situation is even more difficult for illegal residents of PAs, who are not eligible for any compensation (Project Tiger 2005). Often, conflict with the tiger has resulted in incendiary action directed against the animals (Inskip and Zimmermann 2009; Goodrich 2010).

Studies have shown that compensation schemes, although often widely supported, do not necessarily change the attitudes of local communities regarding wildlife (Agarwala et al. 2010). Instead, the tolerance towards large carnivores is reported to be related to social identity and occupation, regardless of compensation schemes (Naughton-Treves et al. 2003).

2.4.3.2. Divergent Strategies

Two strategies are often suggested to meet the livelihood issues: relocation of communities from within PAs, and involvement in tourism for communities adjacent to a PA (Rangarajan and Shahabuddin 2006; Agrawal and Redford 2009). Relocation, in theory, could offer willing communities the opportunity for development, making available inviolate spaces for wildlife to flourish. However, relocation from PAs continues to be a sensitive issue in India. There are very few records of satisfactory relocation of communities (Ghate 2005; Karanth 2005a; Project Tiger 2005; Rangarajan and Shahabuddin 2006; Kabra 2009; Lasgorceix and Kothari 2009). Often, the socio-economic structure of communities is severed during the process of relocation and relocated communities are often left with no livelihoods, and choose to come back to their original areas as illegal encroachers (Agrawal and Redford 2009). Weaker sections of the community often fare worse in the relocation process (Kabra 2009). Further, the entire process creates mistrust between forest officials and communities (Project Tiger 2005; Kandpal 2006; Rastogi 2006). Exceptionally, relocation of communities from Bhadra Wildlife Sanctuary was deemed successful because there were no forced evictions, and relocated families reported that their overall hardships had reduced while the opportunities and facilities increased, and land tenure was deemed equitable (Karanth

2007). In order to replicate successful relocation exercises, numerous authors have suggested that relocation should be handled on a case-by-case basis, creating new livelihoods and addressing the myriad challenges (Karanth 2005a; Shahabuddin et al. 2007; Lasgorceix and Kothari 2009).

Another intuitive alternative for communities would be involvement in tourism (Negi and Nautiyal 2003). Many PAs in India turn into thriving tourism centres, inviting high-end tourists from across the world. Indeed, this should present communities with a potentially lucrative opportunity for enterprise or for employment. However, many studies have revealed that the majority of tourism around PAs is rarely organized by members of local communities, who often lack capital and experience (Wells et al. 1992; Wells and Brandon 1993; Rastogi et al. 2009; Rastogi et al. 2010; Badola et al. 2010a; Karanth and DeFries 2011). The small amount of employment generated by tourism is sometimes regarded as menial and low-paying (Rastogi 2006; Thapliyal 2006; Karanth and DeFries 2011). The antagonism among local communities towards PAs is largely fuelled when traditional livelihoods are curtailed and new opportunities created in which they cannot partake. This antagonism can eventually fuel political action against PAs (Chhatre and Saberwal 2005), and is the source of numerous management issues.

2.4.4. Management Issues

As discussed, PAs in India have given rise to complicated historical, legal, ecological and livelihood issues for communities. Therefore, it is not surprising that antagonism among local communities towards PAs is reported widely in the literature (Wells 1992; Maikhuri et al. 2002; Negi and Nautiyal 2003; Borrini-Feyerabend et al. 2004; Gadgil and Guha 2004; Project Tiger 2005).

Antagonism becomes particularly serious when it translates into conflict directed against the PA or its officials. Minor conflict and non-cooperation with forest guards is commonly reported across the country and through the recorded history of forestry in India (Jalais 2005; Guha 2006; Mukherjee 2009). However, serious conflict and violence have also been reported across the country on various occasions (Kothari et al. 1995a; Badola 1999; Rangarajan 2001). A consistent argument developing in the literature on natural resource management is that the cooperation of local stakeholders is essential (Mushove and Vogel 2005). For PAs the issue is far more serious because local livelihood needs and global conservation needs are demanded from the same resource. Furthermore, an antagonized community can be a potential political lobby against PAs (Chhatre and Saberwal 2005). Potential conflict also jeopardizes PAs and weakens the effort for biodiversity conservation. For example, a negative implication of antagonism toward PAs can be manifested through revenge killing of animals after conflict, incendiary action, or even acquiescence in poaching (Damania et al. 2003; Chapron et al. 2008; Ghate 2003). After the tiger became locally extinct in Sariska Tiger Reserve in 2004-05, an investigating agency found that poachers had been assisted by villagers (Project Tiger 2005). A cooperative local community, well knowledgeable about the intricacies of the area, could be of tremendous service in controlling poaching. However, an antagonised local community may acquiesce, or even be involved in active degradation of the forest (Ghate 2003; Damania et al. 2003).

Local communities dependent on natural resources may have intricate, traditional governance structures that not only restrain the community from overuse, but also check outsiders from exploiting the resource (Maikhuri et al. 2002; Wilshusen et al. 2002). The

design of exclusive PAs is especially faulty when it erodes the authority of traditional structures of governance (Maikhuri et al. 2002). In exclusive PAs, efficient traditional governance structures are replaced by the forest department, which is not always sufficiently equipped to guard the forest (Negi and Nautiyal 2003). In many cases, forest departments do not have sufficient resources to implement regulations. When bans don't work, illegal use by outsider and by local communities becomes rampant (Negi and Nautiyal 2003; Project Tiger 2005). This is detrimental to both communities and conservation goals (Project Tiger 2005).

2.5. Can Development Reconcile with Tiger Conservation?

As a response to the critique of the exclusive approach, there has developed a critical literature regarding broad community-based conservation and natural resource management (Miller et al. 2011). Although this scholarship is not as voluminous as that critiquing the exclusive approach, many trends can be discerned.

2.5.1. Conservation, Communities and Development

Firstly, it is important to differentiate two separate approaches. While 'community based natural resource management' seeks to transfer power and responsibility to communities, 'integrated conservation and development projects' conceptualize communities as external to conservation and as passive recipients of benefits (Songorwa et al. 2000), with conservation being managed by governments.

Songorwa et al. (2000) critiqued the assumptions underlying 'community-based wildlife management' in the context of Africa, questioning the intent and commitments of governments to transfer responsibility of conservation to communities. In addition, it is

often incorrectly assumed that community will have the incentives and capabilities to manage wildlife. Further, such projects may achieve only fleeting success because of complex policy structures (Dressler et al. 2010). The more intricate governance institutions required to refine the community-conservation relationships and transform governance at the local level (Bawa et al. 2010), may not always be available. Additionally, there appears limited substantial evidence that such an approach has succeeded in carnivore conservation.

An alternative approach is to provide communities with development and reduce their dependence on natural resources. Can conservation issues utilize an approach where it is assumed that removing poverty will automatically help with biodiversity conservation? Much scholarship suggests no, and this was confirmed by unsuccessful experience of the Integrated Conservation and Development Projects (Wells et al. 1992). A trend wherein poverty alleviation has subsumed biodiversity conservation has been termed a "significant threat" to conservation objectives (Sanderson and Redford 2003). A group of responding authors called for a more nuanced understanding of the cost of conservation (Brockington and Schmidt-Soltau 2004). When conservation projects also seek to address development issues, they tend to be "overambitious and underachieving" (Wells et al. 1992; Adams et al. 2004). In many cases, a choice may have to be made between the conservation goals and poverty reduction, and both are rarely possible (Adams et al. 2004). While a "win-win" situation may sound appealing, its ends may not always be achievable (McShane et al. 2011).

Indeed practical evidence has shown that conservation projects that target community development may not sufficiently create local support for conservation (Arjunan et al.

2006; Gubbi et al. 2008). Further, such projects are criticised for being monetarily futile and also a distraction for the forest department personnel who manage Tiger Reserves in India (Karanth 2003; Karanth 2005b).

2.5.2. Tigers don't Like Company

Despite the diverse scholarship critiquing the exclusive approach to PAs (Section 2.4), there is no denying their importance. We have established that tigers require protection in large areas of habitat, free from human encumbrances (Table 2-1). In other words, tiger conservation requires the current model of PAs (Karanth 2005b). Outside of PAs, tiger populations have continued to decline (Jhala et al. 2008; Ministry of Environment and Forests et al. 2011). In addition, PAs are needed because tiger populations are severely affected by anthropogenic disturbances. Several empirical studies have underscored the need for tigers to have areas free of incompatible use by humans (Check 2006; Karanth et al. 1999; Johnsingh and Negi 2003; Reddy 2008; Harihar et al. 2009b; Harihar et al. 2009a). To emphasize such PAs, Karanth (2003) suggests:

> "*While there could be arguments over 'who' should manage tiger reserves, there is no doubt that such special reserves are needed, and, 'someone' has to enforce the preservationist measures necessary to maintain and perpetuate them*".

It is clear that for tiger conservation we do need areas free of permanent human settlements or biomass extraction (Shahabuddin and Rangarajan 2007), and these are provided by exclusive PAs.

The underlying dilemma is that if local communities are involved in conservation, they may aspire for more extensive use of ecological resources, which can directly affect both

prey and tiger populations (Carbone and Gittleman 2002; Billgren and Holmén 2008; Reddy 2008). Arguably, in certain contexts community control has resulted in increased biodiversity (Maikhuri et al. 2002; Ramakrishnan 2007; Persha et al. 2011; Gadgil et al. 1993). However, it is unknown if these measures will work in the case of the tiger. Contrarily, there is abundant scholarship to suggest that anthropogenic disturbances affect biodiversity (Shahabuddin and Kumar 2006; Shahabuddin and Kumar 2007). Anthropogenic disturbances have been found to be directly related to village size and proximity (Karanth et al. 2006), rendering green areas and peripheral forests especially vulnerable (Nagendra et al. 2010; Vaidyanathan et al. 2010). As Karanth (2003) suggested:

> *"the assertion that local involvement in resource extraction from tiger habitats, together with the political empowerment of 'local people' are sufficient conditions to recover tiger populations, rests on no solid evidence either in ecological theory or in conservation experience"*.

This argument leaves very little room for community involvement in the current policy framework.

Simplistically, the tiger in India survives in exclusively managed PAs, and is not known to do well outside of these areas. In the face of dwindling population numbers, there may not be the opportunity to experiment with a drastically different approach to conservation, requiring long timeframes for benefits to materialize. Inclusive approaches depend on several factors and do not always work for tiger conservation (Shahabuddin and Ghate 2010). Further, the current policy framework does not allow transfer of responsibility to communities. While inclusion of local concerns in PAs management

may be a desirable social goal, this approach is generally regarded inadequate for tiger conservation.

2.6. Discussion

This paper has reviewed the literature on tiger-biology and natural resources management. The dialogue between these two branches of literature has increased over the last decade, while the 'tiger crisis' has intensified and the tiger became locally extinct from at least two prime PAs in India (Ali 2009; Project Tiger 2005). In what follows, we synthesize literature from political ecology, political sciences and management, to underline key trends that are discernible in the literature on tiger conservation.

2.6.1. Local Support Is Necessary For Tiger Conservation

Tigers are found in parts of India with high degrees of rural poverty, large numbers of livestock and high density human populations (Damania et al. 2003). The support of local communities in these contexts is necessary for three reasons.

Firstly, many of these local populations depend on forests as a resource for livelihood, among other functions. Many authors consider it unethical to impose alien lifestyles on communities that have little role in environmental degradation (Negi and Nautiyal 2003; Guha 2006). The second reason is prudence: alienation of local communities can create conflict with the PA itself (Borrini-Feyerabend et al. 2004). Involvement of local communities in decision-making is considered necessary even if only to increase local support, which in turn removes various impediments against successful implementation of conservation schemes (Grimble and Wellard 1997; Ramirez 1999; Billgren and Holmén 2008). Indignant local communities often identify the tiger as a symbol of elite

dominance, and use daily acts of resistance and non-compliance to express their underlying political struggles (Mukherjee 2009; Jalais 2005). If conservation schemes antagonize local communities, it can jeopardize the tiger by provoking incendiary action against the PA, or the tiger. Significantly, it is also known that a small increase in the payoffs to poaching can lead to sudden extinction of tigers, particularly for small populations (Damania et al. 2003). It can be speculated that some of these factors were responsible for the local extinction of tigers from Sariska Tiger Reserve (Project Tiger 2005).

The third reason to involve local communities in tiger conservation is political. The literature clearly records that stakeholders can use "political influence to circumvent bureaucratic policies of exclusion" (Saberwal 1996). PAs are subject to political processes at the local level, which can by-pass larger policy directives (Chhatre and Saberwal 2005). Lack of political support is one possible reason why many imperatives—better guarding of forests to control poaching and higher disincentives for non-compliance with conservation laws—remain wanting (Karanth and Madhusudan 1997; Karanth 2005b; Damania et al. 2003; Damania and Bulte 2007). To generate political will *for* tiger conservation, the political opposition *against* conservation projects needs to be removed. To meet these political challenges, we would need to address the foundation of the issues (Mukherjee 2009).

2.6.2. The Gridlock of Tiger Conservation and Politics

Ecologists consistently point out that local support is crucial to successfully manage tiger conservation schemes. Yet, it remains unclear how to generate public support, when a scheme will inherently generate opposition. This is akin to a 'wicked problem', with

unclear boundaries and objectives, and thus, unclear solutions (Kawanishi and Seidensticker 2010). We term this collective dilemma the 'gridlock of tiger conservation' (Figure 2-1): while tiger conservation requires the establishment of exclusive PAs, such PAs often antagonize local communities and create management challenges. How is, then, the challenge of tiger conservation to be met? The overarching challenge of tiger conservation, according to a recent review, is not lack of information on biology or ecology, but the "insufficient demand [among the communities affecting tiger conservation] for the survival of wild tigers…" (Seidensticker 2010).

Values and personal dynamics play a crucial role in conservation debates (Lewis 2005). The role of local factors (including politics) in tiger conservation has been tacitly underscored by various authors. A recent contribution by leading tiger experts suggested the need for "politically bold commitments by range-state governments, supported by the general public and the international community" (Walston et al. 2010b). Governments are often exhorted to make "political sacrifices" (Harihar et al. 2009a), or generate the 'political will' to protect the tiger (Dinerstein et al. 2006; Dinerstein et al. 2007; Seidensticker 2010; Karanth 2005b).

Schaller (1967), who is considered the pioneer of research on tigers, too wrote "saving the tiger is a moral issue, an act of conscience, to which each country must make a sincere national commitment." The national commitment was made by India in the 1970s by then Prime Minister, Mrs Indira Gandhi. She is strongly credited by conservationists (Lewis 2005), and the laws for PAs have protected the tiger through precarious times. However, the political milieu in India has since changed. Mrs Gandhi is now regarded as having been a particularly autocratic leader (Guha 2007). The recent political rise of

'backward' castes, ethnic parties and regional leaders is unlikely to afford any single entity the kind of political action that Mrs Gandhi undertook for conservation (Subramanian 1999; Varshney 2001; Chandra 2005). Though the committed leadership of 1970 is credited by biologists for having started the tiger conservation schemes, it is interesting that this very leadership posed the most serious threat to the Indian democracy (Guha 2007). In a changed political context, where populist politics are becoming the rule (Saberwal 1996; Subramanian 1999), the model of PAs has to remain sensitive to local demands, even if only for the sake of prudence. Otherwise it may erode the policies that have successfully protected the tiger over the last few decades. The 'political sacrifices' and 'political will' that conservationists have exhorted (Karanth 2003; Dinerstein et al. 2006), are rendered unrealistic when tiger conservation schemes antagonize the political constituency that they should cater to—the local communities living close to PAs. The exclusionary approach may have been politically feasible when it was introduced to India, but changed political landscape necessitates modifications.

In addition, some scientists have implied that the federal structure of Indian polity has translated into increased political control of the states (Karanth 2005b). Increasingly too, local politicians are influencing the functioning of conservation schemes at the local level (Saberwal 1996; Saberwal 1997; Karanth 2005b). In the Indian political structure, local level politicians tend to appeal to populist demands (Subramanian 1999; Chandra 2004). If a conservation scheme creates antagonism locally, it will be even more sensitive to local political pressures, which can undermine successful conservation outcomes. To illustrate, consider the recommendation by Karanth and Madhusudan (1997) that while creating goodwill locally might be a long term objective for tiger conservation, in the

short term we need to better guard what remains of habitats (Karanth 2005b; Karanth and Madhusudan 1997). Specifically, this recommendation translates into dealing with shortages of staff, infrastructure, and solving legal issues and better implementation of regulations, especially in already existing PAs (Walston et al. 2010b). However, incorporating these measures will require leadership among managers and the support of local leaders (Howlett and Ramesh 1995). To generate such support among local leaders, and to provide legitimacy to their actions, we need to first address the political opposition to tiger conservation in local communities.

In sum, if tiger conservation is to succeed, there may be no way around support from local communities, and political and social sciences will need to increase their scientific contribution to the literature on tiger conservation.

2.6.3. Is there potential for reconciliation?

We have reviewed and discussed the various arguments concerning the involvement of local communities in tiger conservation. Importantly, different branches of science present contradictory claims regarding the involvement of local communities in tiger conservation and this has implications for management. What, then, is the scope for reconciling diverging scientific viewpoints on the role of local communities in tiger conservation?

Regarding the involvement of local communities and the exclusionary approach, 'nature protectionists' have often been pitted against 'social conservationists' in the scientific discourse owing to their different worldviews and values (Miller et al. 2011). This is not

to question the validity of the tiger science being produced, but rather recognizing it as being driven by values, particularly when normative (Lackey 2007; Scott et al. 2007).

Science is complex and adaptive, involving diverse methods and disciplines, producing a wide range of evidence that can be used in framing competing political claims (Sarewitz 2004; Hickey 2009). As identified in this paper, the stakes in tiger conservation management and policy are extremely high (involving the human rights of local communities, the potential extinction of the tiger, a high degree of political currency, and the potential for private gain, among others). The high stakes of the debate are coupled with varying degrees of scientific uncertainty on different aspects of tiger conservation: ranging from the ecology of the tiger, ecological responses to various threats, and the economics of conservation, to the political management of controversies, human attitudes, attributes of stakeholders, and the effects of different policy scenarios. As Sarewitz (2004) pointed out, each of these individual factors is then available for scientific and political scrutiny (the higher the stakes the stronger the scrutiny). The high degree of scientific complexity surrounding tiger protection, the lack of established causality between various (often nested) factors, and the lack of an integrated perspective on tiger conservation lends itself to political discourse with potentially negative conservation outcomes (see, for example, Lackey 2006; Sarewitz 2004). Further, the ensuing political discourse has a strong international perspective, with issues transcending jurisdictional boundaries (for example, tiger trade in China), the human-rights of local communities being questioned, international diplomacy and negotiation outcomes, international conservation treaties and actions, and global environmental change all affecting domestic tiger conservation policy. Importantly, in such contexts

more research does not necessarily allow the debate to settle because it reveals hitherto-undiscovered complexities, and opens the field for further debate (Sarewitz 2004). Environmental disputes are known not to be solved solely by producing more science or knowledge (Jasanoff 1996). As uncertainty and stakes rise, the competing sides are known to question the assumption and sciences of the other side, and even the scientific and moral authority (Jasanoff 1996). In the case of India's tigers, there has been strong debate on the various issues, for example as a result of the report of the Tiger Task Force (leading to the resignation of a member), and the recent estimates of tiger populations (Project Tiger 2005; Karanth et al. 2011; Jhala et al. 2011a; Karanth 2005b; Madhusudan 2005).

In light of the above discussion, there is presently limited scope to achieve reconciliation on the issues of local community involvement and the exclusive approach to tiger conservation. While there are Tiger Reserves such as Nagarhole, Corbett and Kaziranga where the exclusive approach (aided by individual leadership, among other factors) has effectively saved the tiger, there is evidence from Tiger Reserves like Sariska and Panna, where implementation of the approach has led to failures. This may result in conservation professionals having divergent experiences in specialized contexts, leading to strong convictions. The resulting worldviews and values can be inherent and fundamental to the individual (Sarewitz 2004; Lackey 2007; Lewis 2005) meaning that societal and professional discussion is not likely to achieve a satisfactory resolution to the debate. In such contexts, a recommended strategy is to openly discuss the inherent worldviews and values of the competing claims (Miller et al. 2011; Sarewitz 2004).

2.6.4. Ways ahead

Recognizing these dilemmas, how can science better influence policy and management for effective tiger conservation? Primarily, tiger conservation needs to acknowledge the realities of policy making and politics. We need to understand that scientists "can, and do, influence government policy on the environment, but often via complex and iterative interactions that can be painfully slow, and may require fundamental changes in politicians' belief systems, values and norms" (Lawton 2007). Importantly, science does not necessarily dictate policies, which are often based on adjudication between values and competing political claims (Lawton 2007; for detailed discussion of the role of conservation science in policy, see Haller and Gerrie 2007; Sarewitz 2004; Oreskes 2004; Lackey 2006; Scott et al. 2007; Lackey 2007; Hickey 2009). In order for conservation scientists and professionals to improve the levels of communication, co-learning, collaboration and knowledge integration on tigers, we first need to more clearly understand the competing worldviews and inherent values regarding tiger conservation (Minteer and Miller 2011; Miller et al. 2011). This will ultimately enhance the level of coherence that exists among conservation scientists and professionals and facilitate informed tiger conservation policy and management.

Further, we require interdisciplinary and integrated research initiatives to more clearly understand the social factors that affect tiger conservation at various levels of policy formulation and implementation: local, regional, national and international (Agrawal and Ostrom 2006). There are a number of studies conducted in other contexts that have ascertained the influences of local socio-political factors on natural resources (Vasan 2007; Stoll-Kleemann 2001); however this has not been done for tiger conservation. In

order to better understand complex socio-ecological systems, authors have recommended the use of anthropology, political ecology (Adams and Hutton 2007), common property studies, traditional ecological knowledge, environmental ethics, ecological economics (Berkes 2004), human geography, social history, economics, legal studies, and even psychology, ethics and business and development studies (Chan et al. 2007). To further aid the researcher, multidisciplinary frameworks are increasingly available, including human ecology and coupled-human and natural systems (Liu et al. 2007; Margules and Pressey 2000). Such studies can assist decision-makers to better understand the ways in which local and other factors affect tiger conservation management and policy, and have the potential to facilitate the 'political will' necessary for successful conservation.

We also need to better understand the role played by leadership in the management of tiger conservation. "Conservation heroes" have been described as providing leadership which can be a crucial factor in tiger conservation, for example at Nagarhole Tiger Reserve (Post 2010), and we need more theoretical descriptions of their role. There is also the need to investigate the monitoring of law enforcement assisted by technology (Stokes 2010), and improve the training of rangers regarding negotiation and conflict resolution skills, leadership training, and improved staff management and planning.

In addition, we need to broaden the studies on tiger conservation to also address the lack of studies on adaptive institutions (Chan et al. 2007). Bringing a social perspective can also help place politics centrally within the analysis of conservation (Adams and Hutton 2007), thereby placing it within the 'real world' context (Lele et al. 2010). Future studies need to better target managers and policy makers and provide them with richer context-

driven studies. There is a clear need to better understand diverse phenomena, including societal discourse on tiger conservation, the perspectives and understandings of diverse conservation professionals, and grounded studies to develop formal theory on the local-level dynamics that are affecting tiger conservation. Firm theoretical grounding on such issues will support more robust and meaningful dialogue between the science and policy institutions working towards tiger conservation outcomes.

Addressing the gridlock of tiger conservation, and broadening the focus of research could be aided if we underline that the currently dominant disciplines such as environmental management and conservation biology recognize that their scholarship is directed towards the achievement of a particular objective (conservation and/or human welfare), and not completely disassociated from values (Forbes 2011; Scott and Rachlow 2011; Miller et al. 2011; Minteer and Miller 2011). Conservation and environmental management today are grounded in real-world issues and aspire to be active participants in policy making (Lewis 2005). Illustratively, the journal 'Conservation Biology' published a virtual issue for 'International Year of Biodiversity: Conservation Social Science, April 2010'. This widened understanding of the host disciplines helps include questions about politics and social factors in tiger conservation.

2.7. Conclusion

There appears to be universal agreement that saving the tiger is an ecologically, socially and politically complex challenge. Saving the tiger is an issue that does not operate in a socio-political vacuum, as illustrated by the numerous practical issues facing tiger conservation in India. With changing societal circumstances, unprecedented challenges

have emerged for tiger conservation. Tiger conservation involves issues of land use in a land-strapped country; it involves issues of livelihoods, human lives, social capital, values, ethics, political goals and commitments. As a result, the conservation of tigers will require the use of various approaches already included in the broad field of conservation biology and environmental management. It will also require us to genuinely recognize that this is a value-laden approach, and that it is implemented by people and affects people. There are diverse tools and approaches available in many disciplines that can help the field of conservation biology and management to provide a better understanding of complexity in diverse socio-ecological contexts. Some have the potential to be very useful for unpacking tiger conservation issues, and can empower scientists seeking to inform public debate. The existing emphasis on understanding the ecology of tigers remains needed. However, we also have to broaden our focus to invite and encourage scholars from other disciplines to provide input to the science, art and craft of tiger conservation.

This paper has not delved into certain issues in detail. Some scientists have expressed frustration at being subject to the dynamics of bureaucracies and political groups (Madhusudan et al. 2006). Further, most conservationists, regardless of their ideological subscriptions, have expressed discontent with the agencies that manage Tiger Reserves. This is largely because the forest departments that manage Tiger Reserves have been understaffed for a long time (Karanth and Madhusudan 1997), or the rangers have not been appropriately trained or lacked leadership. The report of the Tiger Task Force also confirmed that the forest guards, who face local resistance and armed poachers, are often poorly equipped (Project Tiger 2005). They are offered few incentives to work efficiently

and the quality of the overall infrastructure for tiger conservation in India remains poor. Further, Project Tiger, and the Ministry of Environment and Forests, who together provide the institutional framework for tiger conservation, have been said to be "problem plagued" (Karanth 2005b). As a result, the implementation of laws pertaining to conservation remains weak, and has to improve drastically for tiger conservation measures to be effective (Karanth and Gopal 2005). Indeed, conservationists have expressed frustration at the low priority it is being accorded in policy-making. "Wildlife conservation has little patronage, rather it's everyone's whipping boy today" (Gubbi 2011). Yet, these challenges support the call to reflect and actively widen the discipline. Ultimately we need to learn from failures such as Sariska, and also successful cases such as Kaziranga, Nagarhole and Corbett Tiger Reserves.

The Indian society faces a dilemma in finding the appropriate balance between the divergent uses of its natural resources. The issue of tiger conservation is particularly intense because it is a high-profile challenge worthy of international and domestic scrutiny. Immense financial resources are already diverted towards tiger conservation, policy decisions are being implemented and there is demand for direct and measurable results. As a result, how India meets the challenges of conserving its tigers will have valuable lessons for many other sustainable development challenges in various contexts.

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References

Abbott B, van Kooten GC (2011) Can domestication of wildlife lead to conservation? The economics of tiger farming in China. Ecological Economics 70 (4):721-728

Adams WM, Aveling R, Brockington D, Dickson B, Elliott J, Hutton J, Roe D, Vira B, Wolmer W (2004) Biodiversity Conservation and the Eradication of Poverty. Science 306 (5699):1146-1149. doi:10.1126/science.1097920

Adams WM, Hutton J (2007) People, Parks and Poverty: Political Ecology and Biodiversity Conservation. Conservation & Society 5 (2):147-183

Agarwala M, Kumar S, Treves A, Naughton-Treves L (2010) Paying for wolves in Solapur, India and Wisconsin, USA: Comparing compensation rules and practice to understand the goals and politics of wolf conservation. Biological Conservation 143 (12):2945-2955

Agrawal A, Ostrom E (2006) Political science and conservation biology: A dialog of the deaf. Conserv Biol 20 (3):681-682

Agrawal A, Redford K (2009) Conservation and displacement: An overview. Conservation and Society 7 (1):1

Ali FM (2009) Indian tiger park 'has no tigers' BBC News. http://news.bbc.co.uk/2/hi/south_asia/8150382.stm. Accessed August 18 2009

Arjunan M, Holmes C, Puyravaud J, Davidar P (2006) Do developmental initiatives influence local attitudes toward conservation? A case study from the Kalakad–Mundanthurai Tiger Reserve, India. Journal of Environmental Management 79 (2):188-197

Atkins JP, Burdon D, Elliott M, Gregory AJ (2011) Management of the marine environment: Integrating ecosystem services and societal benefits with the DPSIR framework in a systems approach. Marine Pollution Bulletin 62 (2):215-226

Badola R (1999) People and protected areas in India. Unasylva 50 (1999/4):67

Badola R, Hussain S, Mishra B, Konthoujam B, Thapliyal S, Dhakate P (2010) An assessment of ecosystem services of Corbett Tiger Reserve, India. The Environmentalist 30 (4):320-329

Barbier EB (2001) The Economics of Tropical Deforestation and Land Use: An Introduction to the Special Issue. Land Economics 77 (2):155-171

Bawa KS, Rai ND, Sodhi NS (2010) Rights, Governance, and Conservation of Biological Diversity. Conserv Biol 25 (3):639-641. doi:10.1111/j.1523-1739.2010.01640.x

Berkes F (2004) Rethinking Community-Based Conservation. Conserv Biol 18 (3):621-630. doi:10.1111/j.1523-1739.2004.00077.x

Billgren C, Holmén H (2008) Approaching reality: Comparing stakeholder analysis and cultural theory in the context of natural resource management. Land Use Policy 25 (4):550-562

Borrini-Feyerabend G, Kothari A, Oviedo G, IUCN World Commission on Protected Areas., University College Cardiff. (2004) Indigenous and local communities and protected areas : towards equity and enhanced conservation : guidance on policy and practice for co-managed protected areas and community conserved areas. Best practice protected area guidelines series, vol no 11. IUCN--the World Conservation Union, Gland, Switzerland ; Cambridge

Brockington D, Schmidt-Soltau K (2004) The social and environmental impacts of wilderness and development. Oryx 38 (02):140-142. doi:doi:10.1017/S0030605304000250

Butler RA, Laurance WF (2008) New strategies for conserving tropical forests. Trends in Ecology & Evolution 23 (9):469-472

Carbone C, Gittleman JL (2002) A Common Rule for the Scaling of Carnivore Density. Science 295 (5563):2273-2276. doi:10.1126/science.1067994

Chan KMA, Pringle RM, Ranganathan JAI, Boggs CL, Chan YL, Ehrlich PR, Haff PK, Heller NE, Al-Khafaji K, Macmynowski DP (2007) When Agendas Collide: Human Welfare and Biological Conservation. Conserv Biol 21 (1):59-68. doi:10.1111/j.1523-1739.2006.00570.x

Chandra K (2004) Why ethnic parties succeed : patronage and ethnic head counts in India. Cambridge studies in comparative politics. Cambridge University Press, Cambridge, UK ; New York

Chandra K (2005) Ethnic Parties and Democratic Stability. Perspectives on Politics 3 (02):235-252. doi:doi:10.1017/S1537592705050188

Chapron G, Miquelle DG, Lambert A, Goodrich JM, Legendre S, Clobert J (2008) The impact on tigers of poaching versus prey depletion. Journal of Applied Ecology 45 (6):1667-1674. doi:10.1111/j.1365-2664.2008.01538.x

Check E (2006) Conservation biology: The tiger's retreat. Nature 441 (7096):927-930

Chhatre A, Saberwal V (2005) Political incentives for biodiversity conservation. Conserv Biol 19 (2):310-317

Chundawat RS, Habib B, Karanth U, Kawanishi K, Ahmad Khan J, Lynam T, Miquelle D, Nyhus P, Sunarto S, Tilson R, Wang S (2011) *Panthera tigris*. www.iucnredlist.org. Accessed 04 July 2012

Chundawat RS, Habib B, Karanth U, Kawanishi K, Ahmad Khan J, Lynam T, Miquelle, D. Nyhus, P. Sunarto, Tilson R, Wang S (2008) *Panthera tigris*. www.iucnredlist.org. Accessed 04 August 2009

Damania R, Bulte EH (2007) The economics of wildlife farming and endangered species conservation. Ecol Econ 62 (3-4):461-472

Damania R, Stringer R, Karanth K, Stith B (2003) The economics of protecting tiger populations: linking household behavior to poaching and prey depletion. Land Economics 79 (2):198-216

Damayanti EK (2007) Legality of National Parks and Involvement of Local People: Case Studies in Java, Indonesia and Kerala, India. University of Tsukuba,

Davidar P, Sahoo S, Mammen PC, Acharya P, Puyravaud J-P, Arjunan M, Garrigues JP, Roessingh K (2010) Assessing the extent and causes of forest degradation in India: Where do we stand? Biological Conservation 143 (12):2937-2944

Dinerstein E, Loucks C, Heydlauff A, Wikramanayake E, Bryja G, Forrest J, Ginsberg J, Klenzendorf S, Leimgruber P, O'Brien T, Sanderson E, Seidensticker J, Songer M (2006) Setting Priorities for the Conservation and Recovery of Wild Tigers: 2005-2015. A User's Guide. WWF, WCS, Smithsonian and NFWF-STF, Washington, D.C. - New York

Dinerstein E, Loucks C, Wikramanayake E, Ginsberg J, Sanderson E, Seidensticker J, Forrest J, Bryja G, Heydlauff A, Klenzendorf S, Leimgruber P, Mills J, O'Brien TG, Shrestha M, Simons R, Songer M (2007) The Fate of Wild Tigers. BioScience 57 (6):508-514. doi:doi:10.1641/B570608

Dinerstein E, Wikramanayake E, Robinson J, Karanth U, Rabinowitz A, Olson D, Mathew T, Hedao P, Connor M, Hemley G, Bolze D (1997) A framework for identifying high priority areas and actions for the conservation of tigers in the wild. Washington, D.C., World Wildlife Fund-US and Wildlife Conservation Society

Dressler W, Buscher B, Schoon M, Brockington D, Hayes T, Kull CA, McCarthy JD, Shrestha K (2010) From hope to crisis and back again? A critical history of the global CBNRM narrative. Environmental Conservation 37 (01):5-15. doi:doi:10.1017/S0376892910000044

Elliott M (2002) The role of the DPSIR approach and conceptual models in marine environmental management: an example for offshore wind power. Marine Pollution Bulletin 44 (6):iii-vii

European Environment Agency (1999) Environmental indicators: Typology and overview. vol Report no. 25. European Environment Agency, Copenhegan

Forbes P (2011) Transforming Conservation for the 21st Century. Conserv Biol 25 (2):209-211. doi:10.1111/j.1523-1739.2011.01650.x

Gadgil M, Berkes F, Folke C (1993) Indigenous knowledge for biodiversity conservation. Ambio 22 (2-3):151-156

Gadgil M, Guha R (1993) This fissured land : an ecological history of India. 1st University of California Press edn. University of California Press, Berkeley

Gadgil M, Guha R (2004) The use and abuse of nature. Incorporating: This fissured land, an ecological history of India; Ecology and equity. Oxford India paperbacks. Oxford University Press, Delhi; Oxford

Gadgil M, Thapar R (1990) Human-ecology in India- Some historical perspectives. Interdiscip Sci Rev 15 (3):209-223

Ghate R (2003) Global gains at local costs: Imposing protected areas: evidence from central India. International Journal for Sustainable Development & World Ecology 10 (4):377-389

Ghate R (2005) Relocation versus Wildlife Preservation. Economic and Political Weekly 40 (46):4807-4809

Glasser H, Neil JS, Paul BB (2001) Ecology, Deep. In: International Encyclopedia of the Social & Behavioral Sciences. Pergamon, Oxford, pp 4041-4045

Goodrich JM (2010) Human-tiger conflict: A review and call for comprehensive plans. Integrative Zoology 5 (4):300-312

Gratwicke B, Bennett EL, Broad S, Christie S, Dutton A, Gabriel G, Kirkpatrick C, Nowell K (2008) The world can't have wild tigers and eat them, too. Conserv Biol 22 (1):222-223

Grimble R, Chan M-K (1995) Stakeholder analysis for natural resource management in developing countries. Natural Resources Forum 19 (2):113-124

Grimble R, Wellard K (1997) Stakeholder methodologies in natural resource management: a review of principles, contexts, experiences and opportunities. Agricultural Systems 55 (2):173-193

Gubbi S (2011) In a just society, no justice for wildlife. Deccan Chronicle, 25-12-2011,

Gubbi S, Linkie M, Leader-Williams N (2008) Evaluating the legacy of an integrated conservation and development project around a tiger reserve in India. Environmental Conservation 35 (04):331-339. doi:doi:10.1017/S0376892908005225

Guha R (1989) Radical American Environmentalism and Wilderness Preservation: A Third World Critique. Environ Ethics 11 (1):71-83

Guha R (2003) The Authoritarian Biologist and the Arrogance of Anti-humanism: Wildlife Conservation in the Third World. In: Saberwal VK, Rangarajan M (eds) Battles over nature : science and the politics of conservation. Permanent Black, New Delhi, pp 139-157

Guha R (2006) How much should a person consume? : environmentalism in India and the United States. University of California Press, Berkeley, Calif.

Guha R (2007) India after Gandhi : the history of the world's largest democracy. Macmillan, New York

Haller SF, Gerrie J (2007) The role of science in public policy: Higher reason, or reason for hire? Journal of Agricultural and Environmental Ethics 20 (2):139-165

Harihar A, Pandav B, Goyal S (2009a) Responses of tiger (Panthera tigris) and their prey to removal of anthropogenic influences in Rajaji National Park, India. European Journal of Wildlife Research 55 (2):97-105

Harihar A, Prasad DL, Ri C, Pandav B, Goyal SP (2009b) Losing ground: tigers Panthera tigris in the north-western Shivalik landscape of India. Oryx 43 (01):35-43. doi:doi:10.1017/S0030605307072043

Hickey GM (2009) Polarized debate surrounding Tasmania's old-growth forests. The Forestry Chronicle 85 (5):762-771. doi:10.5558/tfc85762-5

Hoffmann M, Hilton-Taylor C, Angulo A, Bohm M, Brooks TM, Butchart SHM, Carpenter KE, Chanson J, Collen B, Cox NA, Darwall WRT, Dulvy NK, Harrison LR, Katariya V, Pollock CM, Quader S, Richman NI, Rodrigues ASL, Tognelli MF, Vie J-C, Aguiar JM, Allen DJ, Allen GR, Amori G, Ananjeva NB, Andreone F, Andrew P, Ortiz ALA, Baillie JEM, Baldi R, Bell BD, Biju SD, Bird JP, Black-Decima P, Blanc JJ, Bolanos F, Bolivar-G. W, Burfield IJ, Burton JA, Capper DR, Castro F, Catullo G, Cavanagh RD, Channing A, Chao NL, Chenery AM, Chiozza F, Clausnitzer V, Collar NJ, Collett LC, Collette BB, Fernandez CFC, Craig MT, Crosby MJ, Cumberlidge N, Cuttelod A, Derocher AE, Diesmos AC, Donaldson JS, Duckworth JW, Dutson G, Dutta SK, Emslie RH, Farjon A, Fowler S, Freyhof J, Garshelis DL, Gerlach J, Gower DJ, Grant TD, Hammerson GA, Harris RB, Heaney LR, Hedges SB, Hero J-M, Hughes B, Hussain SA, Icochea M. J, Inger RF, Ishii N, Iskandar DT, Jenkins RKB, Kaneko Y, Kottelat M, Kovacs KM, Kuzmin SL, La Marca E, Lamoreux JF, Lau MWN, Lavilla EO, Leus K, Lewison RL, Lichtenstein G, Livingstone SR, Lukoschek V, Mallon DP, McGowan PJK, McIvor A, Moehlman PD, Molur S, Alonso AM, Musick JA, Nowell K, Nussbaum RA, Olech W, Orlov NL, Papenfuss TJ, Parra-Olea G, Perrin WF, Polidoro BA, Pourkazemi M, Racey PA, Ragle JS, Ram M, Rathbun G, Reynolds RP, Rhodin AGJ, Richards SJ, Rodriguez LO, Ron SR, Rondinini C, Rylands AB, Sadovy de Mitcheson Y, Sanciangco JC, Sanders KL, Santos-Barrera G, Schipper J, Self-Sullivan C, Shi Y, Shoemaker A, Short FT, Sillero-Zubiri C, Silvano DL, Smith KG, Smith AT, Snoeks J, Stattersfield AJ, Symes AJ, Taber AB, Talukdar BK, Temple HJ, Timmins R, Tobias JA, Tsytsulina K,

Tweddle D, Ubeda C, Valenti SV, Paul van Dijk P, Veiga LM, Veloso A, Wege DC, Wilkinson M, Williamson EA, Xie F, Young BE, Akcakaya HR, Bennun L, Blackburn TM, Boitani L, Dublin HT, da Fonseca GAB, Gascon C, Lacher TE, Mace GM, Mainka SA, McNeely JA, Mittermeier RA, Reid GM, Rodriguez JP, Rosenberg AA, Samways MJ, Smart J, Stein BA, Stuart SN (2010) The Impact of Conservation on the Status of the World's Vertebrates. Science 330 (6010):1503-1509. doi:10.1126/science.1194442

Hott LR, Chowder K, Garey D, Florentine Films., Direct Cinema Ltd. (1992) The Wilderness idea. Direct Cinema Limited,, Santa Monica, CA

Howlett M, Ramesh M (1995) Studying public policy: policy cycles and policy subsystems. Oxford University Press, Toronto

Igoe J, Neves K, Brockington D (2010) A Spectacular Eco-Tour around the Historic Bloc: Theorising the Convergence of Biodiversity Conservation and Capitalist Expansion. Antipode 42 (3):486-512. doi:10.1111/j.1467-8330.2010.00761.x

Inskip C, Zimmermann A (2009) Human-felid conflict: a review of patterns and priorities worldwide. Oryx 43 (01):18-34. doi:doi:10.1017/S003060530899030X

Jago-on KAB, Kaneko S, Fujikura R, Fujiwara A, Imai T, Matsumoto T, Zhang J, Tanikawa H, Tanaka K, Lee B, Taniguchi M (2009) Urbanization and subsurface environmental issues: An attempt at DPSIR model application in Asian cities. Science of The Total Environment 407 (9):3089-3104

Jalais A (2005) Dwelling on Morichjhanpi: When Tigers Became ‘Citizens’, Refugees ‘Tiger-Food’. Economic and Political Weekly 40 (17):1757-1762

Jasanoff S (1996) The dilemma of environmental democracy. Issues in Science and Technology 13 (1):63

Jhala YV, Gopal R, Qureshi Q (eds) (2008) Status of Tigers, Co-predators and Prey in India. National Tiger Conservation Authority, Ministry of Environment and Forests, Government of India and the Wildlife Institute of India, Dehradun,

Jhala YV, Qureshi Q, Gopal R (2011a) Counting India's Wild Tigers Reliably: A Response. Science

Jhala YV, Qureshi Q, Gopal R, Sinha PR (eds) (2011b) Status of the Tigers, Co-predators, and Prey in India, 2010. National Tiger Conservation Authority, Govt. of India, New Delhi, and Wildlife Institute of India, Dehradun,

Johnsingh AT, Negi AS (2003) Status of tiger and leopard in Rajaji-Corbett Conservation Unit, northern India. Biological Conservation 111 (3):385-393

Kabra A (2009) Conservation-induced displacement: A Comparative Study of Two Indian Protected Areas. Conservation & Society 7 (4):249-267. doi:10.4103/0972-4923.65172

Kandpal V (2006) Socioeconomic Study of Relocated Villages and Its Effect on Relocated Sites in Corbett Tiger Reserve. Forest Research Institute (Deemed University), Dehradun

Karanth KK (2005a) Bhadra Wildlife Sanctuary: Addressing Relocation and Livelihood Concerns. Economic and Political Weekly 40 (46):4809-4811

Karanth KK (2007) Making resettlement work: The case of India's Bhadra Wildlife Sanctuary. Biological Conservation 139 (3-4):315-324

Karanth KK, Curran LM, Reuning-Scherer JD (2006) Village size and forest disturbance in Bhadra Wildlife Sanctuary, Western Ghats, India. Biological Conservation 128 (2):147-157

Karanth KK, DeFries R (2011) Nature-based tourism in Indian protected areas: New challenges for park management. Conservation Letters 4 (2):137-149. doi:10.1111/j.1755-263X.2010.00154.x

Karanth KU (2003) Tiger Ecology and Conservation in the Indian Subcontinent. Journal of the Bombay Natural History Society 100 (2&3):169-189

Karanth KU (2005b) Reconciling Conservation with Emancipatory Politics. Economic and Political Weekly 40 (46):4803-4805

Karanth KU (ed) (2006) Tiger tales: tracking the big cat across Asia. Penguin Books, New Delhi, New York

Karanth KU, Chellam R (2009) Carnivore conservation at the crossroads. Oryx 43 (01):1-2. doi:doi:10.1017/S003060530843106X

Karanth KU, Gopal R (2005) An ecology-based policy framework for human–tiger coexistence in India. In: Woodroffe R, Thirgood S, Rabinowitz A (eds) People

and Wildlife: Conflict or Coexistence? . Conservation Biology. Cambridge University Press, New York, pp 373-387. doi:9786610431021

Karanth KU, Gopalaswamy AM, Kumar NS, Delampady M, Nichols JD, Seidensticker J, Noon BR, Pimm SL (2011) Counting India's Wild Tigers Reliably. Science 332 (6031):791. doi:10.1126/science.332.6031.791-a

Karanth KU, Madhusudan MD (1997) Avoiding Paper Tigers and Saving Real Tigers: Response to Saberwal. Conservation Biology 11 (3):818-820

Karanth KU, Nichols JD, Kumar NS, Link WA, Hines JE (2004) Tigers and their prey: Predicting carnivore densities from prey abundance. Proceedings of the National Academy of Sciences of the United States of America 101 (14):4854-4858. doi:10.1073/pnas.0306210101

Karanth KU, Stith BM (1999) Prey depletion as a critical determinant of tiger population viability. In: Seidensticker J, Christie S, Jackson P (eds) Riding the tiger: tiger conservation in human-dominated landscapes. Cambridge University Press, Cambridge, UK, pp 100-113

Karanth KU, Sunquist M, Chinnappa M (1999) Long-term monitoring of tigers: lessons from Nagarhole. In: Seidensticker J, Jackson P, Christie S (eds) Riding the tiger : tiger conservation in human-dominated landscapes. Zoological Society of London; Cambridge University Press, Cambridge, U.K, pp 114-122

Kawanishi K, Seidensticker J (2010) Collaborations and Partnerships Are Essential to Sustain Wild Tiger Populations. In: Tilson R, Nyhus PJ (eds) TIGERS OF THE WORLD: The Science, Politics, and Conservation of *Panthera Tigris*. Second Edition edn. Academic Press, London, Burlington, San Diego, pp 175-184

Kenney JS, Smith JLD, Starfield AM, McDougal CW (1995) The Long-Term Effects of Tiger Poaching on Population Viability. Conserv Biol 9 (5):1127-1133

Khan MMH (2009) Can domestic dogs save humans from tigers Panthera tigris? Oryx 43 (01):44-47. doi:doi:10.1017/S0030605308002068

Kirkpatrick RC, Emerton L (2010) Killing tigers to save them: Fallacies of the farming argument. Conserv Biol 24 (3):655-659

Kitchener AC (1999) Tiger distribution, phenotypic variation and conservation issues. In: Seidensticker J, Christie S, Jackson P (eds) Riding the tiger: tiger conservation in

human-dominated landscapes. Cambridge University Press, Cambridge, UK, pp 19-39

Kothari A, Suri S, Singh N (1995a) Conservation in India: A new direction. Economic and Political Weekly 30 (43):2755-2766

Kothari A, Suri S, Singh N (1995b) People and Protected Areas- Rethinking conservation in India. The Ecologist 25 (5):188-194

Lackey RT (2006) Axioms of ecological policy. Fisheries 31 (6):286-290

Lackey RT (2007) Science, Scientists, and Policy Advocacy. Conserv Biol 21 (1):12-17. doi:10.1111/j.1523-1739.2006.00639.x

Lasgorceix A, Kothari A (2009) Displacement and Relocation of Protected Areas: A Synthesis and Analysis of Case Studies. Economic & Political Weekly XLIV (49):37-47

Lawton JH (2007) Ecology, politics and policy. Journal of Applied Ecology 44 (3):465-474. doi:10.1111/j.1365-2664.2007.01315.x

Lele S, Wilshusen P, Brockington D, Seidler R, Bawa K (2010) Beyond exclusion: alternative approaches to biodiversity conservation in the developing tropics. Current Opinion in Environmental Sustainability 2 (1-2):94-100

Leopold A (2001) A sand county almanac : with essays on conservation. Oxford University Press, New York

Lewis M (2005) Indian science for Indian tigers? Conservation biology and the question of cultural values. J Hist Biol 38 (2):185-207. doi:10.1007/s10739-004-1486-8

Lewis ML (2003) Inventing global ecology : tracking the biodiversity ideal in India, 1945-1997. New perspectives in South Asian history, vol 5. Orient Longman; Sangam, Hyderabad & London

Li Q, Reuveny R (2006) Democracy and environmental degradation. International studies quarterly 50 (4):935-956

Linkie M (2007) The value of wild tiger conservation. Oryx 41 (4):415-416

Linkie M, Chapron G, Martyr DJ, Holden J, Leader-Williams N (2006) Assessing the viability of tiger subpopulations in a fragmented landscape. Journal of Applied Ecology 43 (3):576-586. doi:10.1111/j.1365-2664.2006.01153.x

Liu J, Dietz T, Carpenter SR, Alberti M, Folke C, Moran E, Pell AN, Deadman P, Kratz T, Lubchenco J, Ostrom E, Ouyang Z, Provencher W, Redman CL, Schneider SH, Taylor WW (2007) Complexity of Coupled Human and Natural Systems. Science 317 (5844):1513-1516. doi:10.1126/science.1144004

Loyola RD, Oliveira-Santos LGR, Almeida-Neto Mr, Nogueira DM, Kubota U, Diniz-Filho JAF, Lewinsohn TM (2009) Integrating Economic Costs and Biological Traits into Global Conservation Priorities for Carnivores. PLoS ONE 4 (8):e6807

Luo S-J, Kim J-H, Johnson WE, Walt Jvd, Martenson J, Yuhki N, Miquelle DG, Uphyrkina O, Goodrich JM, Quigley HB, Tilson R, Brady G, Martelli P, Subramaniam V, McDougal C, Hean S, Huang S-Q, Pan W, Karanth UK, Sunquist M, Smith JLD, O'Brien SJ (2004) Phylogeography and Genetic Ancestry of Tigers (*Panthera tigris*). PLoS Biol 2 (12):e442

Lynam AJ (2010) Securing a future for wild Indochinese tigers: Transforming tiger vacuums into tiger source sites. Integrative Zoology 5 (4):324-334. doi:10.1111/j.1749-4877.2010.00220.x [doi]

Madhusudan M (2005) Of Rights and Wrongs: Wildlife Conservation and the Tribal Bill. Economic and Political Weekly 40 (47):4893-4895

Madhusudan MD (2004) Recovery of wild large herbivores following livestock decline in a tropical Indian wildlife reserve. Journal of Applied Ecology 41 (5):858-869

Madhusudan MD, Mishra C (2003) Why Big, Fierce Animals are Threatened: Conserving Large Mammals in Densely Populated Landscapes. In: Saberwal VK, Rangarajan M (eds) Battles over nature : science and the politics of conservation. Permanent Black, New Delhi, pp 1-31

Madhusudan MD, Shanker K, Kumar A, Mishra C, Sinha A, Arthur R, Datta A, Rangarajan M, Chellam R, Shahabuddin G, Sankaran R, Singh M, Ramakrishnan U, Rajan PD (2006) Science in the wilderness: The predicament of scientific research in India's wildlife reserves. Current Science 91 (8):1015-1019

Maikhuri RK, Nautiyal S, Rao KS, Chandrasekhar K, Gavali R, Saxena KG (2002) Analysis and resolution of protected area-people conflicts in Nanda Devi Biosphere Reserve, India. Environmental Conservation 27 (01):43-53. doi:doi:null

Margules CR, Pressey RL (2000) Systematic conservation planning. Nature 405 (6783):243-253

Mawdsley E (2006) Hindu nationalism, neo-traditionalism and environmental discourses in India. Geoforum 37 (3):380-390

McShane TO, Hirsch PD, Trung TC, Songorwa AN, Kinzig A, Monteferri B, Mutekanga D, Thang HV, Dammert JL, Pulgar-Vidal M, Welch-Devine M, Peter Brosius J, Coppolillo P, O'Connor S (2011) Hard choices: Making trade-offs between biodiversity conservation and human well-being. Biological Conservation 144 (3):966-972

Miller TR, Minteer BA, Malan L-C (2011) The new conservation debate: The view from practical ethics. Biological Conservation 144 (3):948-957

Ministry of Environment and Forests GoI, Wildlife Institute of India, National Tiger Conservation Authority (2011) India Tiger Estimate 2010.

Minteer BA, Miller TR (2011) The New Conservation Debate: Ethical foundations, strategic trade-offs, and policy opportunities. Biological Conservation 144 (3):945-947

Mitra B (2006) Sell the tiger to save it. New York Times, August 15, 2006, p 19

Mitra BS (2005) How the Market can save the Tiger. Far Eastern Economic Review 168 (6):44-47

Mondol S, Karanth KU, Ramakrishnan U (2009) Why the Indian Subcontinent Holds the Key to Global Tiger Recovery. PLoS Genet 5 (8):e1000585

Morell V (2007) WILDLIFE BIOLOGY: Can the Wild Tiger Survive? Science 317 (5843):1312-1314. doi:10.1126/science.317.5843.1312

Mountfort G (1974) International efforts to save the tiger from extinction. Biological Conservation 6 (1):48-52

Mukherjee A (2009) Conflict and Coexistence in a National Park. Economic and Political Weekly XLIV (23):52-59

Mushove P, Vogel C (2005) Heads or tails? Stakeholder analysis as a tool for conservation area management. Global Environmental Change Part A 15 (3):184-198

Myers N, Mittermeier RA, Mittermeier CG, da Fonseca GAB, Kent J (2000) Biodiversity hotspots for conservation priorities. Nature 403 (6772):853-858

Naughton-Treves L, Grossberg R, Treves A (2003) Paying for Tolerance: Rural Citizens' Attitudes toward Wolf Depredation and Compensation. Conservation Biology 17 (6):1500-1511

Nagendra H, Rocchini D, Ghate R (2010) Beyond parks as monoliths: Spatially differentiating park-people relationships in the Tadoba Andhari Tiger Reserve in India. Biological Conservation 143 (12):2900-2908

Negi CS, Nautiyal S (2003) Indigenous peoples, biological diversity and protected area management -- policy framework towards resolving conflicts. International Journal of Sustainable Development and Wold Ecology 10:169-179

Norton BG (1987) Transformative Values. In: Why preserve natural variety?
. Princeton University Press, Princeton, N.J., pp 185-213

Nowell K, Ling X (2007) Taming the tiger trade: China's markets for wild and captive tiger products since the 1993 domestic trade ban. TRAFFIC East Asia., Hong Kong, China

Ojeda-Martínez C, Giménez Casalduero F, Bayle-Sempere JT, Barbera Cebrián C, Valle C, Luis Sanchez-Lizaso J, Forcada A, Sanchez-Jerez P, Martín-Sosa P, Falcón JM, Salas F, Graziano M, Chemello R, Stobart B, Cartagena P, Pérez-Ruzafa A, Vandeperre F, Rochel E, Planes S, Brito A (2009) A conceptual framework for the integral management of marine protected areas. Ocean & Coastal Management 52 (2):89-101

Oreskes N (2004) Science and public policy: What's proof got to do with it? Environmental Science and Policy 7 (5):369-383

Persha L, Agrawal A, Chhatre A (2011) Social and Ecological Synergy: Local Rulemaking, Forest Livelihoods, and Biodiversity Conservation. Science 331 (6024):1606-1608. doi:10.1126/science.1199343

Pimm SL, Ayres M, Balmford A, Branch G, Brandon K, Brooks T, Bustamante R, Costanza R, Cowling R, Curran LM, Dobson A, Farber S, da Fonseca GAB, Gascon C, Kitching R, McNeely J, Lovejoy T, Mittermeier RA, Myers N, Patz JA, Raffle B, Rapport D, Raven P, Roberts C, Rodriguez JP, Rylands AB, Tucker

C, Safina C, Samper C, Stiassny MLJ, Supriatna J, Wall DH, Wilcove D (2001) ENVIRONMENT: Can We Defy Nature's End? Science 293 (5538):2207-2208. doi:10.1126/science.1061626

Post G (2010) Evaluation of Tiger Conservation in India: the use of comparative effectiveness research. Duke University,

Prendergast JR, Quinn RM, Lawton JH, Eversham BC, Gibbons DW (1993) Rare species, the coincidence of diversity hotspots and conservation strategies. Nature 365 (6444):335-337

Project Tiger (2005) Joining The Dots: The Report of the Tiger Task Force Union Ministry of Environment and Forests, Government of India, New Delhi

Ramakrishnan PS (2007) Traditional forest knowledge and sustainable forestry: A north-east India perspective. Forest Ecology and Management 249 (1-2):91-99

Ramirez R (1999) Stakeholder analysis and conflict management. In: Buckles D (ed) Cultivating peace: conflict and collaboration in natural resource management. International Development Research Center; World Bank Institute, Ottawa; Washington, D.C., pp 101-126

Rangarajan M (2001) India's wildlife history : an introduction. Permanent Black in association with Ranthambhore Foundation : Distributed by Orient Longman, Delhi

Rangarajan M, Shahabuddin G (2006) Displacement and relocation from protected areas: Towards a biological and historical synthesis. Conservation and Society 4 (3):359

Rastogi A (2006) Stakeholder Analysis of Corbett National Park. Forest Research Institute (Deemed University), Dehradun

Rastogi A (2007) Hereinafter Forest. Down To Earth, vol 16. Society for Environmental Communications, New Delhi

Rastogi A, Badola R, Hussain SA, Hickey GM (2009) Stakeholder Analysis of Corbett National Park. Paper presented at the XIII World Forestry Congress, Buenos Aires, Argentina, Oct 18-23

Rastogi A, Badola R, Hussain SA, Hickey GM (2010) Assessing the utility of stakeholder analysis to Protected Areas management: The case of Corbett National Park, India. Biological Conservation 143 (12):2956-2964

Reddy G (2008) Lessons from Two Local Extinctions: Sariska and Kailadevi (Ranthambhore) in Rajasthan, India. Conservation & Society 6 (3):256-262

Rosencranz A, Lélé S (2008) Supreme Court and India's Forests. Economic and Political Weekly 43 (5):11

Rudel TK (2007) Changing agents of deforestation: From state-initiated to enterprise driven processes, 1970-2000. Land Use Policy 24 (1):35-41

Saberwal VK (1996) Pastoral Politics: Gaddi Grazing, Degradation, and Biodiversity Conservation in Himachal Pradesh, India. Conserv Biol 10 (3):741-749

Saberwal VK (1997) Saving the Tiger: More Money or Less Power? Conserv Biol 11 (3):815-817

Sanderson E, Forrest J, Loucks C, Ginsberg J, Dinerstein E, Seidensticker J, Leimgruber P, Songer M, Heydlauff A, O'Brien T, Bryja G, Klenzendorf S, Wikramanayake E (2006) Setting Priorities for the Conservation and Recovery of Wild Tigers: 2005-2015. The Technical Assessment. WCS, WWF, Smithsonian, and NFWF-STF, New York – Washington, D.C.

Sanderson EW, Forrest J, Loucks C, Ginsberg J, Dinerstein E, Seidensticker J, Leimgruber P, Songer M, Heydlauff A, O'Brien T, Bryja G, Klenzendorf S, Eric W (2010) Setting Priorities for Tiger Conservation: 2005-2015. In: Tilson R, Nyhus PJ (eds) TIGERS OF THE WORLD: The Science, Politics, and Conservation of *Panthera Tigris*. Second Edition edn. Academic Press, London, Burlington, San Diego, pp 143-173

Sanderson SE, Redford KH (2003) Contested relationships between biodiversity conservation and poverty alleviation. Oryx 37 (04):389-390. doi:doi:10.1017/S003060530300070X

Sarewitz D (2004) How science makes environmental controversies worse. Environmental Science & Policy 7 (5):385-403

Sarin M (2005) Laws, lore and logjams: Critical issues in Indian forest conservation. International Institute for Environment and Development, London

Saxena NC (Undated) Tenurial Issues in Forestry in India. Planning Commission, Goverment of India, New Delhi

Schaller GB (1967) The deer and the tiger; a study of wildlife in India. University of Chicago Press, Chicago

Schipper J, Chanson JS, Chiozza F, Cox NA, Hoffmann M, Katariya V, Lamoreux J, Rodrigues ASL, Stuart SN, Temple HJ, Baillie J, Boitani L, Lacher TE, Mittermeier RA, Smith AT, Absolon D, Aguiar JM, Amori G, Bakkour N, Baldi R, Berridge RJ, Bielby J, Black PA, Blanc JJ, Brooks TM, Burton JA, Butynski TM, Catullo G, Chapman R, Cokeliss Z, Collen B, Conroy J, Cooke JG, da Fonseca GAB, Derocher AE, Dublin HT, Duckworth JW, Emmons L, Emslie RH, Festa-Bianchet M, Foster M, Foster S, Garshelis DL, Gates C, Gimenez-Dixon M, Gonzalez S, Gonzalez-Maya JF, Good TC, Hammerson G, Hammond PS, Happold D, Happold M, Hare J, Harris RB, Hawkins CE, Haywood M, Heaney LR, Hedges S, Helgen KM, Hilton-Taylor C, Hussain SA, Ishii N, Jefferson TA, Jenkins RKB, Johnston CH, Keith M, Kingdon J, Knox DH, Kovacs KM, Langhammer P, Leus K, Lewison R, Lichtenstein G, Lowry LF, Macavoy Z, Mace GM, Mallon DP, Masi M, McKnight MW, MedellÃ-n RA, Medici P, Mills G, Moehlman PD, Molur S, Mora A, Nowell K, Oates JF, Olech W, Oliver WRL, Oprea M, Patterson BD, Perrin WF, Polidoro BA, Pollock C, Powel A, Protas Y, Racey P, Ragle J, Ramani P, Rathbun G, Reeves RR, Reilly SB, Reynolds JE, Rondinini C, Rosell-Ambal RG, Rulli M, Rylands AB, Savini S, Schank CJ, Sechrest W, Self-Sullivan C, Shoemaker A, Sillero-Zubiri C, De Silva N, Smith DE, Srinivasulu C, Stephenson PJ, van Strien N, Talukdar BK, Taylor BL, Timmins R, Tirira DG, Tognelli MF, Tsytsulina K, Veiga LM, ViÃ© J-C, Williamson EA, Wyatt SA, Xie Y, Young BE (2008) The Status of the World's Land and Marine Mammals: Diversity, Threat, and Knowledge. Science 322 (5899):225-230. doi:10.1126/science.1165115

Scott JM, Rachlow JL (2011) Refocusing the Debate about Advocacy. Conserv Biol 25 (1):1-3. doi:10.1111/j.1523-1739.2010.01629.x

Scott JM, Rachlow JL, Lackey RT, Pidgorna AB, Aycrigg JL, Feldman GR, Svancara LK, Rupp DA, Stanish DI, Steinhorst RK (2007) Policy Advocacy in Science: Prevalence, Perspectives, and Implications for Conservation Biologists. Conserv Biol 21 (1):29-35. doi:10.1111/j.1523-1739.2006.00641.x

Seidensticker J (2010) Saving wild tigers: A case study in biodiversity loss and challenges to be met for recovery beyond 2010. Integrative Zoology 5 (4):285-299. doi:10.1111/j.1749-4877.2010.00214.x

Seidensticker J, Christie S, Jackson P (eds) (1999) Riding the tiger: tiger conservation in human-dominated landscapes. Cambridge University Press, Cambridge, UK

Sekhsaria P (2007) Conservation in India and the Need to Think Beyond 'Tiger vs. Tribal'. Biotropica 39 (5):575-577. doi:10.1111/j.1744-7429.2007.00333.x

Shahabuddin G, Ghate R (2010) Creating Local Constituencies for Tiger Conservation through Community Incentives and Alternative Livelihoods. World Bank, Washington D.C.

Shahabuddin G, Kumar R (2006) Influence of anthropogenic disturbance on bird communities in a tropical dry forest: role of vegetation structure. Animal Conservation 9 (4):404-413. doi:10.1111/j.1469-1795.2006.00051.x

Shahabuddin G, Kumar R (2007) Effects of extractive disturbance on bird assemblages, vegetation structure and floristics in tropical scrub forest, Sariska Tiger Reserve, India. Forest Ecology and Management 246 (2-3):175-185

Shahabuddin G, Kumar R, Shrivastava M (2007) Creation of `Inviolate Space': Lives, Livelihoods and Conflict in Sariska Tiger Reserve. Economic and Political Weekly 42 (20):1855-1862

Shahabuddin G, Rangarajan M (eds) (2007) Making Conservation Work: Securing Biodiversity in this New Century. Nature, Culture, Conservation Series. Permanent Black, New Delhi

Singh C (1996) Legal Policy for India's National Parks and Sanctuaries. In: Kothari A, Singh N, Suri S (eds) People and protected areas : towards participatory conservation in India. Sage Publications, New Delhi ; Thousand Oaks, Calif., pp 60-69 p.

Songorwa AN, Bührs T, Hughey K (2000) Community-Based Wildlife Management in Africa: A Critical Assessment of the Literature. Natural Resources Journal 40 (3):603-644

Stokes EJ (2010) Improving effectiveness of protection efforts in tiger source sites: Developing a framework for law enforcement monitoring using MIST. Integrative Zoology 5 (4):363-377. doi:10.1111/j.1749-4877.2010.00223.x

Stoll-Kleemann S (2001) Barriers to nature conservation in Germany: A model explaining opposition to protected areas. Journal of Environmental Psychology 21 (4):369-385

Subramanian N (1999) Ethnicity and populist mobilization : political parties, citizens, and democracy in South India. Oxford University Press, Delhi ; New York

Sundar N (2001) Is Devolution Democratization? World Development 29 (12):2007-2023

Sunquist M, Karanth KU, Sunquist F (1999) Ecology, behaviour and resilience of the tiger and its conservation needs. In: Seidensticker J, Christie S, Jackson P (eds) Riding the tiger: tiger conservation in human-dominated landscapes. Cambridge University Press, Cambridge, UK, pp 5-18

Svarstad H, Petersen LK, Rothman D, Siepel H, Watzold F (2008) Discursive biases of the environmental research framework DPSIR. Land Use Policy 25 (1):116-125

Thapliyal S (2006) Economic Evaluation of Ecosystem Services of Corbett National Park. Forest Research Institute (Deemed University), Dehradun

Tilson R, Nyhus PJ (eds) (2010) TIGERS OF THE WORLD: The Science, Politics, and Conservation of *Panthera Tigris*. Second Edition edn. Academic Press, London, Burlington, San Diego

Vaidyanathan S, Krishnaswamy J, Samba Kumar N, Dhanwatey H, Dhanwatey P, Ullas Karanth K (2010) Patterns of tropical forest dynamics and human impacts: Views from above and below the canopy. Biological Conservation 143 (12):2881-2890

Varshney A (2001) Ethnic Conflict and Civil Society - India and beyond. World Politics 53 (April):362-398

Vasan S (2007) Timber access in the Indian Himalaya: Rethinking social capital in public policy. J Dev Stud 43 (7):1215-1233. doi:10.1080/00220380701526360

Vitousek PM, Mooney HA, Lubchenco J, Melillo JM (1997) Human domination of Earth's ecosystems. Science 277 (5325):494-499

Walston J, Karanth UK, Stokes EJ (2010a) Avoiding the Unthinkable: What will it Cost to Prevent Tigers Becoming Extinct in the Wild? Wildlife Conservation Society, New York,

Walston J, Robinson JG, Bennett EL, Breitenmoser U, da Fonseca GAB, Goodrich J, Gumal M, Hunter L, Johnson A, Karanth KU, Leader-Williams N, MacKinnon K, Miquelle D, Pattanavibool A, Poole C, Rabinowitz A, Smith JLD, Stokes EJ, Stuart SN, Vongkhamheng C, Wibisono H (2010b) Bringing the Tiger Back from the Brink--The Six Percent Solution. PLoS Biol 8 (9):e1000485. doi:10.1371/journal.pbio.1000485

Wells M (1992) Biodiversity conservation, affluence and poverty: mismatched costs and benefits and efforts to remedy them. Ambio 21 (3):237-243

Wells M, Brandon K, Hannah LJ, World Bank. (1992) People and parks : linking protected area management with local communities. World Bank : World Wildlife Fund : U.S.Agency for International Development, Washington, D.C.

Wells MP, Brandon KE (1993) The Principles and Practice of Buffer Zones and Local Participation in Biodiversity Conservation. Ambio 22 (2-3):157-162

West P, Igoe J, Brockington D (2006) Parks and Peoples: The Social Impact of Protected Areas. Annual Review of Anthropology 35 (1):251-277. doi:doi:10.1146/annurev.anthro.35.081705.123308

White Jr L (1967) The historical roots of our ecological crisis. Science 155 (3767):1203-1207

Wikramanayake E, Dinerstein E, Robinson JG, Karanth KU, Rabinowitz A, Olson D, Mathew T, Hedao P, Connor M, Hemley G, Bolze D (1999) Where can tigers live in the future? A framework for identifying high-priority areas for the conservation of tigers in the wild. In: Seidensticker J, Jackson P, Christie S (eds) Riding the tiger : tiger conservation in human-dominated landscapes. Zoological Society of London; Cambridge University Press, Cambridge, U.K, pp 255-272.

Wikramanayake E, Dinerstein E, Seidensticker J, Lumpkin S, Pandav B, Shrestha M, Mishra H, Ballou J, Johnsingh AJT, Chestin I, Sunarto S, Thinley P, Thapa K, Jiang G, Elagupillay S, Kafley H, Pradhan NMB, Jigme K, Teak S, Cutter P, Aziz MA, Than U (2011) A landscape-based conservation strategy to double the wild

tiger population. Conservation Letters 4 (3):219-227. doi:10.1111/j.1755-263X.2010.00162.x

Wikramanayake E, McKnight M, Dinerstein E, Joshi A, Gurung B, Smith D (2004) Designing a Conservation Landscape for Tigers in Human-Dominated Environments. Conserv Biol 18 (3):839-844. doi:10.1111/j.1523-1739.2004.00145.x

Wikramanayake ED, Dinerstein E, Robinson JG, Karanth U, Rabinowitz A, Olson D, Mathew T, Hedao P, Conner M, Hemley G, Bolze D (1998) An ecology-based method for defining priorities for large mammal conservation: The tiger as case study. Conserv Biol 12 (4):865-878

Protected Area Database (2007) ENVIS: Wildlife and Protected Area http://www.wii.gov.in/envis/pa_database.html. Accessed October 31, 2008

Wilshusen PR, Brechin SR, Fortwangler CL, West PC (2002) Reinventing a Square Wheel: Critique of a Resurgent "Protection Paradigm" in International Biodiversity Conservation. Society & Natural Resources 15 (1):17-40

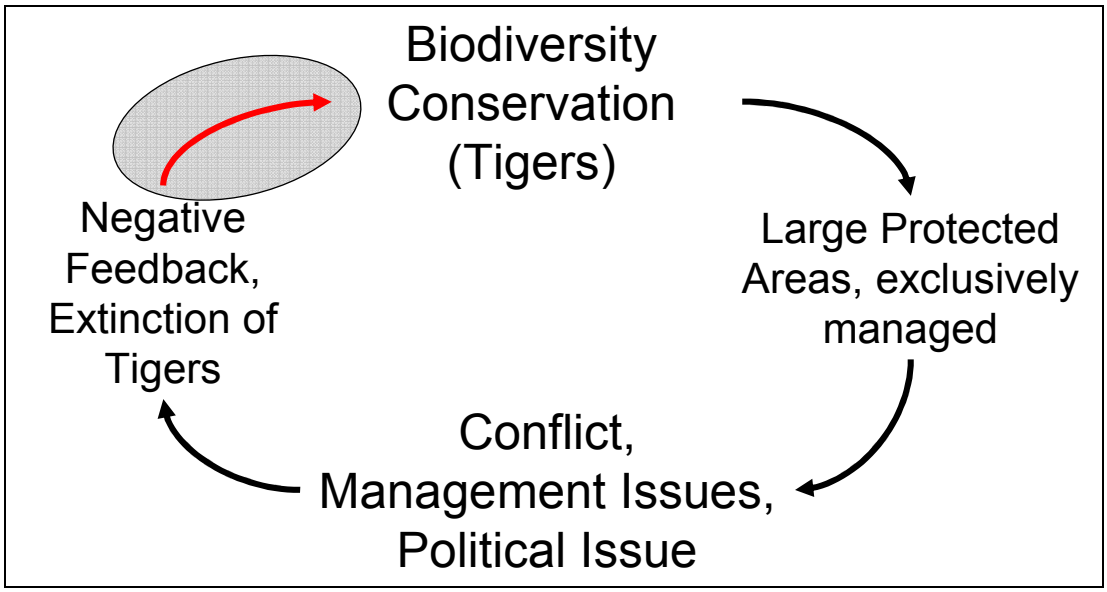

Figure 2-1 The Gridlock of Tiger Conservation. The ecological requirement for tiger conservation is to establish Protected Areas. However, exclusive management of Protected Areas can lead to conflict and provide negative feedback for biodiversity conservation.

Table 2-1 A Drivers-Pressure-Status-Impact-Response (DPSIR) analysis of the challenges facing tiger conservation.

Challenges for tiger conservation	***Drivers***	***Pressure***	***Status***	***Impacts***	***Responses***
Poaching related challenges	Tiger body parts are used for traditional medicine and other practices in China and other Asian countries.	Trade is officially banned by China, yet continues illegally and provides an incentive for poaching of tigers.	Tiger populations are highly sensitive to poaching. Poaching can lead to extinction.	Tigers are known to have become locally extinct from at least two Protected Areas in India.	Markets for tiger body parts have to be closed. Tigers have to be strictly protected against poaching
	(Kenney et al., 1995; Project Tiger, 2005)	(Nowell and Ling, 2007)	(Chapron et al., 2008; Kenney et al., 1995)	(Ali, 2009; Project Tiger, 2005)	(Abbott and van Kooten, 2011; Damania and Bulte, 2007)
Reduction in prey	Many local communities traditionally depend on forests and livestock for subsistence and livelihoods.	a. Poaching of prey populations by local communities is reported. b. Domestic livestock of local communities are known to ecologically compete with ungulates (tiger prey), causing ungulate populations to decline.	Ecological models suggest that an average tiger requires about 50 ungulates/ year. Prey density affects tigers' breeding rates, and is a key determinant of tiger populations.	Tiger populations directly depend upon prey density, and hence are affected by the presence of livestock populations. Loss of prey can also exacerbate the vulnerability to poaching.	A viable population of about 75-100 tigers (including >25 breeding females) would need 500-2,500 square kilometres of "forests relatively free of incompatible human uses". These large areas of tiger habitats with sufficient prey availability have to be legally protected.
	(Davidar et al., 2010; Gadgil and Thapar, 1990; Persha et al., 2011; Project Tiger, 2005)	(Carbone and Gittleman, 2002; Damania et al., 2003; Karanth et al., 2004; Karanth and Stith, 1999; Madhusudan, 2004; Sanderson et	(Dinerstein et al., 1997; Karanth et al., 2004; Karanth and Stith, 1999; Sunquist et al., 1999)	(Carbone and Gittleman, 2002; Damania et al., 2003; Karanth et al., 2004; Karanth and Stith, 1999)	(Jhala et al., 2008; Karanth and Gopal, 2005; Karanth et al., 2004; Karanth and Stith, 1999)

		al., 2006)			
Habitat depletion	With rising populations and increasing resource consumption, human enterprise and demands from natural resources are expanding.	Changing land-use patterns and resource extraction (such as logging, mining and urbanization) by various agencies have been major causes of deforestation and loss of habitat.	The range of tigers in 2006 was about 7% of their historical range. In the years 1997-2006 alone, the area with wild tigers shrunk by 41%.	Loss of habitat is a major challenge for tiger conservation; we must focus on specific regions and connectivity between small and large habitat fragments.	Key Sites: a. Nearly 76 units of Tiger Conservation Landscapes across the range have been identified, 33 in India. b. There are 42 source sites, where the tiger populations have the potential to repopulate larger landscapes. 18 sites are in India c. In addition, landscapes level interventions are important to secure corridors.
	(Vitousek et al., 1997)	(Barbier, 2001; Butler and Laurance, 2008; Rudel, 2007)	(Dinerstein et al., 2007; Dinerstein et al., 1997; Sanderson et al., 2006; Wikramanayake et al., 1999; Wikramanayake et al., 1998)	(Linkie et al., 2006; Loyola et al., 2009)	(Sanderson et al., 2006; Sanderson et al., 2010; Walston et al., 2010a; Wikramanayake et al., 2011)

Summary	a. Traditional livelihoods (use of livestock, use of forests for subsistence). b. Urban growth and demands of economic and infrastructure development (logging, mining, infrastructure projects etc.).	Human activities involve direct or indirect interaction with tigers or their environment, creating active or passive pressures on tiger populations.	Tiger numbers and their ranges have reduced to historic lows.	a. Anthropogenic disturbances affect tigers and reduce numbers. b. Active pursuit and destruction of habitat reduce tiger populations.	Sufficient areas need to be procured and protected for conservation of remaining tiger populations. Viable tiger populations need relatively large areas of contiguous habitat, which require immunity from anthropogenic disturbances.

Preface to Chapter 3

Having established the dilemma of tiger conservation, there is a need to better understand the social dimensions of tiger conservation. To do this, we first need to consider the drivers of tiger conservation policy and practice. The socio-scientific emphasis for tiger conservation and the options for policy and management are largely defined, contextualized and legitimized by conservation professionals: including reserve managers, scientists, NGO staff and governments. There is, therefore, a need to examine the basis of their worldviews and the fundamental reasons behind their support for tiger conservation. In the following chapter I present the results of a national-level study into the tiger-related worldviews of conservation professionals in India. The results allow us to explore tiger conservation viewpoints and better understand the basis for policy conflicts and potential for fostering agreement.

CHAPTER 3: DIVERGING VIEWPOINTS ON TIGER CONSERVATION: A Q-METHOD STUDY AND SURVEY OF CONSERVATION PROFESSIONALS IN INDIA

Abstract

Biodiversity conservation often involves contentious and complex decision-making dilemmas that do not have clear solutions yet need urgent attention. Such problems typically involve stakeholders with divergent viewpoints and interests, leading to disagreement, controversy and political dispute. In these situations it becomes critical for conservation managers and policy-makers to distinguish the worldviews driving the debate. Focusing on the case of tiger conservation in India, we combined the Q-Method with a traditional survey instrument to explore the diverse viewpoints of conservationists in India. The results indicate five dominant viewpoints: 1) community-centered; 2) tiger-centered; 3) science and tourism-led; 4) instrumental approach; and 5) moral-centered. Based on these findings we identify the predictable points of disagreement and potential areas of consensus, and discuss the implications of the findings for addressing complex socio-ecological conservation challenges. Overall, our research suggests that despite 'tiger-tribal' issues often overwhelming conservation debates in India, there are important areas of overlap within the tiger-centered and community-centered viewpoints, and with other independent (albeit rarely evident) viewpoints. To help foster consensus, we suggest the need to avoid framing conservation policy discussions along the tiger-tribal debate and instead focus on existing areas of agreement. Creating a discourse around these views can help organize conservation professionals into a more coherent and united body, crucial for effective participation in policy advocacy, design and implementation.

3.1. Introduction

Biodiversity conservation often involves contentious and complex decision-making dilemmas that do not have clear solutions yet need urgent attention (Ludwig et al. 2001). Such problems typically involve stakeholders with divergent viewpoints and interests, leading to disagreement, controversy and political dispute (Grimble and Wellard 1997). During political disputes on environmental issues, the competing arguments do not necessarily rest on the merits of scientific evidence, but on the divergent worldviews and belief systems[2] of the various participants (Bengtsson and Tillman 2004; Sarewitz 2004; Hickey 2009). In these situations it becomes critical for conservation managers and policy-makers to distinguish the worldviews driving the debate (Sarewitz 2004).

Take the example of tiger conservation in India, an urgent conservation issue of global concern. Despite a large-scale global effort to conserve the tiger (*Panthera tigris*), its population continues to decline. The wild population of tigers now comprises approximately 4,000 individuals in 13 countries in Asia, of which India holds the majority of individuals and genetic diversity (Mondol et al. 2009; Chundawat et al. 2011).

India initiated formal policies to save the tiger in the 1970s (Lewis 2003), with the promulgation of the *Wildlife (Protection) Act 1972*, the establishment of many protected areas, and the launching of a national-level 'Project Tiger' (Lewis 2005). These measures utilized the 'exclusionary model' of conservation (Rastogi et al. 2012), later criticized because this approach did not prescribe a strong role for local communities, fueling

[2] We utilize the following definitions for this chapter: *Attitude:* a relatively enduring organization of beliefs around an object or situation predisposing one to respond in some preferential manner (Rokeach 1968); *Value:* a broad tendency to prefer certain states of affairs over others (Hofstede 1980); and *Belief:* the attitude we have, roughly, whenever we take something to be the case or regard it as true (Schwitzgebel 2011).

ongoing debate among conservation professionals (Guha 1989; Agrawal and Gibson 1999). This debate around the precise role of communities in conservation has often been named the 'tiger-tribal' debate and can be likened to the "parks vs. people" or "conservation-development" viewpoints of conservation (Minteer and Miller 2011; Miller et al. 2011). In India, this debate has generally dominated the discourse on tiger conservation, particularly over the last decade (Karanth 2005b; Saberwal 1997; Karanth and Madhusudan 1997; Project Tiger 2005; Madhusudan 2005). For example, the debate resurfaced when tigers disappeared from two protected areas in India over the last decade, and the Prime Minister's Tiger Task Force was established to assess the situation. Although the subsequent report addressed many key issues, including the implementation of laws and the integration of modern scientific methods in estimating tiger populations, the issue that received widest attention was the role of local communities in tiger conservation (Project Tiger 2005; Karanth 2005b; Vasan 2005). Dramatically, a member of the Tiger Task Force subsequently resigned, criticizing the Task Force for focusing too much on inequity and social justice, and adding - "the interests of the tiger's survival has been relegated and lost sight of" (Project Tiger 2005). Indeed, more recent scientific discourse has been divided by the debate. A recent study considered the possibility for "co-existence" between tiger and humans (Carter et al. 2012). This study was rebutted by at least three groups of scientists (Harihar et al. 2013; Goswami et al. 2013; Karanth et al. 2013) (also refer, Carter et al. 2013). Separately, one of these groups had previously proposed a model of tourism (Karanth and Karanth 2012), which was critiqued by others (Rai 2012) citing Carter et al. (2012). Through such a complex dialogue, it is evident that to date, a workable reconciliation has not been achieved, and a coherent and broadly

acceptable approach to tiger conservation remains elusive (Karanth et al. 2008). With a general lack of consensus among conservation professionals on the best way forward, the meaningful input of highly knowledgeable and experienced actors in the policy process becomes jeopardized (Noss et al. 2012). Further, the 'tiger-tribal' debate often overwhelms other conservation debates in India, reducing the potential for other initiatives and viewpoints to inform and progress sustainable conservation policy and management (Karanth et al. 2008; Rastogi et al. 2012).

Applying (Sabatier and Jenkins-Smith 1993) Advocacy Coalition Framework (ACF) to the complex challenge of tiger conservation policy in India highlights that a number of policy subsystems are operating at various scales, comprising various actors concerned with tiger conservation. These actors include professionals working in government (e.g. involved with policy formulation, scientific research, and policy implementation) and also professionals working in the private, university and non-government organization (NGOs) sectors (e.g. involved with generation, dissemination and evaluation of policy ideas (refer, Sabatier and Jenkins-Smith 1993). According to Sabatier and Jenkins-Smith (1993), these actors are motivated by their beliefs to aggregate into advocacy coalitions – networks consisting of other people who share similar views and beliefs – to advance their own beliefs through policy advocacy, while resisting differing viewpoints. Recognizing the importance of these actors to the process of developing and implementing tiger conservation policy in India, there is a need to better understand the viewpoints of India's conservation professionals.

A deeper understanding of the viewpoints held by conservation professionals will assist tiger conservation policy makers to better understand the various perspectives and

motivations, with a view to building areas of consensus and creating opportunities for more sustainable policy interventions (Clark 2002; Miller et al. 2011; Noss et al. 2012; Sabatier and Jenkins-Smith 1993; Weible 2007). Improving our understanding of divergent viewpoints will also help actors to anticipate the actions of others in policy negotiation and devise better strategies for conservation advocacy, particularly when ecological decisions are socially wrenching and politically contentious (Lackey 2006). This will better equip conservation practitioners to avoid the pitfalls of inadvertent advocacy (Lackey 2007; Wilhere 2012), reinforce their credibility and establish professional propriety (Barry and Oelschlaeger 1996).

To date, most relevant studies have concerned themselves with determining and exploring certain viewpoints (Sandbrook et al. 2010; Mattson et al. 2006; Chamberlain et al. 2012) or with mapping pre-determined viewpoints to specific stakeholder groups (Karanth et al. 2008; Bremner and Park 2007; Karanth and Nepal 2011). Very few conservation-related studies have bridged the two approaches, for example by combining the Q-method to explore viewpoints with a survey for validating such viewpoints among the respondents (Danielson 2009). In this paper we present the results of an exploratory study into the viewpoints on tiger conservation among conservation professionals in India. We then identify the points of disagreement, and overlap between the viewpoints, and discuss the implications for addressing complex socio-ecological conservation challenges.

3.2. Methods

The viewpoints of conservation professionals were examined in two distinct, but linked, research steps. The first step involved exploring and determining the dominant

viewpoints of tiger conservation professionals in India using the Q-Method (Brown 1980). The second step involved measuring the popular approval of these viewpoints across a larger sample of conservation professionals in India using an online survey.

The journal 'Human Dimensions of Wildlife' recently published a special issue on the advantages and disadvantages of Internet surveys and suggested that when "Internet surveys are used in combination with other modes of data collection, findings can contribute to human dimensions decision making" (Vaske 2011). As a result, we use a coupled approach by combining the intellectual rigor of the Q-Method and the grounded evidence of surveys; this is considered especially helpful when seeking to overcome issues with deadlocks or intense debate (Danielson 2009), and to uncover overlap between the viewpoints.

3.2.1. Research Steps

3.2.1.3. Q-Method Study

The Q-Method has recently been used by various researchers to understand subjectivities relevant to conservation (Sandbrook et al. 2010; Malan 2008; Mattson et al. 2006). The method allows for a "systematic study of subjectivity, a person's viewpoint, opinion, beliefs, attitude, and the like" (Brown 1980). The participants are asked to rank a set of statements according to their inherent views (consisting of preference or judgement or worldviews), and the subsequent analysis of the ways of ranking the statement allows researchers to understand the inherent viewpoints (van Exel and de Graaf 2005). Q-Method allows participants to express themselves without conforming to pre-assigned categories set by the researcher, yet reveals the implicit subjectivities of participants. This was particularly useful in the exploratory phase of our research, where we set out to

determine *what* the viewpoints in tiger conservation in India were. The concepts underpinning Q-method are described in detail elsewhere (refer, for example, Brown 1980; van Exel and de Graaf 2005). To refrain from repetition, we will only describe the methodology in brief, adapting from other authors (Sexton et al. 1998):

Step 1: Developing the Concourse. The concourse is a set of statements that reflect the diversity and complexity of the current discourse around the issue under study, in this case, issues pertinent to tiger conservation. The concourse was developed through a detailed literature review conducted between October 2010 and January 2011 (refer Rastogi et al. 2012), and brainstorming and discussions with stakeholder groups. The final concourse consisted of 36 statements, as required by our scheme of the Q-Sort distribution (Step 3). We made every effort to retain the original wording of the statements in order to capture the intent of the source (Cuppen et al. 2010).

Step 2: Organizing the P-Sample. The group of respondents is referred to as the P-Sample. For Q-Method, the precise profile of the participant is not important to the response as long as a diverse representation of viewpoints is maintained, and this necessitated a purposive sampling strategy (Sexton et al. 1998). Conservation professionals working on tiger issues in India were subsequently recruited to ensure a representation across major groups (media, researchers, NGOs, Indian Forest Service), genders, ages and geographic regions. Participant emails were obtained through personal contact, institutional databases and online searches.

Step 3: Determining Q-Sort. Using an online tool[3] (http://q-assessor.com), we provided the participants with the concourse, requesting they sort the 36 statements according to their degree of agreement on a 9-point scale (-4 to +4). Demographic data were also

[3] The online instrument was pre-tested with five conservation professionals in India prior to distribution.

obtained and participants were invited to provide comments and further details on their viewpoints. This step was conducted between December 2011 and January 2012.

Step 4: Analysis/ Interpretation. After the data were collected, they were downloaded, cleaned and sorted for analysis using the online tool. We first ascertained the correlation between the Q-sorts, indicating the level of agreements among the responses. On the basis of similarities among Q-sorts, we conducted factor analysis to obtain the number of natural groupings (or factors) for the Q-sorts, to identify how they were fundamentally different. We then performed Varimax rotation (Brown 1980), to develop the final set of factors, where each factor consisted of a set of statements representing a particular viewpoint on tiger conservation in India. The process for analyzing Q-sorts has been described by other authors in detail (van Exel and de Graaf 2005; Brown 1980).

To develop a narrative to represent each viewpoint we then conducted follow-up qualitative interviews with participants who clearly represented that viewpoint. In this step, we also made an effort to identify any hitherto-unrevealed views. Through this process we retained emphasis on representing all professions and experience-groups. Each factor/ viewpoint was then described by a short narrative, which was triangulated directly with participants in order to keep the narratives emic (Danielson 2009). [4]

3.2.1.4. Online Survey

After the viewpoints were determined, we sought to validate the viewpoints with a larger community of conservation professionals using an online survey instrument and assessed the level of popular approval/ disapproval for each viewpoint (Folz 1996). A simple

[4] We do not provide further analysis of the Eigenvalues and total variance, which are regarded as "relatively meaningless" for the Q-method (see Brown 1980). These values are ultimately determined by the arbitrary number of participants involved in the study, and are not regarded as directly significant in this analysis (Ward 2011).

questionnaire was designed to reduce errors of non-attitudes (Dillman et al. 2009) and pre-tested with five conservation professionals working in India.

The survey asked participants to rate each of the narratives on a scale of 1-5 according to their level of agreement/ disagreement (1 being low, 5 being high). While this individual rating of viewpoints allowed for determining the popularity of viewpoints, it also allowed participants to reflect their individual complex viewpoints, without assigning themselves to prescribed categories (Danielson 2009). Data pertaining to demographic profiles were also obtained. Using the snowball sampling technique (requesting participants to recommend others) we sought participants from various sectors including the government, academia and NGOs. In addition, we distributed the survey through online conservation discussion forums and listserves. The survey was conducted between January and March 2012, independently of the Q-method study.

3.2.1.5. Limitations

The results of the online survey are limited by the sampling method (Umbach 2004). We utilized a convenience sample (a sample in which the probability of sample member's inclusion in the sample cannot be computed) (Schonlau et al. 2002) which limits generalizability (see, for example, Coomber (1997)). Since the population of conservation professionals in India has not been determined, the results of our survey can not be directly generalized. Nevertheless our sample exhibited representation from across India and a variety of demographic profiles (see Tables 3-1 and 3-2) providing a trustworthy basis for interpretation.

The survey may also suffer from a degree of coverage error, with a mismatch between the target population (larger group) and frame populations (subset of population, created by

limiting the group based on method of the process). Our survey may also have set limits by being only available online (Zhang 2000), and in English. Despite this, the Internet provided the best available means to reach out to conservation professionals spread across the country. Further, it was necessary to conduct a national survey in English, as this is the only common language used among conservation professionals in India.

Another possible source of error was non-response bias (when respondents are different in attitudes from the non-respondents). We checked for non-response bias by performing a two tailed t-test on the data to check for differences among early and late respondents in our sample (Korkeila et al. 2001). Splitting our respondent data in half (early and late), we were unable to statistically reject the null hypothesis that both sub-samples are the same (p-value= 0.9887).

We controlled for other errors by disallowing multiple entries from the same IP address, and by screening the responses from unintended participants (Zhang 2000). We utilized established best-practice in survey design (Umbach 2004), for example, by being easy to navigate, short, allowing scrolling, limiting line length, including a progress timer and pre-testing the survey.

3.3. Results

3.3.1. Respondent Profiles

Q-Method: A typical Q-method exercise involves 30-60 participants. We received complete response data from 51 participants. Our sample comprised officers from the government (35%) and NGOs (33%), members of the media (18%), and several participants reported more than one professional affiliation including universities and the

private sector (filmmakers, bloggers, staff of international agencies, consultants to governments, etc) (Table 3-1). Our participants included senior members of the Indian Forest Service with extensive experience in the management of Tiger Reserves, senior staff of major conservation-related NGOs in India, senior biologists, researchers, and media professionals (editors and reporters). Nearly 86% of our participants rated themselves as having high familiarity with tiger conservation issues (either 4 or 5 on a 5-point scale).

Online Survey: We received 153 complete responses to our online survey. The majority of the participants identified themselves as working with NGOs (31%), Government (27%) and Universities (27%) (see Table 3-2). The majority of our sample held a Masters' degree (65%), while 45% assigned themselves to having a natural science focus. Nearly 63% of participants rated themselves as being highly familiar with tiger conservation in India (either 4 or 5 on a 5-point scale).

3.3.2. Factor 1: Community-centered Conservation

The overall results of the factor analysis are reported in Table 3.

In Factor 1 statements that positively or negatively reflected the concerns of local communities were kept at the extreme ends of the Q-sort, since they evoked maximum reaction (Table 3-4). This factor supported the possibility of coexistence among communities and the tiger (Statement 22) and did not agree that Protected Areas have to be kept inviolate (Statement 3). Respondents suggested that relocation from Protected Areas is not advisable if it has high social costs (Statement 12). This factor was sympathetic towards communities, and describes the view that communities should be

centrally placed in tiger conservation schemes. We named this viewpoint 'Community-centered Conservation'.

"Yes we need to protect tigers but the current exclusionary policy is not the way to go."

-Q Sort 2431, Associate Professor

"Historically communities living in forest areas have lived in harmony with tigers. ... (With) *the creation of tiger parks and the Project Tiger the level of injustice being meted out to local communities has reached severe proportions… Like a Baiga in Chhattisgarh* (a particular tribe in a province) *says 'Bagh Baiga Jungle Sab Ek'* (the tiger, the tribal and the forest is one entity)*".*

-Q-Sort 2541, Programme Coordinator, NGO, translation ours.

"Conservation is a political process and …rural societies in countries like India need to be incentivized."

-Q Sort 2424, member of the Indian Forest Service

For the subsequent online survey, participants were asked to rate the following narrative: "Current exclusionary approach to tiger conservation is not appropriate. Historically, communities have shared tiger habitats, and management must not ignore community concerns. We need to give incentives to communities for participating in tiger conservation. We need a more sensitive approach to community needs." While 88% (n= 134) respondents agreed, among the disagreeing participants five expressed a high degree of disagreement (Table 3-9).

3.3.3. Factor 2: Tiger-centered Conservation

Factor 2 (Table 3-5) was more sympathetic towards the tiger, and did not support statements regarding compromises in tiger conservation. This factor supported both inviolate areas for the tiger and the protection of habitat outside Protected Areas (Statements 3 and 27). This factor did not agree that communities pay an unfair cost of conservation (Statement 5), and participants suggested a strong belief in the resources and outlook of the governments (Statements 32, 24). Overall, this factor emphasized the tiger, and was named 'Tiger-centered Conservation'.

"Community managed tiger reserve is a big joke…If the tribals decide to cut a tree…and leave a part of the lopped branches under the tree to apologise in a sentimental display of love for the forest, it does not quite make up for the loss of habitat…".

- Q-Sort 2404, Media Professional

"We need to make larger land masses free for the tiger. Such delineated areas need to be kept absolutely free from activities detrimental to the tiger fortunes"

- Q-Sort 2522, Government Officer

This viewpoint was described by the following narrative: "Protected Areas for the tiger need to be kept inviolate. To ensure this, local communities may have to be relocated, as it would also help integrate them into the mainstream society. To ensure such measures, governments need to have the political will for successful implementation." This narrative was rated positively by 75% of our survey respondents (n= 114). Among the disagreeing participants, the majority rated it moderately (n=10) to highly (n=15) disagreeable (Table 3-9 and Figure 3-1).

3.3.4. Factor 3: Science and Tourism-led Approach to Conservation

Factor 3 (Table 3-6) suggested that tourism and science drive support for tiger conservation, without sympathy towards the government. This factor also suggested that livelihood concerns of local communities need to be balanced with conservation imperatives (Statement 19), and creating partnerships with communities can help in controlling poaching and help the tiger survive (Statements 11 and 6). Overall, this factor laid emphasis on statements related to the role of NGOs, governments, tourism and science.

"There is a major disconnect between the Policy Makers / national level administrators and the ground level workers."

- Q Sort 2427, Tourism and media related professional

"Relocation of villages in Tiger reserves is a critical issue which needs to be dealt with soft hands…The relocation of locals by merely providing monetary benefits would not serve a good purpose in long term conservation goals."

- Q Sort 2484, Research Biologist

This viewpoint was called the 'Science and Tourism-led Approach to Conservation'. The narrative to be utilized for further analysis was framed as "Tourism in tiger reserves creates a constituency for conservation and should be supported. There are community related management issues with the government. But stronger research on tigers can help solve many issues. Although NGOs have not been entirely successful in their desired roles, governments cannot be the sole authority to manage conservation." This viewpoint received 84% agreement and 16% disagreement in our online survey (Figure 3-1).

3.3.5. Factor 4: Instrumental Approach to Conservation

Factor 4 (Table 3-7) describes the fourth dominant viewpoint among tiger conservation professionals in India. This viewpoint believed that humans could not co-exist with tigers, yet the respondents were sympathetic to the concerns of local communities (Statement 19 and 8).

"Man and Tiger can never coexist together."

-Q-Sort 2489, Field Biologist

Additionally, this viewpoint suggested that the government has the resources but requires political will to conserve the tiger (statement 7, 24).

"Stop the consumption of tiger in China, the Bengal tiger will survive in India and other countries. Why no one is targeting China? Are we afraid of facing truth? Stop the demand, poaching will decrease."

-Q Sort 2436, Director, NGO

Because of the emphasis on various instruments of conservation, this viewpoint was called the 'Instrumental Approach to Conservation'. It was summarized in the narrative: "Tigers cannot coexist with humans, and this makes conservation a complex issue, with many involved parties. The media needs to be utilized to generate public support, and the NGOs have been instrumental in bridging the goals of conservation and community interests. Interests of the local communities are also important. Stronger and more sensitive government machinery would help in effective tiger conservation." In our online survey, this viewpoint was rated favorably by 82% respondents (n=126) with 28% expressing high agreement (n= 52) (Table 3-9, Figure 3-1). Among those disagreeing, 15 expressed high or highest disagreement.

3.3.6. Factor 5: Conservation as a Moral Duty

Factor 5 (Table 3-8) appeared to regard conservation as a moral duty (Statement 2). This factor suggested that governments need to demonstrate political will, and that local-level politics often become a roadblock in tiger conservation (Statement 34 and 7). For this factor, it appeared that tiger conservation was a desirable imperative and we should follow any means available to achieve this goal, while being sensitive to local communities.

"Tiger conservation…should be part of a continual nationwide, forest-wide movement always supported by all the stakeholders."

- Q Sort 2171, Researcher

"..Every species has the inherent right to live…Relocation of tribals is good, but we do have to keep in mind their needs. They can be very useful to have in Protected Areas because they know the area like none else.."

- Q Sort 2488, PhD Research Scholar

This viewpoint was called 'Conservation as a Moral Duty'. We framed the narrative for this viewpoint as: "Conservation of tigers is a moral duty of humans, as tigers too have a right to live. Like other animals, local communities may be occupants of certain ecosystems. But some areas should be made clear for the tiger, even if the society has to bear the costs. Research is very important for conservation."

This factor was rated agreeably by 89% (n=136) of our survey participants with the majority of them in highest agreement (n= 73) (Table 3-9, Figure 3-1). The majority of the respondents who disagreed with this viewpoint, only did so moderately (n=6).

3.4. Discussion

This study is interestingly positioned: the participants of this study are also its prospective consumers. To certain readers this study may appear self-critical of the discipline, and we urge caution when reading. It is important to underline that by measuring the popularity of viewpoints, we do not seek to legitimize them, rather only to provide insights into underlying values and assumptions held by the conservation professionals sampled.

3.4.1. Tiger-tribal debate

As expected, we found tiger-centered and community-centered viewpoints (Factors 1 and 2). The basic tenets of this debate are similar to the 'conservation-development' viewpoints which have been fairly consistent in the conservation biology discourse. Such putative 'polarizing' viewpoints have also been reported by other conservation studies (Malan 2008; Sandbrook et al. 2010; Mattson et al. 2006). Seeking to assess the degree of popular approval for such divergent viewpoints, we were able to make two important observations.

Firstly, our survey findings suggest that conservation professionals have strong positions on the 'tiger-tribal' debate, with the majority of participants rating their level of agreement or disagreement as 'high' for these viewpoints (4-5 on a 5 point scale), but with more acceptance for the local communities. The tiger-centric viewpoint was disagreed with by 25% of participants (the highest level of disagreement for any viewpoint in our study), but supported by nearly 75% and *highly* supported by nearly 37% of participants. On the other hand, during qualitative interviews for the Q-Method, many participants rated the concerns of local communities as being important to address,

even if it may be more important to manage the ecological disturbances. Overall, the community-centered perspective was approved by nearly 88% of participants and disagreed with by only 12% of the participants in our study, compared to 18% disagreement reported by Karanth et al. (2008) through a similar exercise. These findings suggest that the majority of conservation professionals tend towards tolerating, or even accepting, the involvement of local communities in conservation plans.

Importantly, the 'conservation-development' viewpoints are fundamental to philosophies of conservation biology, and a solution may not be possible or necessary (Miller et al. 2011; Minteer and Miller 2011). Our findings suggest that tiger conservation management and policy in India may benefit from accepting the polarity of the tiger-tribal debate, and that research in either of these areas alone is not likely to reconcile it. For example, past policy initiatives that raised the tiger-tribal debate (such as the *Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006,* and the report of the Tiger Task Force) have met with polarized responses. When environmental issues create political disputes, scientific evidence is often not useful in reconciliation, because the dispute is essentially between divergent worldviews and belief systems (Sarewitz 2004). As a result, we can speculate that any policy issue that invokes the tiger-tribal debate will not receive widespread support from conservation professionals in India. Our results suggest that if a policy change requires a high degree of agreement or coalition among conservation professionals, it will need to refrain from utilizing the tiger-tribal perspectives, and instead emphasize the more widley-acceptable perspectives.

Our second key observation offers the potential for agreement. Our results indicate that the viewpoints on tiger conservation are not neatly arranged along the 'tiger-tribal' debate. For example, while 37% of our survey respondents highly agreed with the tiger-centered viewpoints, only 12% disapproved of the community-centered viewpoints. While nearly 88% of participants favored the community centered-viewpoint, nearly 75% participants also agreed with the tiger-centered viewpoints. This suggests that the two viewpoints are not mutually exclusive or necessarily contradictory. Instead, the majority of participants agreed with *both* – the tiger-centered and community centered viewpoints. This suggests that many survey participants were able to identify areas of overlap between the viewpoints, where agreeing with one did not predispose disagreeing with another. Further, beyond the 'tiger-tribal' viewpoints, we recorded at least three other dominant viewpoints that were found to be latent among conservation professionals. These viewpoints had similar rates of approval among the participants. Popular viewpoints (such as the moral viewpoint) need to be further explored in tiger conservation policy, management and research.

It is recognized that 'tiger-tribal' issues are highly vocalized, seemingly polarizing, and often overwhelm conservation debates in India, potentially becoming a basis for the segregation of advocacy coalitions (Sabatier and Jenkins-Smith 1993). Our results, however, indicate that the participants found areas of agreement within the tiger-centered and community-centered viewpoints, and with other independent (albeit rarely evident) viewpoints (Miller et al. 2011). For policy makers, it will be important to recognize the existence of advocacy coalitions along the 'tiger-tribal' viewpoints, and the potential of these coalitions to affect policy design. It is therefore important for tiger-related policy

debates to emphasize this overlap between the 'tiger-tribal' viewpoints and also with the other latent views.

3.4.2. Transient Viewpoints

Factor 3 placed emphasis on the role of tourism in conservation. It is important to note that at the time of our survey the Supreme Court of India was considering a petition to ban tourism from core areas of Tiger Reserves. This resulted in a dialogue among conservation professionals in India regarding the desirable nature and extent of tourism in Tiger Reserves. More recently, the Supreme Court of India temporarily banned tourism in tiger reserves, leading to further discussions and debates in the popular media and online forums of professionals (Sethi 2012). This debate was reflected in our Q-Method exercise, suggesting that the current (2011-12) public discourse may have led to greater emphasis being placed on the role of tourism. According to Macnamara (2006), some viewpoints and subjectivities become prominent depending on the current status of societal discourse (for instance, as depicted through media). It is therefore likely that a different level of salience may be accorded to tourism in future studies, depending on the concurrent societal discourse. More generally, the transient nature of viewpoints indicates that strong perceptions for, or against, a policy measure may be temporary and may change with time.

3.4.3. Role of Morals and Ethics

This study has demonstrated the prevalence of a viewpoint that justified tiger conservation on a moral or ethical basis (Viewpoint 5). Importantly, the moral/ ethical viewpoint of tiger conservation was the most widely accepted viewpoint, with nearly

90% agreement (Figure 1). This viewpoint echoes the pioneer of tiger research, George Schaller, who called tiger conservation "a moral issue" (cited in Dinerstein et al. 2006). These moral/ ethical grounds for tiger conservation are rarely stated explicitly in the literature. Indeed, a reason for the protection of tigers is rarely specified, and much of the argument on saving tigers focuses on its value as an umbrella species, or a majestic species (Tilson and Nyhus 2010). In addition, the concourse for the Q-method offered an alternative argument for protecting the tiger: its value as a nationalistic symbol in the Indian political discourse, as implied by Lewis (2005). Yet, this statement was not accorded precedence by the participants. Our results suggest that conservation professionals, irrespective of their position in the tiger-tribal debate, are likely to agree on the moral/ ethical grounds for tiger conservation. Explicitly building from this general consensus may facilitate the resolution or progression of polarized issues in tiger conservation policy and management discourse. The moral viewpoint of tiger conservation has the potential to serve as a basis from which stronger coalitions of advocacy for tiger conservation can form, de-emphasizing the 'tiger-tribal' divide, and instead emphasizing tiger conservation as a highly desirable societal goal. Such a coalition of professionals could play a greater role in policy-related debates over tiger conservation in India.

Ultimately, the lack of professional consensus combined with the high levels of scientific uncertainty surrounding many tiger conservation issues creates an 'unstructured complex problem' for policy makers that requires sophisticated strategies to progress (Tompkins et al. 2008; Hanssen et al. 2009). Such strategies would include reducing dissent, building consensus, identifying differences, promoting shared understanding to conceptualize

future scenarios, including scientists in policy assessments and reducing uncertainty for decision-makers (Lawton 2007; Hanssen et al. 2009; Tompkins et al. 2008). Our study provides an initial step in the process of formulating and developing such policy strategies. By combining the Q-Method (to explore viewpoints), with a survey instrument (to validate the results and ascertain the popularity of individual viewpoints) we were able to frame both extant and latent viewpoints and measure their acceptability. We recommend using this combination of methods in other conservation-related contexts where a more nuanced understanding of stakeholder viewpoints is required by policy-makers and conservation managers.

3.5. Conclusion

This exploratory study revealed that conservation professionals in India view tiger conservation in at least five different ways, which were not necessarily contradictory. Through an analysis of viewpoints among conservation professionals we were able to underline two general conclusions, one encouraging and the other cautionary. Encouragingly, we found a complexity of viewpoints befitting a conservation challenge of the magnitude of tiger conservation, and representing the diversity in the body of conservation professionals. However, a general caution follows: the diversity of viewpoints among conservation professionals in a complex political setting underlines that any policy decision will receive support from certain groups and opposition from others. Utilizing the results of this study, it may be possible to recognize some of the potential grounds for opposition or support to proposed policy changes, and manage these pre-emptively.

Our study also suggests the 'tiger-tribal debate', which reflects the global conservation-development debate in biodiversity conservation, may have reduced in intensity but is potentially divisive. Since the differences appear to be fundamental to individuals, it may be futile to seek consensus through more research or dialogue. Our results suggest the need to avoid framing tiger conservation policy discussions along the tiger-tribal debate and instead focus on areas of potential agreement. Creating a discourse around these views can help organize conservation professionals to provide more coherent inputs for policy makers. This will be crucial for effective participation in tiger conservation policy advocacy, design and implementation in India.

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References

Agrawal A, Gibson CC (1999) Enchantment and disenchantment: The role of community in natural resource conservation. World Development 27 (4):629-649

Barry D, Oelschlaeger M (1996) A Science for Survival: Values and Conservation Biology. Conserv Biol 10 (3):905-911

Bengtsson M, Tillman A-M (2004) Actors and interpretations in an environmental controversy: the Swedish debate on sewage sludge use in agriculture. Resources, Conservation and Recycling 42 (1):65-82

Bremner A, Park K (2007) Public attitudes to the management of invasive non-native species in Scotland. Biological Conservation 139 (3-4):306-314

Brown SR (1980) Political Subjectivity: Applications of Q Methodology in Political Science. Yale University Press, New Haven and London

Carter NH, Shrestha BK, Karki JB, Pradhan NMB, Liu J (2012) Coexistence between wildlife and humans at fine spatial scales. Proceedings of the National Academy of Sciences 109 (38):15360-15365. doi:10.1073/pnas.1210490109

Carter NH, Shrestha BK, Karki JB, Pradhan NMB, Liu J (2013) Reply to Goswami et al., Harihar et al., and Karanth et al.: Fine-scale interactions between tigers and people. Proceedings of the National Academy of Sciences 110 (2):E111-E112. doi:10.1073/pnas.1217414110

Chamberlain EC, Rutherford MB, Gibeau ML (2012) Human Perspectives and Conservation of Grizzly Bears in Banff National Park, Canada. Conserv Biol 26 (3):420-431. doi:10.1111/j.1523-1739.2012.01856.x

Chundawat RS, Habib B, Karanth U, Kawanishi K, Ahmad Khan J, Lynam T, Miquelle D, Nyhus P, Sunarto S, Tilson R, Wang S (2011) *Panthera tigris*. www.iucnredlist.org. Accessed 04 July 2012

Clark TW (2002) The policy process: a practical guide for natural resource professionals. Yale University Press, New Haven and London

Coomber R (1997) Dangerous drug adulteration-an international survey of drug dealers using the internet and the world wide web (WWW). International Journal on Drug Policy 8 (2):71-81

Cuppen E, Breukers S, Hisschemoller M, Bergsma E (2010) Q methodology to select participants for a stakeholder dialogue on energy options from biomass in the Netherlands. Ecol Econ 69 (3):579-591

Danielson S (2009) Q Method and Surveys: Three Ways to Combine Q and R. Field Methods 21 (3):219-237. doi:10.1177/1525822x09332082

Dillman DA, Smyth JD, Christian LM (2009) Internet, mail, and mixed-mode surveys : the tailored design method. 3rd edn. Wiley & Sons, Hoboken, N.J.

Dinerstein E, Loucks C, Heydlauff A, Wikramanayake E, Bryja G, Forrest J, Ginsberg J, Klenzendorf S, Leimgruber P, O'Brien T, Sanderson E, Seidensticker J, Songer M (2006) Setting Priorities for the Conservation and Recovery of Wild Tigers: 2005-2015. A User's Guide. WWF, WCS, Smithsonian and NFWF-STF, Washington, D.C. - New York

Folz DH (1996) Survey research for public administration. Sage Publications, Thousand Oaks

Goswami VR, Vasudev D, Karnad D, Krishna YC, Krishnadas M, Pariwakam M, Nair T, Andheria A, Sridhara S, Siddiqui I (2013) Conflict of human-wildlife coexistence. Proceedings of the National Academy of Sciences 110 (2):E108. doi:10.1073/pnas.1215758110

Grimble R, Wellard K (1997) Stakeholder methodologies in natural resource management: a review of principles, contexts, experiences and opportunities. Agricultural Systems 55 (2):173-193

Guha R (1989) Radical American Environmentalism and Wilderness Preservation: A Third World Critique. Environ Ethics 11 (1):71-83

Hanssen L, Rouwette E, van Katwijk MM (2009) The role of ecological science in environmental policy making: From a pacification toward a facilitation strategy. Ecology and Society 14 (1)

Harihar A, Chanchani P, Sharma RK, Vattakaven J, Gubbi S, Pandav B, Noon B (2013) Conflating "co-occurrence" with "coexistence". Proceedings of the National Academy of Sciences 110 (2):E109. doi:10.1073/pnas.1217001110

Hickey GM (2009) Polarized debate surrounding Tasmania's old-growth forests. The Forestry Chronicle 85 (5):762-771. doi:10.5558/tfc85762-5

Hofstede GH (1980) Culture's consequences : international differences in work-related values. Sage Publications, Beverly Hills, California

Karanth K, Nepal S (2011) Local Residents Perception of Benefits and Losses From Protected Areas in India and Nepal. Environmental Management 49 (2):372-386. doi:10.1007/s00267-011-9778-1

Karanth KK, Karanth KU (2012) A Tiger in the Drawing Room. Can Luxury Tourism Benefit Wildlife? Economic & Political Weekly XLVII (38):38-43

Karanth KK, Kramer RA, Qian SS, Christensen Jr NL (2008) Examining conservation attitudes, perspectives, and challenges in India. Biological Conservation 141 (9):2357-2367

Karanth KU (2005) Reconciling Conservation with Emancipatory Politics. Economic and Political Weekly 40 (46):4803-4805

Karanth KU, Gopalaswamy AM, Karanth KK, Goodrich J, Seidensticker J, Robinson JG (2013) Sinks as saviors: Why flawed inference cannot assist tiger recovery. Proceedings of the National Academy of Sciences 110 (2):E110. doi:10.1073/pnas.1216623110

Karanth KU, Madhusudan MD (1997) Avoiding Paper Tigers and Saving Real Tigers: Response to Saberwal. Conserv Biol 11 (3):818-820

Korkeila K, Suominen S, Ahvenainen J, Ojanlatva A, Rautava P, Helenius H, Koskenvuo M (2001) Non-Response and Related Factors in a Nation-Wide Health Survey. European Journal of Epidemiology 17 (11):991-999

Lackey RT (2006) Axioms of ecological policy. Fisheries 31 (6):286-290

Lackey RT (2007) Science, Scientists, and Policy Advocacy. Conserv Biol 21 (1):12-17. doi:10.1111/j.1523-1739.2006.00639.x

Lawton JH (2007) Ecology, politics and policy. Journal of Applied Ecology 44 (3):465-474. doi:10.1111/j.1365-2664.2007.01315.x

Lewis M (2005) Indian science for Indian tigers? Conservation biology and the question of cultural values. J Hist Biol 38 (2):185-207. doi:10.1007/s10739-004-1486-8

Lewis ML (2003) Inventing global ecology : tracking the biodiversity ideal in India, 1945-1997. New perspectives in South Asian history, vol 5. Orient Longman; Sangam, Hyderabad & London

Ludwig D, Mangel M, Haddad B (2001) Ecology, Conservation and Public Policy. Annual Review of Ecology & Systematics 32:481-517

Macnamara J (2006) Media content analysis: Its uses, benefits & best practice methodology. Media Monitors Pty Ltd,

Madhusudan M (2005) Of Rights and Wrongs: Wildlife Conservation and the Tribal Bill. Economic and Political Weekly 40 (47):4893-4895

Malan L-C (2008) Beyond the debate: Exploring the underlying values and assumptions of biodiversity conservation in protected areas. Antioch University New England,

Mattson DJ, Byrd KL, Rutherford MB, Brown SR, Clark TW (2006) Finding common ground in large carnivore conservation: mapping contending perspectives. Environmental Science & Policy 9 (4):392-405

Miller TR, Minteer BA, Malan L-C (2011) The new conservation debate: The view from practical ethics. Biological Conservation 144 (3):948-957

Minteer BA, Miller TR (2011) The New Conservation Debate: Ethical foundations, strategic trade-offs, and policy opportunities. Biological Conservation 144 (3):945-947

Mondol S, Karanth KU, Ramakrishnan U (2009) Why the Indian Subcontinent Holds the Key to Global Tiger Recovery. PLoS Genet 5 (8):e1000585

Noss RF, Dobson AP, Baldwin R, Beier P, Davis CR, Dellasala DA, Francis J, Locke H, Nowak K, Lopez R, Reining C, Trombulak SC, Tabor G (2012) Bolder Thinking for Conservation. Conserv Biol 26 (1):1-4

Project Tiger (2005) Joining The Dots: The Report of the Tiger Task Force Union Ministry of Environment and Forests, Government of India, New Delhi

Rai N (2012) Green Grabbing in the Name of the Tiger. Economic & Political Weekly XLVII (42):108-109

Rastogi A, Hickey GM, Badola R, Hussain SA (2012) Saving the Superstar: A review of the social factors affecting tiger conservation in India. Journal of Environmental Management 113:328-340. doi:10.1016/j.jenvman.2012.10.003

Rokeach M (1968) Beliefs, attitudes, and values : a theory of organization and change. Jossey-Bass, San Francisco

Sabatier PA, Jenkins-Smith HC (eds) (1993) Policy Change and Learning: An Advocacy Coalition Approach. Westview Press, Boulder CO

Saberwal VK (1997) Saving the Tiger: More Money or Less Power? Conserv Biol 11 (3):815-817

Sandbrook C, Scales IR, Vira B, Adams WM (2010) Value Plurality among Conservation Professionals. Conserv Biol 25 (2):285-294. doi:10.1111/j.1523-1739.2010.01592.x

Sarewitz D (2004) How science makes environmental controversies worse. Environmental Science & Policy 7 (5):385-403

Schonlau M, Fricker RD, Elliott MN (2002) Conducting research surveys via e-mail and the Web. Rand, Santa Monica, CA

Sethi N (2012) Tiger tourism: Lobbies fight tooth and nail. The Times of India, August 14,

Sexton D, Snyder P, Wadsworth D, Jardine A, Ernest J (1998) Applying Q Methodology to Investigations of Subjective Judgments of Early Intervention Effectiveness. Topics in Early Childhood Special Education 18 (2):95-107. doi:10.1177/027112149801800205

Schwitzgebel E (2011) Belief. In: Zalta EN (ed) The Stanford Encyclopedia of Philosophy

Tilson R, Nyhus PJ (eds) (2010) TIGERS OF THE WORLD: The Science, Politics, and Conservation of *Panthera Tigris*. Second Edition edn. Academic Press, London, Burlington, San Diego

Tompkins EL, Few R, Brown K (2008) Scenario-based stakeholder engagement: Incorporating stakeholders preferences into coastal planning for climate change. Journal of environmental management 88 (4):1580-1592

Umbach PD (2004) Web surveys: Best practices. New Directions for Institutional Research 2004 (121):23-38. doi:10.1002/ir.98

van Exel J, de Graaf G (2005) Q methodology: A sneak preview.

Vasan S (2005) Wildlife Conservation. Deconstructing the 'Public'. Economic and Political Weekly 40 (46):4805-4807

Vaske JJ (2011) Advantages and Disadvantages of Internet Surveys: Introduction to the Special Issue. Human Dimensions of Wildlife 16 (3):149-153. doi:10.1080/10871209.2011.572143

Ward T (2011) Mapping the Epistemological Diversity of Chinese Medicine; a Q Methodology Study. University of Westminster, Westminster

Weible CM (2007) An Advocacy Coalition Framework Approach to Stakeholder Analysis: Understanding the Political Context of California Marine Protected Area Policy. Journal of Public Administration Research and Theory 17 (1):95-117. doi:10.1093/jopart/muj015

Wilhere GF (2012) Inadvertent Advocacy. Conserv Biol 26 (1):39-46. doi:10.1111/j.1523-1739.2011.01805.x

Zhang Y (2000) Using the Internet for survey research: A case study. Journal of the American Society for Information Science 51 (1):57-68

Table 3-1 Demographic characters of participants in Q-Method survey of tiger conservation professionals in India.

	Number of Participants (n= 51)	Percentage
Sector of employment		
Government	18	35.29
Non-government organization (NGO)	17	33.33
Private sector	8	15.69
University	5	9.80
Other	7	13.73
Familiarity with tiger conservation issues in India on a scale of 1-5 (5 being highly familiar, and 1 being low)		
1	0	0
2	2	3.92
3	5	9.80
4	22	43.14
5	22	43.14
Role in conservation		
Policy	14	27.45
Management	6	11.76
Field work	18	35.29
Academia	10	19.61
Research	28	54.90
Advocacy	16	31.37
Fund-raising	2	3.922
Media	9	17.65
Tourism	8	15.69
Other	6	11.76
Sex		
Female	20	39.22
Male	31	60.78
Average age		39 years

Table 3-2 Demographic characters of conservation professionals participating in an online survey regarding viewpoints on tiger conservation in India.

	Number of Participants (n= 153)	Percentage
Sector of employment		
Government	42	27.45%
Non-government organization (NGO)	48	31.37%
Private sector	19	12.42%
University	41	26.80%
Other	20	13.07%
Academic Degree		
Bachelors	35	22.88%
Masters	100	65.36%
Doctoral	32	20.92%
Other	10	6.54%
Categories best pertaining to role in conservation		
Natural Sciences	69	45.10%
Social Sciences	17	11.11%
Conservation Management	71	46.41%
Amateur Naturalist Practice	14	9.15%
Advocacy	23	15.03%
Conservation Education	54	35.29%
Other	17	11.11%
Years of conservation-related experience		
1-10 years	115	75.16%
11-20 years	24	15.69%
21-30 years	6	3.92%
More than 30 years	8	5.23%
Familiarity with tiger conservation issues in India on a scale of 1-5 (5 being highly familiar, and 1 being low)		
1	2	1.31%
2	13	8.50%
3	41	26.80%
4	51	33.33%
5	46	30.07%
Role in conservation		
Policy	31	20.26%
Management	44	28.76%
Field work	88	57.52%
Academia	66	43.14%
Research	102	66.67%
Advocacy	30	19.61%
Donor	10	6.54%

Fund-raising	13	8.50%
Media	22	14.38%
Tourism	20	13.07%
Other	10	6.54%
Sex		
Female	57	37.25%
Male	96	62.75%

Table 3-3 List of Q-Statements and the Z-scores and ranks assigned to them under the various factors.
The various factors represent the viewpoints held by tiger conservation professionals in India, under which the statements were differently ranked and scored. The Eigenvalues indicate the amount of variation in the total sample, accounted for by the factor.

No,	Statements	Factors									
		1		2		3		4		5	
		Z-Score	Rank	Z-Score	Rank	Z-Score	Rank	Z-Score	Rank	Z-Score	Rank
1	Tigers should be protected because they are the pride and heritage of India.	-0.262	21	-0.295	21	-0.81	28	0.246	18	0	17
2	Humans have a moral duty to protect the tiger, since the tiger's right to live is threatened by humans.	0.143	19	0.234	15	0.568	13	0.511	15	1.737	1
3	Protected areas for tigers should be kept completely inviolate.	-1.381	33	1.609	3	-0.378	25	0.679	13	1.035	8
4	Science alone should determine the policy for tiger conservation.	-1.665	35	-1.112	30	-0.924	29	-0.186	21	-0.434	22
5	The cost of conservation is unfairly borne by local communities.	0.623	14	-1.155	32	0.872	10	-0.852	30	-0.434	22
6	Poaching of tigers can be controlled if local communities are made part of tiger conservation schemes.	1.017	7	-0.043	18	1.184	4	-0.66	28	-0.526	23
7	For tiger conservation to be successful, governments must have the political will.	0.643	12	1.792	1	0.18	17	1.436	2	1.303	5
8	Relocation of local communities should be consensual and sensitive to their needs.	1.618	1	0.837	9	0.014	21	1.136	4	-0.86	28
9	Local communities should occupy a larger role in tourism in tiger reserves.	0.962	8	0.532	12	-0.02	22	0.662	14	-1.044	30
10	The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, should not be implemented in tiger reserves.	-1.104	31	1.333	5	0.97	8	-0.506	25	-1.219	33

11	Partnerships with local communities will ensure the long-term survival of tigers in India.	0.871	10	-0.338	23	1.212	3	1.049	5	1.127	7
12	Local communities have to be relocated from key habitat for tigers at any cost.	-1.786	36	1.278	6	0.146	18	-0.324	23	0.175	16
13	Protected areas that are managed with community involvement are less likely to be successful.	-1.399	34	-1.469	35	-2.008	36	-1.651	34	-0.693	25
14	Involving local communities in tiger reserves would increase anthropogenic disturbances.	-1.083	30	-0.008	17	-1.326	31	-1.706	35	0.443	14
15	The media plays a crucial role in tiger conservation, and should be utilized to generate support for tiger conservation.	0.145	18	0.003	16	-0.724	27	1.971	1	-0.259	20
16	NGOs are effective in pressuring the government to act on tiger conservation.	0.286	16	-0.74	26	-1.45	32	0.694	12	-0.86	28
17	NGOs represent the desirable viewpoints in societal debates on tiger conservation.	-0.568	24	-1.399	34	-1.492	33	0.694	12	-1.386	35
18	If local communities have a financial incentive, they will support tiger conservation.	0.242	17	-0.335	22	0.844	11	0.801	8	-1.127	32
19	Livelihood concerns of local communities need to be balanced with tiger conservation requirements.	1.112	6	0.711	11	1.104	5	1.24	3	1.219	6
20	Conservation projects cannot be made responsible for livelihood concerns.	-1.008	28	-1.003	28	-0.973	30	-1.578	33	-1.303	34
21	Given a chance, local communities will live harmoniously with the tiger.	0.563	15	-1.145	31	0.122	19	-0.644	27	-0.702	26
22	In human dominated landscapes, such as India, we need to find ways for tigers and humans to coexist.	1.279	5	-0.792	27	1.056	6	-0.41	24	0.61	12
23	The government should be solely responsible for tiger conservation in India.	-1.235	32	-0.349	24	-2.008	36	-1.938	36	-1.737	36
24	The government does not have the resources or skills to manage tiger conservation.	-0.741	26	-1.658	36	-0.264	23	-1.552	32	-1.127	32
25	Tiger conservation cannot succeed if it antagonizes local communities.	1.372	2	0.998	7	0.966	9	0.308	16	-0.092	18
26	There should be a heavy penalty for grazing	-1.067	29	0.967	8	0.048	20	-0.574	26	-1.044	30

	livestock within protected areas.										
27	There is an urgent need to protect the tiger habitats outside of protected areas.	0.69	11	1.702	2	1.046	7	0.725	10	0.869	11
28	Many issues in tiger conservation can be solved by dialogue between stakeholders.	1.309	4	0.364	14	-0.536	26	-0.171	20	0.259	15
29	Tourism in tiger reserves disturbs the tiger, and it should be controlled.	0.628	13	0.808	10	-1.496	34	0.998	6	0.601	13
30	Tourism in tiger reserves is an effective way of engaging the public in tiger conservation.	-0.616	25	-1.072	29	0.382	14	-0.788	29	-0.601	24
31	More research on tigers will lead to better results from tiger conservation projects.	-0.527	23	-0.192	20	1.582	1	0.939	7	1.562	3
32	The government has a landlord-like attitude towards protected areas.	1.312	3	-1.364	33	1.36	2	0.265	17	1.303	5
33	There is corruption in the management of tiger reserves.	0.04	20	-0.149	19	0.598	12	-0.288	22	0.961	9
34	Local level politics are a roadblock in tiger conservation.	-0.515	22	0.449	13	-0.326	24	-0.059	19	1.562	3
35	The legal framework for tiger conservation should be strengthened.	-0.823	27	1.366	4	0.214	16	0.798	9	0.869	11
36	Rather than increase the number of tiger reserves, we need to ensure adequate protection in the existing reserves.	0.927	9	-0.365	25	0.266	15	-1.265	31	-0.184	19
	Eigenvalues	8.9468		5.0976		4.4397		5.0054		3.0601	

Table 3-4 Statements that describe Factor 1 (Community Centered Conservation) in Q-Analysis of viewpoints among tiger conservation professionals in India.

No.	Statements	Rank
8	Relocation of local communities should be consensual and sensitive to their needs.	+4
25	Tiger conservation cannot succeed if it antagonizes local communities.	+4
32	The government has a landlord-like attitude towards protected areas.	+4
28	Many issues in tiger conservation can be solved by dialogue between stakeholders.	+4
22	In human dominated landscapes, such as India, we need to find ways for tigers and humans to coexist.	+3
23	The government should be solely responsible for tiger conservation in India.	-3
3	Protected areas for tigers should be kept completely inviolate.	-4
13	Protected areas that are managed with community involvement are less likely to be successful.	-4
4	Science alone should determine the policy for tiger conservation.	-4
12	Local communities have to be relocated from key habitat for tigers at any cost.	-4

Table 3-5 . Statements that describe Factor 2 (Tiger Centered Conservation) in Q-Analysis of viewpoints among tiger conservation professionals in India.

No.	Statements	Rank
7	For tiger conservation to be successful, governments must have the political will.	+4
27	There is an urgent need to protect the tiger habitats outside of protected areas.	+4
3	Protected areas for tigers should be kept completely inviolate.	+4
35	The legal framework for tiger conservation should be strengthened.	+4
10	The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, should not be implemented in tiger reserves.	+3
5	The cost of conservation is unfairly borne by local communities.	-3
32	The government has a landlord-like attitude towards protected areas.	-4
17	NGOs represent the desirable viewpoints in societal debates on tiger conservation.	-4
13	Protected areas that are managed with community involvement are less likely to be successful.	-4
24	The government does not have the resources or skills to manage tiger conservation.	-4

Table 3-6 Statements that describe Factor 3 (Science and Tourism-led Approach to Conservation) in Q-Analysis of viewpoints among tiger conservation professionals in India.

No.	Statements	Rank
31	More research on tigers will lead to better results from tiger conservation projects.	+4
32	The government has a landlord-like attitude towards protected areas.	+4
11	Partnerships with local communities will ensure the long-term survival of tigers in India.	+4
6	Poaching of tigers can be controlled if local communities are made part of tiger conservation schemes.	+4
19	Livelihood concerns of local communities need to be balanced with tiger conservation requirements.	+3
16	NGOs are effective in pressuring the government to act on tiger conservation.	-3
17	NGOs represent the desirable viewpoints in societal debates on tiger conservation.	-4
29	Tourism in tiger reserves disturbs the tiger, and it should be controlled.	-4
23	The government should be solely responsible for tiger conservation in India.	-4
13	Protected areas that are managed with community involvement are less likely to be successful.	-4

Table 3-7 Statements that describe Factor 4 (Instrumental Approach to Conservation) in Q-Analysis of viewpoints among tiger conservation professionals in India.

No.	Statements	Rank
15	The media plays a crucial role in tiger conservation, and should be utilized to generate support for tiger conservation.	+4
7	For tiger conservation to be successful, governments must have the political will.	+4
19	Livelihood concerns of local communities need to be balanced with tiger conservation requirements.	+4
8	Relocation of local communities should be consensual and sensitive to their needs.	+4
11	Partnerships with local communities will ensure the long-term survival of tigers in India.	+3
24	The government does not have the resources or skills to manage tiger conservation.	-3
20	Conservation projects cannot be made responsible for livelihood concerns.	-4
13	Protected areas that are managed with community involvement are less likely to be successful.	-4
14	Involving local communities in tiger reserves would increase anthropogenic disturbances.	-4
23	The government should be solely responsible for tiger conservation in India.	-4

Table 3-8 Statements that describe Factor 5 (Conservation as a Moral Duty) in Q-Analysis of viewpoints among tiger conservation professionals in India.

No.	Statements	Rank
2	Humans have a moral duty to protect the tiger, since the tiger's right to live is threatened by humans.	+4
34	Local level politics are a roadblock in tiger conservation.	+4
31	More research on tigers will lead to better results from tiger conservation projects.	+4
7	For tiger conservation to be successful, governments must have the political will.	+4
32	The government has a landlord-like attitude towards protected areas.	+3
24	The government does not have the resources or skills to manage tiger conservation.	-3
18	If local communities have a financial incentive, they will support tiger conservation.	-3
10	The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, should not be implemented in tiger reserves.	-4
20	Conservation projects cannot be made responsible for livelihood concerns.	-4
17	NGOs represent the desirable viewpoints in societal debates on tiger conservation.	-4
23	The government should be solely responsible for tiger conservation in India.	-4

Table 3-9 Total participants reporting agreement/ disagreement with different viewpoints on tiger conservation in an online survey of conservation professionals.

		Participants reporting agreement		Participants reporting disagreement	
		Number of Participants (N= 153)	Percentage	Number of Participants (N= 153)	Percentage
1.	Community Centered Conservation	134	87.58%	19	12.42%
2.	Tiger Centered Conservation	114	74.51%	39	25.49%
3.	Science and Tourism-led Approach to Conservation	128	83.66%	25	16.34%
4.	Instrumental Approach to Conservation	126	82.35%	27	17.65%
5.	Conservation as Moral Duty	136	88.89%	17	11.11%

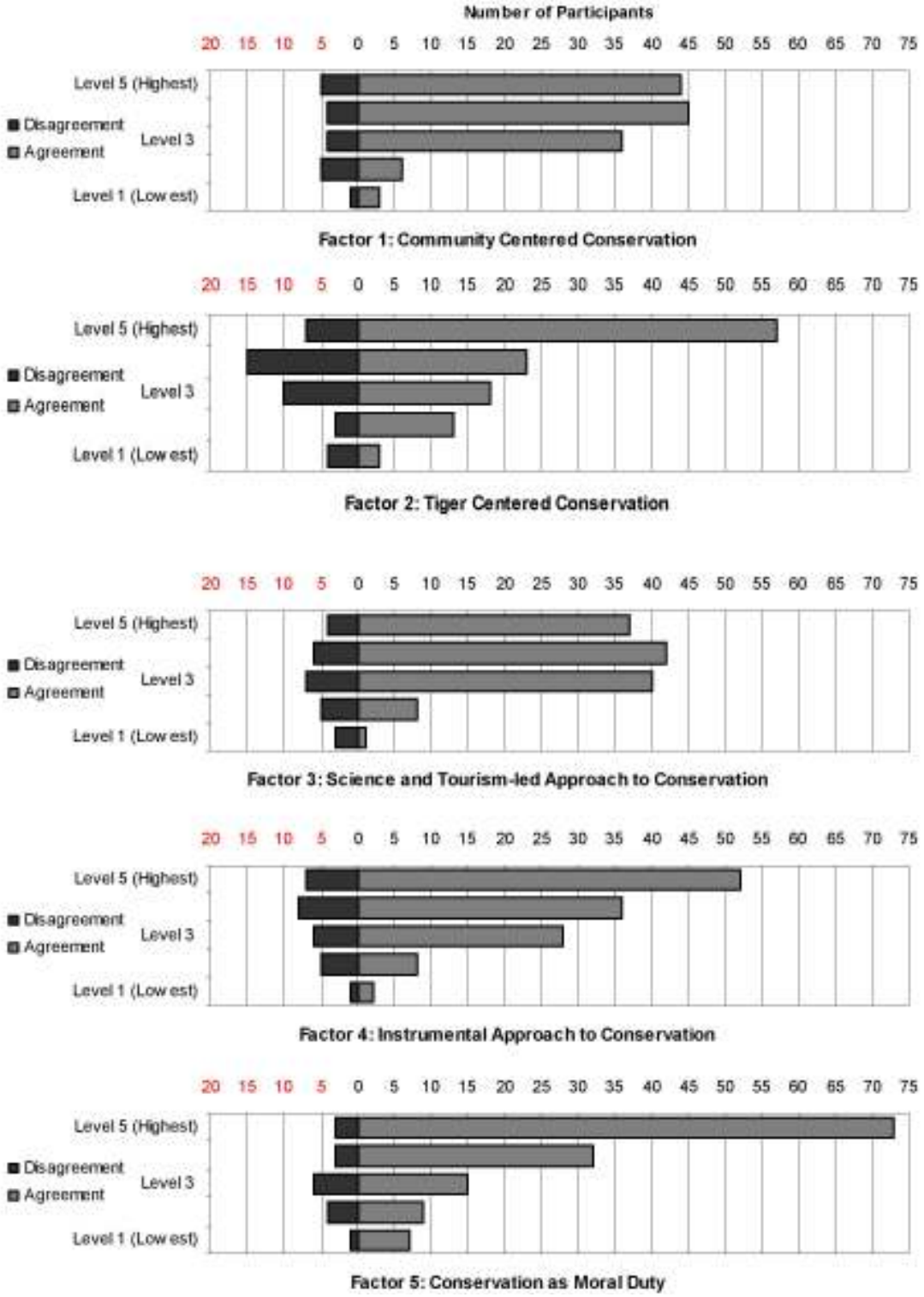

Figure 3-1 The number of participants awarding various ratings to the viewpoints on tiger conservation in India. Viewpoints were rated as Agreement or Disagreement, on a scale of 1-5 (1 being low, 5 being high).

Preface to Chapter 4

In the preceding chapter I identified the tiger-related viewpoints of conservation professionals in India, and explored the basis for policy conflicts and potential for agreements. The following chapters focus on different scales and components of the social dimensions affecting tiger conservation using Corbett Tiger Reserve, India, as a case study.

In Chapter 4, I outline the political processes through which local stakeholders can assert their issues and elicit favourable action from park management. This analysis allows us to better understand the vulnerabilities of tiger conservation and management to local-level political processes.

CHAPTER 4: UNDERSTANDING THE LOCAL SOCIO-POLITICAL PROCESSES AFFECTING CONSERVATION MANAGEMENT OUTCOMES IN CORBETT TIGER RESERVE, INDIA.

Abstract

Tiger conservation requires the provision of secure habitat, and the establishment of protected areas. However, protected areas in developing countries are known to create issues with local communities, resulting in significant challenges for management. This highlights the dilemma of tiger conservation: while local support is the key to success, the very protection of tigers can antagonize local communities. For example, tiger populations recently disappeared from two key Tiger Reserves in India, underlining the need to better understand and establish substantive theory on how local-level issues can affect tiger conservation outcomes. However, little empirical research has been undertaken on the local-level socio-political interactions that are influencing the efficacy of tiger conservation in India. In this paper we present the results of an exploratory research into the ways in which local stakeholder groups affect the management of a Tiger Reserve. Using a combined grounded theory-case study research design, and the Institutional Analysis and Development (IAD) framework for analysis, we identify the socio-political processes through which local stakeholder groups are able to articulate their issues and elicit desirable actions from management in Corbett Tiger Reserve, India. Increasing our awareness of these processes will improve the design and implementation of tiger conservation

management and policy strategies that can result in a more supportive coalition of conservation stakeholders.

4.1. Introduction

Although the merits of species-specific conservation schemes are often debated (Rodrigues et al. 2004; Ozaki et al. 2006), the tiger (*Panthera tigris*) offers significant practical advantages to decision-makers and acts as a powerful symbol for conservation action (Seidensticker et al. 1999). It is a charismatic species that can guarantee public curiosity and elicit favourable political action (Seidensticker et al. 1999). Administratively, the tiger mobilizes international support and, ecologically, it facilitates conservation of a variety of ecosystems and species diversity (Walston et al. 2010b; Loyola et al. 2009). Finally, it can attract tourism, thereby offering opportunity for involving local communities (Jamal and Stronza 2009; Post 2010). Further, projects targeting to protect the tiger have historically translated into the conservation of large ecosystems and associated species (Dinerstein et al. 2006). However, the literature on conservation science suggests that tiger ranges are continually receding, and argues for improved conservation efforts (Wikramanayake et al. 2011; Walston et al. 2010b).

Scientists have recommended several measures to guarantee a sustainable population of tiger: sufficient inviolate spaces for a viable population, sufficient prey populations, trained and skilled manpower to guard against poaching and intrusion, banning trade in tiger products to reduce poaching, and importantly, the political will to precipitate these recommendations into implementation (Wikramanayake et al. 2004; Sanderson et al. 2006; Karanth and Chellam 2009; Walston et al. 2010b; Seidensticker et al. 1999; Karanth 2003,

2006; Tilson and Nyhus 2010; Seidensticker 2010). To provide for these recommendations, India has declared numerous protected areas (PAs) through legislative means and state action, comprising nearly 40 Tiger Reserves. To date, these PAs are managed according to the exclusionary principle, with little role for local communities (Wilshusen et al. 2002; Lele et al. 2010).

This particular model of PAs, however, is generally regarded unfit for developing areas (Wilshusen et al. 2002; Lele et al. 2010). Firstly, the formal declaration of PAs can undermine the historical rights of local communities and potentially lead to severe ethical and legal complications in management (Chan et al. 2007; Miller et al. 2011). Secondly, PAs are often regarded to curtail traditional livelihoods and undermine the role of communities in maintaining biological diversity (Maikhuri et al. 2002; Negi and Nautiyal 2003). Thirdly, there is often conflict, and even hostility, between the resident community and the government agencies that control PAs (and also between other stakeholders who may have an existing, or potential, stake in the natural resources), thereby rendering conservation efforts more difficult (McShane et al. 2011; Goodrich 2010). These issues can potentially give rise to political mobilization against tiger conservation (Saberwal 1996; Chhatre and Saberwal 2005). Also, poaching remains a major issue facing tiger conservation, linked to the local extinction of tigers from two major Tiger Reserves in India (Damania et al. 2003; Project Tiger 2005). Therefore, if antagonized local communities decide to support poachers, it can be terminal for the species.

This is a major problem facing tiger conservation: while local support is the key to success, the very protection of tigers can antagonize local populations (Rastogi et al. 2012; Chhatre and Saberwal 2005; Dinerstein et al. 2006; Project Tiger 2005; Karanth 2005b). Despite the

significance of this dilemma for successful tiger conservation management and policy, very little empirical research has been done to understand the local-level socio-political interactions that are influencing the efficacy of tiger conservation in India. This is a major knowledge gap (Janssen and Ostrom 2006; Project Tiger 2005; Rastogi et al. 2012).

In this paper we present the results of exploratory research into the ways in which local stakeholder groups affect the management of Corbett Tiger Reserve (CTR), India. Using a combined grounded theory-case study research design, and the Institutional Analysis and Development (IAD) framework for analysis, we identify the socio-political processes through which local stakeholder groups are able to articulate their issues and elicit desirable actions from CTR management. Being aware of such relationships can equip PA management for better interventions.

4.2. Methods

For this exploratory research, we utilized a combined grounded theory-case study research design (Creswell 2009; Glaser and Strauss 1967; Stoll-Kleemann 2001).

Grounded theory provided a suitable framework because it allowed us to generate substantive theory (as opposed to grand theory) without an *a priori* framed hypothesis (Locke 2001). As a result, the research process was inductive, and data collection and analysis were simultaneous (Glaser and Strauss 1967). Grounded theory has previously generated useful models for protected area management (Stoll-Kleemann 2001). Case-study research was especially suitable to our exploratory study, directed at looking into complex contemporary phenomena regarding local-level tiger conservation, which were not distinguishable from their socio-political context. Using the case study research strategy,

we framed our exploratory inquiry into socio-political patterns, considered multiple variables utilizing multiple sources of evidence, focused on contextual conditions (Creswell 2009; Yin 2009) and selected an appropriate unit of analysis (Yin 2009).

4.2.1.6. Case Study: Corbett Tiger Reserve

Corbett Tiger Reserve (CTR) was selected as the case study (Yin 2003). CTR has among the highest populations of tigers in India, and is regarded a key site for global tiger conservation (Jhala et al. 2011b; Ranganathan et al. 2008; Wikramanayake et al. 2011). Located in the Himalayan foothills, in the new-formed state of Uttarakhand, CTR is one of the oldest PAs in India. Its proximity to New Delhi, recognized success as a Tiger Reserve, relatively easy access by road and railways, and status as a prime destination for wildlife tourism in India provided a rich context within which to explore and analyze diverse stakeholder interactions affecting tiger conservation management and policy. Unlike many other Tiger Reserves in India, CTR has not been affected by large-scale civil unrest. This provided an excellent context for theoretical development on the ways in which various stakeholder interactions affect the legitimate management of a Tiger Reserve. Additionally, CTR was selected because of our prior experience working at the site (Rastogi et al. 2010), familiarity with the local context, its geographic accessibility and the researchers' ability to use the predominant local language, Hindi.

4.2.1.7. Theoretical framework

In order to frame our analysis, we have used the Institutional Analysis and Development (IAD) Framework (McGinnis 2011; Ostrom 2011). The IAD framework was developed to

help understand the ways in which natural resource management-related institutions work and evolve (McGinnis 2011; Ostrom 2011). In our study, it provided a common language to categorize explanatory factors and variables within a structure of logical relationships (McGinnis 2011). The framework has been extensively used to understand resource governance, because it provides a structure to link various levels of decision-making: from collective-choice and constitutional levels, where rules for decision-making are made, to the operative level where everyday decisions are taken, for example in ecosystem-based fisheries management (Rudd 2004) and land-use policy (Koontz 2005). The IAD framework centers on identification of an 'action situation', the social space where actors interact and generate outcomes (McGinnis 2011). These actors are affected by a number of exogenous attributes: biophysical conditions of the resources, attributes of the community and rules-in-use. The interactions resulting from the action situation produce outcomes that are then evaluated based on evaluation criteria. These outcomes result in institutions, setting the stage for further interaction (Ostrom 2011). The framework has been adapted and developed by various authors (for example, see Rudd 2004; Fischer et al. 2007). For the purposes of our study, the most relevant adaptations of the IAD framework have been to 'politicize' it, to include the assessment of policy impacts and change across various levels of governance (Clement 2010), and also to include multiple actors and institutional change (Fischer et al. 2007). This allows the researcher to include additional complexity, for example, by describing power relations, socio-historical contexts in which decisions are made, and the ways in which actors construct their social and physical reality (Clement 2010). Building on this work, we adapted this approach for the current study, for example by including the politico-economic context among the exogenous factors for analysis.

4.2.1.8. Data collection

Data for the study were collected between October 2010 to January 2011 and December 2011 to April 2012. Sources of data included interviews, focus-group discussions, newspaper reports, pamphlets that described the stated positions of stakeholders, and participant observation in their natural setting (Glaser and Strauss 1967; Yin 2009).

We conducted about 45 interviews with representatives of various stakeholders in and around Corbett Tiger Reserve, ensuring broad representation of various groups (including villagers, tourism professionals, tourists, and staff of PA) and different demographic and social profiles (including different castes, religions, professions, social backgrounds, age-groups and sexes). We also conducted six focus-group discussions with representatives of key stakeholder groups (non-government organizations (NGOs), tourists, villagers and tourism professionals). Participants were contacted directly, following a snowball sampling strategy (Wasserman and Faust 1994). The majority of the interviews/ focus groups lasted between 20 minutes and 1 hour. The interviews/discussions were semi-structured to allow participants to speak freely and were guided by the emergent research questions (as recommended by Huberman and Miles 2002). The initial interview/ discussion questions were pre-tested with researchers and local residents. The research questions then progressively sharpened during the course of the study, directing data collection and increasingly providing focus to the questions being asked to respondents (Glaser and Strauss 1967; Charmaz 2006). Most interviews/ discussions were conducted in Hindi or English. Interviews with the participants belonging to a local tribe were conducted in their language (*Gujjari*) with the assistance of a translator.

Since our interviews and focus group discussions were considered verbal reports, "subject to the common problems of bias, poor recall, and poor or inaccurate articulation", all information was corroborated through other sources of evidence, such as newspaper reports, published leaflets, and records (Yin 2003). This helped us to maximize the accuracy of our findings (Wasserman and Faust 1994).

Another key method for data collection was participant observation. Participant observation was defined by Kluckhohn (1940) as "conscious and systematic sharing, insofar as circumstances permit, in the life-activities and, on occasion, in the interests and affects of a group of persons". The technique involved the researchers immersing themselves in the social situation, and observing the interaction of the participants in their natural settings. This technique allows researchers to develop insights on the values, structures and dynamics of the participants (Nandhakumar and Jones 2002). Our research followed a semi-structured inquiry to conduct non-participatory observation of stakeholder groups in their natural environment. This strategy was employed to gain a deeper understanding of stakeholder interactions: inter-group (such as NGO-communities, communities-PA management, tourists-tourism professionals) and also intra-group (including NGOs, communities, and tourism professional).

4.2.1.9. Data analysis

Data analysis for qualitative research is an "ongoing process involving continual reflection" (Creswell 2009). All interviews and other verbal data were recorded, translated, and transcribed (as recommended by Huberman and Miles 2002). These transcripts and other text-based data were then systematically analyzed and arranged into categories and codes to

identify the processes and relationships that were influencing tiger conservation outcomes (Huberman and Miles 2002; Strauss and Corbin 1998).

Applying the analytical technique of constant comparison (Glaser and Strauss 1967), data were coded and placed into emergent categories, with codes and categories subsequently being amended as the qualitative data analysis proceeded. Through this process, the properties of the categories become progressively more defined, ultimately allowing themes to be identified and associated detailed descriptions and interrelationships captured. Based on these themes, we were able to generate the theoretical model, as in grounded theory.

4.2.1.10. Assumptions and limitations

This research was conducted based on the assumption that tiger conservation is a societal imperative, and is therefore inherently biased towards conservation. Further, we considered 'external validity' or generalizability of the results; qualitative research, and particularly case-study research, may not always be directly generalized (Creswell 2009; Yin 2009). Although the descriptions provided by this research are limited, in that they are particular to the context and site of CTR, yet as a case study this research was targeted towards generalization to theory (Yin 2009). However, with careful consideration of the context, the results of this study find wide application.

We took steps to ensure validity of the research through the research design and specific data collection procedures. In order to reduce bias, the first author collected the data individually (Huberman and Miles 2002). To enhance construct validity, we used multiple sources of evidence (triangulation), and established chain of evidence. Further, key informants reviewed the study findings to enhance the construct validity (Yin 2003). In

order to increase internal validity, we undertook pattern-matching and detailed building of explanations, allowing us to examine the similarity of data collected from different sources and from participants expected to have different perspectives (Huberman and Miles 2002). We also considered the issues of reliability, by ensuring detailed documentation of research protocol and internal-review of research methods by the authors (Merriam 2009; Huberman and Miles 2002; Glaser and Strauss 1967).

4.3. Results and Discussion

Based on our results, we describe and model the processes through which stakeholder issues are articulated with a view to eliciting favorable reactions from the managers of the protected area. Following the 'politicized' IAD framework (Clement 2010), we first discuss the exogenous variables, followed by the 'action situation' which includes details of the model, and the concept of the 'threshold of public pressure'. We then detail the factors that affect this threshold.

4.3.1. Exogenous Variables

4.3.1.1. Biophysical conditions

CTR is among the oldest Tiger Reserves of India. The area was designated a PA in 1936, and is now considered a premier Tiger Reserve with one of the healthiest tiger population densities (Jhala et al. 2011b). Located in the Himalayan foothills (Latitudes 29°25'–29°40' N and Longitude 78°5'–79°50' E), the landscape is primarily dry with moist deciduous forests dominated by sal (*Shorea robusta*), scrub savannah and alluvial grasslands. The

landscape also contains two major rivers: the Ramganga (flows through CTR) and the Kosi (flows along the south-eastern boundary) (Figure 4-1). CTR has high densities of tiger prey species, such as chital (*Axis axis*) and sambhar (*Cervus unicolor*) (Contractor 2007; Jhala et al. 2008; Jhala et al. 2011b; Kumar et al. 2008; Khan et al. 2008). The area is also home to many human settlements. Approximately 92 villages are located within 3 km of the boundary; a total of about 123 villages and 17 Gujjar *deras* (tribal hamlets) are dependent on CTR for fuelwood, grazing livestock and the collection of grasses for fodder (Musavi et al. 2006).

4.3.1.2. Politico-economic context

CTR is designated a Tiger Reserve under the National Tiger Conservation Authority (NTCA). The offices of Corbett Tiger Reserve are headquartered at Ramnagar (township adjacent to the boundary), headed by the Field Director. Officially, the entire area of CTR is controlled and managed by the office of CTR. Yet, in the interest of developing a supportive local stakeholder group, the PA management has involved many local members in the tourism sector.

CTR is affected by the politico-economic context in many ways. Firstly, a large proportion of local stakeholders depend on CTR for their livelihood, either for non-consumptive benefits (tourism-related activities), or for consumptive benefits (fuelwood/ grazing/ grasses) (Rastogi et al. 2010; Musavi et al. 2006). These benefits link CTR with many local stakeholder groups, who may assert themselves during a conflict with PA management. Secondly, CTR is an important global conservation site and a national wildlife tourism destination. As a result, the PA management is affected by central- and state-level

government policies and politics, and globally networked stakeholders of conservation (represented primarily through their associations with NGOs and local conservation organizations). Thirdly, with its establishment 75 years ago, CTR is a well-known regional symbol of international reputation, and assumes an important symbolic role in the local political discourse.

The effects of this politico-economic context are particularly evident when the local stakeholders affect the management of CTR. From a traditional tiger conservation perspective, CTR should be managed for ecological function, focused primarily on ecosystem management and sustainable forestry operations. However, CTR management also serves other day-to-day social functions, including managing tourism, providing assistance to local communities, engaging with local and non-local stakeholders, providing compensation for daily incidents of human-wildlife conflict, and managing the relocation of local communities from within the reserve. Occasionally, the PA management may also take action that could be deemed antithetical to the interests of the reserve, such as the removal of a tiger after an incident of conflict, or allowing controlled traffic on a contentious road running through the park boundary. These supplementary activities are generally undertaken in response to the prevailing politico-economic context.

4.3.1.3. Attributes of the community

Drawing from our previous study (Rastogi et al. 2010), we considered the following attributes of the stakeholder groups: knowledge of CTR, positions towards CTR (supportive/ neutral/ non-supportive), interests in CTR (such as tourism, livelihood etc), alliances, resources available for mobilization (including human, scientific, financial,

political etc) and leadership. Additionally, we considered 'power' as a function of resources available to potentially affect CTR, and 'importance' a function of 'power' and leadership. Stakeholder groups with high power or importance were: the PA management, NGOs, media, tourism professionals (local and non-local), and sections of villagers. An additional stakeholder attribute was perceived legitimacy. Certain stakeholders are often perceived as legitimate, particularly when their claims have a historical, livelihood-related, humanitarian or moral basis (Mushove and Vogel 2005). For example, a CTR manager stated: "...*he* [the member of the local community living close to the boundary] *has some rights in that forest*", despite no legal provision for rights in a designated Tiger Reserve. Local-level tourism professionals are also seen as depending on CTR for their livelihood, and many of their claims are regarded as legitimate.

4.3.1.4. Rules-in-Use

Following the IAD framework, the rules for managing CTR arise out of various levels of governance: constitutional, collective-choice, and operational (Ostrom 2011; McGinnis 2011).

a) Constitutional rules: Considering the constitutional level, the formal rules of the management are established by legislation and governance structures. The overarching legislation for conservation and forestry in India are provided by the *Indian Forest Act (1927)*, the *Wildlife (Protection) Act 1972*, and the *Forest (Conservation) Act 1980*, with their associated amendments and rules. The primary function of PA management is provided for by subsequent legislation, formal policies and government institutions such as the NTCA. The PA management is headquartered at Ramnagar (the nearby township),

headed by the Field Director. CTR is subsequently managed according to a 'management plan', which provides the overarching directions, with the following two objectives (Project Tiger 2005): 1) to ensure maintenance of a viable population of tiger in India for scientific, economic, aesthetics cultural and ecological values, 2) to preserve, for all times, the areas of such biological importance as a national heritage for the benefit, education and enjoyment of the people.

b) Collective choice rules: At the collective level there is extensive autonomy in implementing management actions required for contingency or day-to-day functions, and these are rooted in a bundle of factors. The literature suggests that everyday PA management functions may be driven by factors including maintenance of governmentality, or environmentality (Agrawal 2005), day-to-day relations of hierarchical staff and bureaucracy with the local stakeholders (Robbins et al. 2007), and struggles and negotiations of field-based staff with local communities (Jalais 2005). The presence of such factors was corroborated by our participants affiliated with different research organizations and NGOs in CTR, for example: "*managers still feel…sense of ownership in a wrong way. "I know; it's my property" kind of attitude*".

Among other formal rules established by the PA management is the regulation of tourist traffic into CTR through a system of advance reservation for day-visits and overnight stays in the Forest Rest Houses. There is also a system of rotation for 'Nature Guides' to accompany tourists. CTR management has established formal mechanisms for other interactions with stakeholders, such as mechanisms for compensation of cattle-kills and human injuries through tiger-attacks.

However, no formal rules have been established for issues such as the development of tourism outside CTR boundaries, which is generally regarded as having led to an uncontrolled growth of infrastructure, and negative impacts on the protected ecosystem. The village lands legally qualify as 'revenue land' (as opposed to forestlands) allowing for private ownership and construction. However, through the intervention of allied government agencies such as the district authorities, CTR management has established some degree of regulation over outdoor sound-systems in tourist-resorts to try and control disturbances to the ecosystem. Another relevant set of rules includes the formal programs being run by the local NGOs. In particular, a local NGO operates an Interim Relief Scheme to provide compensation to villagers for cattle-kills by tigers.

c) Operational rules: At the operative level, the senior management staff reported that their functions were based on a pool of priorities. The primary priority is ecological function, which is largely self-regulating as CTR is considered to have a very healthy ecosystem (Jhala et al. 2011b; Contractor 2007). The remaining pool of management priorities can be grouped into two. The first priority for PA management is the legitimacy of the claims of a stakeholder group, based on their humanitarian, historical or ethical claims to benefits from the natural resources. All levels of park staff implied that certain livelihoods have suffered losses because of wild animals, especially crop-raiding by wild-pig and other herbivores which were described as a major source of livelihood loss, or when cattle are attacked by carnivores. Not only does CTR management feel obliged to reduce such losses (although the formal process for compensation is not considered satisfactory), it also described a responsibility to assist the local communities in improving living conditions. The second is a more prudent and practical criteria: the local community can help better safeguard the

natural resource, becoming a "*soldier for conservation*", as suggested by a senior government officer. Apart from the local communities, this includes the entire body of professionals that run the tourism apparatus in CTR, and also the broader public, whose opinion is considered very important to CTR management. A senior reserve officer reflected: "(if) *the people close to you become hostile to conservation,* (if) *they turn against the overall issue of conservation itself, then you are taking a very big risk*". A supportive local community can greatly enhance the function of CTR management, and an antagonistic local community can greatly reduce the efficacy. "*And if we don't account for them, then the management cannot be lasting, and the management will not be effective either*", a manager stated. What are the specific threats posed by local antagonism? An antagonistic local community could make it difficult to manage a tiger reserve, where the PA management is not a constant presence throughout the perimeter. More importantly, antagonism can potentially create serious threats to the tiger population, with communities taking incendiary actions against the tiger through relatively simple means, for example, killing tigers by spraying poison on tiger-kills. The loss of only a few individual tigers may be low in absolute numbers, but can be significant in percentage terms [the CTR tiger population is estimated to be about 214 (190-239), with each individual comprising nearly 0.5% of the population (Jhala et al. 2011b)]. In the long-term interest of conserving the tiger population, the PA management makes an effort to address potential antagonism through trying to engage local residents, for example, in tourism.

Interestingly, if CTR management faces serious potential for antagonism, making an urgent management reaction necessary, the resulting reaction can compromise many constitutional/ collective-level rules in the short-term. This is indicative of the urgency of

certain local management issues. Regarding a particular case where tourism allegedly disturbed tigers, resulting in attacks on humans in villages, a manager stated: "*it is not important if there is a scientific reasoning behind it* [the allegation that tourism familiarized the tiger to humans, leading it to attack]. *Because if I get caught in the cycle of scientific reasoning, I will incur loss! For me it is important that the public in my area has started to feel this way* [antagonistic]*...Then as a park manager I have to make a decision, and I have to devise such a set-up that this problem, this feeling of their's, this should end.*"

In another example, certain tigers were removed from Corbett Tiger Reserve in order, to reduce local antagonism after there were repeated attacks on residents of nearby villages between 2009-11. Such temporary suspensions of constitutional/ collective rules is driven by the ecological imperative of tiger protection which draws from the overarching political emphasis and constitutional/ legal mandate.

On the other hand, what rules govern the behavior of local stakeholders towards CTR? Ultimately, stakeholder interactions can be understood as being driven by their attributes, such as power, knowledge, interests, alliances, leadership and knowledge (Rastogi et al. 2010). In CTR, many temporary committees/ organizations have been floated to deal with specific issues, including organizing flood relief, representing the demands of tourism professionals, organizing villages to communicate with CTR management. These village institutions are typically headed by a village head, although individual villagers are also informally pursued by local opinion leaders, who are regarded as playing a large role in local-level processes in response to change (Keys et al. 2010).

4.3.2. Action Situation

Building from our previous study (Rastogi et al. 2010), we considered the following stakeholder groups as actors in our analysis: villagers, tribal community (*Gujjars*, a previously nomadic, now sedentary, forest-dwelling community), Ramnagar-residents, religious groups, PA management, NGOs, local tourism professionals, owners of tourist resorts, local media, politicians and tourists. The boundaries between the various stakeholder groups were often fluid, and individuals can assume dual or multiple roles. For example, an individual could be involved with local politics, while being employed at an NGO and also benefitting from a tourism resort. Also, organic interactions among members of the various stakeholder groups occur daily and affect mutual relations.

Based on our analysis of the action situation, we developed a conceptual model of the socio-political process through which stakeholder issues are articulated to CTR management and in which cases they are likely to get a response (see Figure 4-2). While there is evidence in the literature regarding the effects of PA management on local stakeholders (Ghate 2003; Guha 1989; Chhatre and Saberwal 2005), there are few empirical studies documenting a reciprocal relationship. Through our analysis of interactions between the stakeholders, we have been able to indentify a hitherto-tacit relationship between the local actors and CTR management. Subsequently, we are able to identify the ways in which stakeholder groups draw their desired actions from CTR management, and affect management outcomes.

This socio-political process of issue articulation can be divided into three phases, which may overlap in time: 1) initiation; 2) mobilization; and 3) action. The last phase of 'action'

is equivalent to the 'outcome' in Clement's model of the 'politicized' IAD framework (Clement 2010).

4.3.2.5. Initiation

The first phase of the process is initiation (Figure 4-2) where a social agent (actor) frames a pre-existing or recent issue to create the perception that a solution is required. Evidence from our data suggests that different actors/ stakeholder groups can function independently or together in this phase. We identified three actors that can initiate an issue: local communities, the media, and political actors.

A *local community* can self-organize itself after a particular incident. For example, after there were tiger attacks on different individuals in villages along the boundary of CTR, the village community, and especially the victim's social groups, would gather together and assess the situation and devise a plan of action. Such a process is often steered by local political leaders or opinion leaders, who nudge the issue into the next phase of the process (Keys et al. 2010). However, there are two inherent checks to the process provided, by:

i) The high stakes in tiger conservation. One respondent, an NGO professional/ informal village leader/ tourism professional, reflected: "*Everybody wants the tiger to live because villagers know that they are alive and have employment just because of tiger. When the tiger will die they will be left starved*." As a result the local community initiates an issue aggressively only after it is perceived to be extreme.

ii) The limited resources of the villagers. A villager, whose mature buffalo had been recently killed by a tiger, reported that the villagers would hesitate to react collectively because they find themselves limited for financial (and political)

resources. "*If we gather together and go to them* [to the authorities to initiate an issue] *then how will we earn? When we go outside* (to work) *during daytime and only then can we earn something. We work then only we can eat. This village is already* (financially) *backward*", the participant said.

Our data suggested that *political actors* also utilize specific incidents for ad-hoc mobilization, or utilize a stock of pre-existing issues for mobilization at certain opportunities, such as imminent elections. For example, after specific incidents of conflict with tigers, local politicians found it necessary to get involved in social agitation. Further, pre-existing issues such as the rights of local communities, crop-depredation by wild herbivores, and contentious roads, are often reused during political mobilization for elections.

The media, at its own initiative, is also known to frame certain wildlife and forest issues. For example, after several incidents of tiger deaths, the local media published stories suggesting that the postmortem reports were not being collected and reviewed by CTR management. This indicated indifference on the part of CTR management, and eventually made them collect the postmortem reports. Such incidents suggest that media can utilize its capacities to outline general issues of interest to various stakeholders.

Rumors also have a role to play in the process of initiation. For example, after a series of attacks on women residents of local communities, various rumors circulated regarding the motives of the culpable tigress and the vulnerability of women. Such rumors may have a role in altering perceptions, and reinforcing the strength of the issue, affecting the subsequent steps of the process. This is an area that warrants further research.

All the above agencies can act independently, and can also assist one-another. As previously stated, among communities around CTR, social boundaries are often fluid and many stakeholders play multiple roles in the system. This results in strong everyday interactions and facilitates the transfer of an issue among agencies. For example, an issue initiated by the media can then be articulated by the local communities or political agencies as their own (such as the issue of post-mortems of tigers). Also an issue initiated by the communities or political agencies, often transitions into further processing only after it is highlighted in the local media (for example, tiger attacks on humans). The actor initiating an issue can also actively seek the support of other actors (e.g. local communities communicating with the media and political agencies for mobilization).

4.3.2.6. Mobilization

In our analysis of the 'action situation', after an issue is initiated, and before it elicits a response from the bureaucracy and CTR management, it goes through a phase of mobilization. In this phase of the process, local stakeholders utilize the perception of an issue created through the initiation (previous phase) and utilize various means to create public pressure. This phase includes a 'threshold of public pressure', after which an issue elicits management action.

4.3.2.6.1. Perception of an Issue, and Impact

After initiation, a perception is created that there is an issue which needs management intervention. This perception involves an issue (real/ imaginary), which affects 'someone', and can be solved through some 'action'. For example, an attack by a tiger affects villagers,

and the situation can be addressed by the removal of the animal. Or, after episodes of tiger-deaths by unknown causes, the PA management needs to provide better safeguards, so that the tigers and the tourism-professionals are not affected. Based on our findings, such issues are often short term. Longer-term issues such as crop-depredation and livestock-kills do not form part of this process to elicit a management response (refer, Section 4.3.2.4., Factor 3: Intervention of NGOs) . Short term and sudden issues allow for easier mobilization, due to their urgency and ability to be addressed, and higher 'impact'.

According to our data, the 'impact' of the issue is determined by two aspects:

a) Who is affected (is the stakeholder somehow legitimate or important?)? The affected actor can be any stakeholder, including the local community, or the tourism professional body, or even the tiger. The diverse claims of such stakeholder groups are perceived to be differentially legitimate, and the stakeholder groups have different levels of importance to CTR management (Rastogi et al. 2010).

b) To what degree is the stakeholder affected (are the claims urgent?)? The degree to which a stakeholder is affected can vary (ranging from threat to life or livelihood, to an everyday nuisance or disturbance). The required intervention could be made more urgent or more pressing because of the ethical/ moral/ historical rights of the affected stakeholder.

The issues that more strongly affect a more important stakeholder are likely to create more 'impact', as opposed to an issue that has less serious consequences or affects a less-important stakeholder. Issues with higher impact are smoothly transitioned into the next phase of creating public pressure (Figure 4-3).

4.3.2.6.2. Creating Public Pressure

After the perception is created that an issue needs to be addressed, the affected stakeholder (occasionally, supported by allies), utilizes various means to demonstrate its position and demand action by creating public pressure. In the Indian political structure, various means of demonstration are possible (Phadke 2005). In CTR, there are peculiar means of demonstration that are often utilized. For severe protests along the Ramnagar-Ranikhet road (which runs along the eastern boundary of CTR, with many villages situated along the road and the forest, leading to high rate of human-wildlife conflict), the road can be blocked, affecting an important traffic route and creating additional political pressure. For other organized protests, the gates to CTR are blocked to create pressure, completely or partially halting tourism and management (and implicating the livelihood of the local tourism professionals, creating additional pressures on CTR management). There are also 'traditional' political means available: marches between vantage points in the city of Ramnagar (where the headquarters of CTR are located); protests outside the offices of CTR; and briefings to the media. For more peaceful demonstrations, or when the affected stakeholder is not directly entitled to the demand (low legitimacy and low impact), simple formal requests are made during meetings with CTR management (see Figure 4-3, Scenario B). A combination of these means can also be used. A journalist recalled a particular incident where, "*a few days ago the villagers again held a meeting. Yesterday, they came to Ramnagar to blockade against the Park Director. Today also they had a meeting for new program. They are continuously protesting it*."

The precise nature of the protests depends on the nature of the request, urgency, legitimacy, the location, and also the motives of the stakeholders involved. Politicians tended to be more aggressive than other stakeholders, such as tourism professionals. Tourism

professionals and NGOs generally preferred not to attract negative publicity for CTR, nor intend to strain relations with CTR management, and express their discontent in more peaceful ways. For example, issues of tourism professionals were often demonstrated through meetings, or at a local scale. Indeed, participants involved with tourism were often against large-scale mobilization by other stakeholders, because it was likely to hinder the tourist traffic. A local politician suggested, "*Nobody listens* (to the demands)*, until people come out on the roads and become aggressive*". Another village leader (also a conservationist and tourism professional), addressed the futility of written communication: "*Written applications are kept as they were. Nobody takes them seriously… They* (affected villagers) *block the road when no one hears them out.*" As a result, highly 'impactful' issues like human deaths are often demonstrated with the highest vitriol, accompanied by the intention of violence (implied or realized). A politician recalled regarding one such incident where, "*the aggressive people were saying only one thing: that we will die but will not stop going to the forest. The tiger has to kill us eventually, but we will die anyway when we will not go jungle*." The majority of our discussion regarding politics refers either to village-level politicians (backed by larger political outfits) or to marginal political outfits, without a mainstream political presence. Not all of their action is considered of serious political impact. However, such mobilization creates an impact because of the suspension of everyday life. A local person reflected, *"Roads get jammed, common people get troubled. After this the matter goes to administrative level and then the matter gets published in newspaper where some people get their names highlighted. This is routine."* Incidents that occur within CTR boundaries do not cause as much public outrage because CTR management is perceived be the sole authority within the boundaries. Incidents close

to the important road locations and those closer to townships attract more attention and are easily mobilized.

During the mobilization phase, the events sometimes involve a mob. A tourism professional and resident of the village, recalled patterns in mobilization after the incidents of serial tiger-attacks, "*One or two fellows start shouting that 'do this and that' and it becomes a movement and mostly the mob goes in negative direction because mob has no character and no leader which can explain to them what to do or what not to do. The mob simply moves on*". In situations that involve a mob, it is not possible for us to propose a direct sequence of events based on our data. However, the overall process does appear to follow the model.

It is possible for the mobilization phase to be completely by-passed when the issue is accorded legitimacy through another route. For example, if the issue has achieved legitimacy because it is related to human rights or historical rights of the local communities, mobilization may be unnecessary because the threshold is automatically crossed. Further, issues concerning tribal communities or forest-dependent communities (or even communities directly dependent on tourism) often acquire a degree of legitimacy directly, leading to high impact, and do not require extended mobilization to elicit a response from CTR management (Figure 4-3, Scenario A). On the other hand, some of these issues, if not addressed reasonably, can lead to mobilization (Figure 4-3, Scenario C).

4.3.2.6.3. Threshold of Public Pressure

We now introduce the concept of a threshold of public pressure. Threshold is a concept borrowed largely from the biological sciences and theoretical concepts such as 'punctuated

equilibrium theory' (Folke et al. 2005; Folke et al. 2004; Boushey 2012). It denotes a concept in which a state of equilibrium is disturbed, and when the disturbance crosses a certain level, the entire system delivers a response, shifting to a new state of equilibrium and addressing the disturbance (Folke et al. 2004; Folke et al. 2005). Similarly, in CTR, after the perception of an issue is created among the stakeholders, there is mobilization regarding the issue, leading to public pressure (comparable to disturbed state of equilibrium). The public pressure, when it crosses a certain threshold, can elicit the PA management to react, or to create the perception that the issue has been addressed. The threshold of public pressure is different for different issues and can be affected by numerous factors (discussed below). The threshold of public pressure needs to be crossed for action to be taken. If the threshold is not crossed, the PA management may not take an action or may take merely token action, depending on the lethargy of the system. The concept of threshold becomes clearer upon considering one participant who recalled a particular incident in which a woman was killed by a tiger. "*In the evening at 4 PM a lady was killed, not a single officer came to the venue. When CTR was eventually closed then they* (the officers concerned) *came at 2 PM the next day. If they had come in evening at 4 PM and given the written orders, then the people won't have closed the park gate.*" In this case, the threshold was eventually crossed upon the forced closing of CTR by the villagers, and PA management was forced to react (Figure 4-3, Scenario C). In another particular case, a tiger had attacked a resident, although the threshold was not crossed, a participant commented: "*a few days ago the villagers again held a meeting. Yesterday, they came to Ramnagar to blockade against the Park Director. Today also they had a meeting for new*

program. They are continuously protesting it." The threshold had not yet been crossed, and CTR management was not being forced to react.

The threshold can be crossed depending on the political/ human/ capital resources of the affected party, and the scale of mobilization. In other words, two independent factors affect the threshold: 'who' is mobilizing, and 'what is the scale' of mobilization. This also corresponds to the 'impact' of the issue (Figure 4-3). The larger the number of participants in mobilization, or the higher the clout of the involved parties, the easier it is to cross the threshold. For example, tourists are ranked as a stakeholder with low importance (Rastogi et al. 2010), and mobilization by tourists would be unlikely to elicit any reactions from CTR management.

The patterns for mobilization can follow different scenarios, as indicated in Figure 4-3. Rarely, depending on the perceived gravity of an issue, an action can be taken by CTR management based on the expectation that the threshold will be crossed. For example, after a human kill, the threshold is almost certainly crossed and a mitigating action is required (Figure 4-3, Scenario A). However in Scenario D, for example, the threshold is never crossed. In such cases, the desired action is out of scope for CTR management, and even after a high level of mobilization sustained over a long period of time, the threshold may not be crossed.

4.3.2.7. Action (Management Reaction)

The 'action' phase of this process is not to be confused with the 'action situation' of the IAD framework. Upon the crossing the threshold of public pressure, CTR management is forced to take action, or create the perception of an action. The precise action depends upon

the incident, and could include, for example, providing compensation to a victim of human-wildlife conflict, following up on the post-mortem reports, or assuring an affected community that their issues will be addressed. For example, after tiger attacks on humans, or human deaths, the typical action is the removal of the animal (by shooting, or enclosure in a zoo). CTR management readily compromises one individual tiger in order to avoid large-scale antagonism towards tigers from stakeholders. An official said, "*Because you know that tigers… breed a lot. So if one or two tigers are removed from the total population in a large reserve for these reasons* (to pacify the public)*, then although it is an injustice, it is not right, but even then the system has no problems replacing it* (the tiger)." This action meets the public pressure, creates the perception of addressing the issue and pacifies the stakeholder.

Often, certain demands are diverted to the central or state governments and affected stakeholders may regard this as an appropriate management action and withdraw the pressure from local PA management agencies. This is particularly relevant for issues like a politically contentious road, which was demanded to be opened by political groups but beyond the mandate of CTR management. The issue of the road was then taken to court. Since the local stakeholders lost direct contact with the issue, it was not the subject of further mobilization (Figure 4-3, Scenario D). A respondent told us, "*A proposal was sent from here on the behalf of state government even NGO was made to send it. Now I am not sure about what happened to that issue*."

Certain social pressures also create incentives for conservation. The particular case of poaching of elephants in CTR is part of local discourse and forms a key point in local history. Some of the social pressure generated after the poaching incident, created the

incentives for CTR management to increase checks against poaching. Further, the creation of a stakeholder that has an active monetary stake in conservation *viz*, the local tourism professionals, creates automatic answerability for CTR management. This stakeholder is directly dependent on CTR and its reputation. Any shortcoming in CTR directly impinges upon the livelihood of tourism professionals, and drives them to create public pressure for management actions.

4.3.2.8. Factors affecting the threshold

The threshold of public pressure is unique to each issue. For example, for very urgent/ high impact issues, there is often an immediate reaction with the senior officials making a visit to the area. For medium impact issues, for example those affecting tourism professionals, the threshold may be crossed by persistent mobilization. However, for everyday occurrences such as the management of tourism issues, or the killing of livestock by tigers, there are no major institutional reactions, as the threshold is not crossed. Based on our case study, the threshold is affected by numerous inter-related factors. These factors also provide CTR management with strategies to preemptively address important socio-political issues, either by reducing their impact or mobilization, and subsequently reducing the need to be reactionary:

1. Accessibility of CTR management. The senior managers may or may not be directly available for everyday interaction with the stakeholder groups and general public. This accessibility, which depends upon the individual incumbent, can affect the threshold. A manager may remain inaccessible to the public, and as a result remain immune to public pressure until it reaches a high level. This can insulate CTR

management from everyday issues (thereby raising the threshold that needs to be crossed), yet it can also make the management more prone to retaliatory mobilization for more serious issues. This has two implications regarding a more accessible bureaucracy: 1) the necessary actions may be more readily taken as a result of the everyday interactions; 2) some of the public pressure can be offset by dialogue and building trust, and offsetting the need to take any action.

2. Media support. The support of the media is crucial at each step of the above process: initiation, mobilization and action. Also, the media can voluntarily initiate issues and successfully mobilize them. The role of the media is critical in determining the threshold for an issue. Media discourse can also create political pressure, by projecting issues as highly important. The media can affect the overall perceptions of an issue, altering the perceived urgency, legitimacy of the affected stakeholder, power and other attributes. It is also crucial in creating positive support for CTR, which as discussed in the section on 'Motives for Management Actions', is the ultimate motive for CTR management actions. The media can effectively raise or lower thresholds.
3. Intervention of NGOs. The perception of an issue can be offset by the actions of NGOs. In CTR, for example, the Corbett Foundation is a local NGO that operates a scheme to provide interim compensation after a carnivore kills or injures livestock. Such an intervention complements the 'action' itself. By imitating the 'management action' the NGO pre-emptively addresses the issue, thereby raising the threshold for management interventions.

4. Actions of support group. In the case of CTR, the *Bagh Bachao Sangharsh Samiti* (translated, Committee for Struggle to Save the Tiger) was constituted by the local tourism professionals to articulate their own demands (including the demands to protect the tiger, after serial tiger deaths were reported). Such groups can also create the perception of a legitimate stakeholder group and this can raise the threshold. To illustrate, in a hypothetical situation where a particular group may demand actions against CTR, this committee will negotiate directly and insulate CTR management from action. Conversely, such a committee may raise its own issues and assume the role of the aggrieved party and can instead demand action. Our participants reported that the committee demanded that the post-mortem reports of tiger deaths be addressed and also requested action when heavy floods damaged the tourism infrastructure inside the reserve. On the other hand, political groups and other vested interests can also float their own interests by forming contradictory groups. For example, in CTR a group was formed to support the regularization of a forest-road for public use. The threshold is lowered or crossed sooner if a political group is involved and has means of accessing the bureaucracy (interpersonal skills, media skills, economic powers, access to higher political powers). Together with imminent political pressure (point 8, below), this is an important factor affecting the threshold. It is important for the PA management to preempt the actions of such groups by also creating stakes in CTR. Some of these stakes are evident through the *Bagh Bachao Sangharsh Samiti*, which demonstrates that supportive local-stakeholder groups can significantly aide PA management.

5. Economic factors. If the stakeholder has a perception of a monetary incentive or livelihood from CTR, it will significantly delay the initiation and mobilization of an issue, and raise the threshold of public pressure. For example, in two separate incidents, members of one family were attacked by wild animals within a short span of time. However, the family was involved with an NGO in CTR and did not participate in politicization of the attacks. Hypothetically, widespread and equitable monetary incentives from CTR will raise the tolerance levels towards issues, and will support management.
6. Institutionalized boycott of the aggrieved. If a village is boycotted or separated from the machinery of public pressure, the threshold of pressure is artificially raised to a very high level. To illustrate, Laldhang is a village that is partially relocated from the area of CTR. The remaining residents are unwilling to relocate due to several factors, and social services are no longer provided to the village. To mobilize the public in Laldhang, and then eventually extract some action from CTR management, would need the perception of a very high loss. This raises the threshold.
7. Scale/ Recurrence of incidents. The perception of the scale of an issue and its recurrence ultimately determine the mobilization and public pressure. For example, our participants often regarded tiger attacks on livestock as routine. Such attacks are not perceived to be strong enough issues to warrant mobilization or management action. However, recurring loss of human lives or recurring attacks on humans are deemed to be extremely severe issues, and automatically result in mobilization and prompt management action. Ultimately incidents have varied impacts, and will

involve different scenarios of public pressure. Controlling incidents with high impact (Figure 4-3) will automatically reduce the need to take compensatory management actions.

8. Imminent political pressure. If there is an imminent election, or if there are potential political incentives for groups, there will be a higher chance for mobilization, and higher public pressure thereby lowering the threshold.
9. Physical accessibility. An issue that is initiated close to town centers or along the south-eastern boundary of CTR is likely to be easily mobilized and have a lower threshold. The communities in these areas have better access to the media and are better connected to important road-routes (which can also be blocked after effective mobilization), making these areas more sensitive for CTR management. However, villagers in the northern parts of CTR or the resident tribal communities (residing in small hamlets around CTR) are politically and socially isolated. The threshold for issues affecting these communities is higher than that of the public that has active access to political systems.
10. Stakeholder attributes. Is the issue perceived to be urgent/ legitimate or have significant effects? The threshold is more easily crossed when these significant factors are attached to an incident. The PA management may actively feel that a particular problem needs attention because of its moral or ethical implications. This can increase the perceived impact of an issue, and may more easily result in action. The threshold is therefore lower for a group that is 'important' or has access to political resources able to create an issue with higher impact, and higher mobilization.

11. Delay in mitigation. A perceived delay in the mitigation of crisis or taking management action will create higher public pressure and lower the threshold. For example, respondents recalled that after a particular incident of tiger attack on a resident, no official of CTR arrived at the site. This raised the perceived importance of the issue and led to higher mobilization, including the blockading of a key road, ultimately resulting in mitigating actions being taken by the PA management (Figure 4-3, Scenario C). However, prompt management action can delay the mobilization, even if it is perceived to insufficiently address the issue.

The above factors also represent important policy and management considerations for CTR management as it seeks to mitigate the need to take reactionary steps that compromise conservation objectives in the short-term, and create a more supportive network of stakeholder groups. For example, the creation of large-scale and equitable monetary incentives in CTR (Factor 5) will likely create incentives to support PA management. Also, prompt and thorough responses to incidents of human-wildlife conflict will facilitate issue resolution and avoid volatile situations (Factors 7 and 11). Although such management and policy implications may appear intuitive, very often they are breached. Further, such interventions can help the PA management to pre-empt situations where they may have to take an action contradictory to tiger conservation. Timely interventions can also help PA management to focus more effectively on the task of conservation, while enjoying greater support from the local stakeholders, which will together facilitate the ongoing success of CTR.

4.4. Conclusion

By utilizing a combined grounded theory-case study research design we were able to identify and describe the process through which various stakeholder groups of CTR articulate their demands through the socio-political apparatus and pressure the PA management to take action. Recognizing that a large body of literature exists describing the effects of PA management on local stakeholders, we were able to go beyond this, to identify the reciprocal aspects of this relationship to describe certain ways in which local stakeholders affect PA management. This knowledge is important because it will help PA management design more effective interventions to build a more supportive coalition of conservation stakeholders.

Apart from this strength, we were able to understand some of the other factors that contribute to the success of CTR as a reserve. While there are many socio-ecological issues in the landscape, including local politics and human-wildlife conflict, they are yet to become a significant challenge for CTR management. For example, the loss of crops or livestock to wildlife is a highly resented issue among the villagers, yet it does not feature as a prominent political issue. What are the factors that contribute to this? A key factor that works in favor of the PA management is the geographic dispersion of the affected communities and the resultant difficulties in politically mobilizing them. The villagers rate basic development issues as primary, rather than issues of conflict with wildlife. Further, the rare interface with the government machinery is better utilized on issues that are more critical, and on which the government is more likely to respond. More importantly, however, CTR is supported by the residents who regard issues of wildlife as a regular part

of their lives. There seems to be a level of submission or resignation regarding these issues. The *Gujjars* are keen on staying within the forest. There are others residents like Raju, a resident of a forest-village, who expressed his intent to not leave the forest. We met him after three of his mature livestock had been killed by a tigress on the same day. He was able to locate only two bodies, and would have to forgo any chance of partial compensation for the third kill. Yet, when asked about the tiger, Raju said, "*usne bhi yahin rehna hai, humne bhi yahin rehna hai* (he has to live here, and so do we)", while his family herded the remainder of the livestock in a grassland with the persistent threat of an aggressive tigress. The success of CTR also owes, in part, to the communities to which Raju and the *Gujjars* belong. Going forward, CTR management need to further understand and foster such inherent tolerance towards the wild in order to maximize the success of tiger conservation.

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References

Agrawal A (2005) Environmentality: Community, intimate government, and the making of environmental subjects in Kumaon, India. Current Anthropology 46 (2):161-190

Boushey G (2012) Punctuated equilibrium theory and the diffusion of innovations. Policy Studies Journal 40 (1):127-146

Chan KMA, Pringle RM, Ranganathan JAI, Boggs CL, Chan YL, Ehrlich PR, Haff PK, Heller NE, Al-Khafaji K, Macmynowski DP (2007) When Agendas Collide: Human Welfare and Biological Conservation. Conserv Biol 21 (1):59-68. doi:10.1111/j.1523-1739.2006.00570.x

Charmaz K (2006) Constructing grounded theory : a practical guide through qualitative analysis. Sage Publications, London ; Thousand Oaks, Calif.

Chhatre A, Saberwal V (2005) Political incentives for biodiversity conservation. Conserv Biol 19 (2):310-317

Clement F (2010) Analysing decentralised natural resource governance: proposition for a "politicised" institutional analysis and development framework. Policy Sciences 43 (2):129-156. doi:10.1007/s11077-009-9100-8

Contractor D (2007) Evaluating the Effect of Design and Sampling intesity on Estimating Tiger Population and Density. Saurashtra Univerisity, Rajkot, Dehradun

Creswell JW (2009) Research design : qualitative, quantitative, and mixed methods approaches. Sage Publications, Thousand Oaks

Damania R, Stringer R, Karanth K, Stith B (2003) The economics of protecting tiger populations: linking household behavior to poaching and prey depletion. Land Economics 79 (2):198-216

Dinerstein E, Loucks C, Heydlauff A, Wikramanayake E, Bryja G, Forrest J, Ginsberg J, Klenzendorf S, Leimgruber P, O'Brien T, Sanderson E, Seidensticker J, Songer M (2006) Setting Priorities for the Conservation and Recovery of Wild Tigers: 2005-2015. A User's Guide. WWF, WCS, Smithsonian and NFWF-STF, Washington, D.C. - New York

Fischer A, Petersen L, Feldkötter C, Huppert W (2007) Sustainable governance of natural resources and institutional change–an analytical framework. Public Administration and Development 27 (2):123-137. doi:10.1002/pad.442

Folke C, Carpenter S, Walker B, Scheffer M, Elmqvist T, Gunderson L, Holling CS (2004) Regime shifts, resilience, and biodiversity in ecosystem management. Annual Review of Ecology, Evolution, and Systematics 35:557-581

Folke C, Hahn T, Olsson P, Norberg J (2005) Adative governance of social-ecological systems. Annual Review of Environment and Resources 30 (1):441-473. doi:doi:10.1146/annurev.energy.30.050504.144511

Glaser BG, Strauss AL (1967) The discovery of grounded theory: strategies for qualitative research. Aldine Pub. Co., Chicago

Goodrich JM (2010) Human-tiger conflict: A review and call for comprehensive plans. Integrative Zoology 5 (4):300-312

Huberman AM, Miles MB (2002) The qualitative researcher's companion. Sage Publications, Thousand Oaks, CA

Jalais A (2005) Dwelling on Morichjhanpi: When Tigers Became 'Citizens', Refugees 'Tiger-Food'. Economic and Political Weekly 40 (17):1757-1762

Jamal T, Stronza A (2009) Collaboration theory and tourism practice in protected areas: stakeholders, structuring and sustainability. Journal of Sustainable Tourism 17 (2):169-189

Janssen MA, Ostrom E (2006) Governing Social-Ecological Systems. In: Tesfatsion L, Judd KL (eds) Handbook of Computational Economics, vol Volume 2. Elsevier B. V., pp 1465-1509

Jhala YV, Gopal R, Qureshi Q (eds) (2008) Status of Tigers, Co-predators and Prey in India. National Tiger Conservation Authority, Ministry of Environment and Forests, Government of India and the Wildlife Institute of India, Dehradun,

Jhala YV, Qureshi Q, Gopal R, Sinha PR (eds) (2011) Status of the Tigers, Co-predators, and Prey in India, 2010. National Tiger Conservation Authority, Govt. of India, New Delhi, and Wildlife Institute of India, Dehradun,

Karanth KU (2003) Tiger Ecology and Conservation in the Indian Subcontinent. Journal of the Bombay Natural History Society 100 (2&3):169-189

Karanth KU (2005) Reconciling Conservation with Emancipatory Politics. Economic and Political Weekly 40 (46):4803-4805

Karanth KU (ed) (2006) Tiger tales: tracking the big cat across Asia. Penguin Books, New Delhi, New York

Karanth KU, Chellam R (2009) Carnivore conservation at the crossroads. Oryx 43 (01):1-2. doi:doi:10.1017/S003060530843106X

Keys N, Thomsen DC, Smith TF (2010) Opinion leaders and complex sustainability issues. Management of Environmental Quality 21 (2):187-197

Khan JA, Kumar S, Khan A, Musavi A, Malik PK, Kushwaha SPS, Khati DS, Sarin GD (2008) An ecological study in the buffer zone of the Corbett Tiger Reserve: Prey abundance and habitat conditions. International Journal of Ecology and Environmental Sciences 34 (2):121-131

Kluckhohn FR (1940) The Participant-Observer Technique in Small Communities. American Journal of Sociology 46(3): 331-343.

Koontz TM (2005) We finished the plan, so now what? Impacts of collaborative stakeholder participation on land use policy. Policy Studies Journal 33 (3):459-481

Kumar S, Khan JA, Khan A, Musavi A, Malik PK, Kushwaha SPS, Khati DS, Sarin GD (2008) An ecological study in the buffer zone of the Corbett Tiger Reserve: Tiger abundance and cattle depredation. International Journal of Ecology and Environmental Sciences 34 (2):133-140

Lele S, Wilshusen P, Brockington D, Seidler R, Bawa K (2010) Beyond exclusion: alternative approaches to biodiversity conservation in the developing tropics. Current Opinion in Environmental Sustainability 2 (1-2):94-100

Locke K (2001) Grounded Theory in Management Research. Sage Series in Management Research. Sage Publications Ltd., London, Thousand Oaks, New Delhi

Loyola RD, Oliveira-Santos LGR, Almeida-Neto Mr, Nogueira DM, Kubota U, Diniz-Filho JAF, Lewinsohn TM (2009) Integrating Economic Costs and Biological Traits into Global Conservation Priorities for Carnivores. PLoS ONE 4 (8):e6807

McGinnis MD (2011) An Introduction to IAD and the Language of the Ostrom Workshop: A Simple Guide to a Complex Framework. Policy Studies Journal 39 (1):169-183. doi:10.1111/j.1541-0072.2010.00401.x

McShane TO, Hirsch PD, Trung TC, Songorwa AN, Kinzig A, Monteferri B, Mutekanga D, Thang HV, Dammert JL, Pulgar-Vidal M, Welch-Devine M, Peter Brosius J, Coppolillo P, O'Connor S (2011) Hard choices: Making trade-offs between biodiversity conservation and human well-being. Biological Conservation 144 (3):966-972

Merriam SB (2009) Qualitative research : a guide to design and implementation. The Jossey-Bass higher and adult education series. Jossey-Bass, San Francisco

Miller TR, Minteer BA, Malan L-C (2011) The new conservation debate: The view from practical ethics. Biological Conservation 144 (3):948-957

Musavi A, Khan JA, Kumar S, Khan A, Malik PK, Kushwaha SPS, Khati DS, sarin GD (2006) A Study of Tiger Human Conflict in Buffer Zone of the Corbett Tiger Reserve: Protected Area-People Relationship. International Journal of Ecology and Environmental Sciences 32 (3):241-257

Mushove P, Vogel C (2005) Heads or tails? Stakeholder analysis as a tool for conservation area management. Global Environmental Change Part A 15 (3):184-198

Nandhakumar J, Jones M (2002) Development gain? Participant observation in interpretive management information systems research. In: Qualitative Research, vol 2. vol 3. Sage Publications, London, Thousand Oaks, New Delhi, pp 323-341

Ostrom E (2011) Background on the Institutional Analysis and Development Framework. Policy Studies Journal 39 (1):7-27. doi:10.1111/j.1541-0072.2010.00394.x

Phadke R (2005) People's science in action: The politics of protest and knowledge brokering in India. Society and Natural Resources 18 (4):363-375

Post G (2010) Evaluation of Tiger Conservation in India: the use of comparative effectiveness research. Duke University,

Project Tiger (2005) Joining The Dots: The Report of the Tiger Task Force Union Ministry of Environment and Forests, Government of India, New Delhi

Ranganathan J, Chan KMA, Karanth KU, Smith JLD (2008) Where can tigers persist in the future? A landscape-scale, density-based population model for the Indian subcontinent. Biological Conservation 141 (1):67-77

Rastogi A, Badola R, Hussain SA, Hickey GM (2010) Assessing the utility of stakeholder analysis to Protected Areas management: The case of Corbett National Park, India. Biological Conservation 143 (12):2956-2964

Rastogi A, Hickey GM, Badola R, Hussain SA (In press) Saving the Superstar: A review of the social factors affecting tiger conservation in India. Journal of Environmental Management Accepted

Robbins PF, Chhangani AK, Rice J, Trigosa E, Mohnot SM (2007) Enforcement authority and vegetation change at Kumbhalgarh Wildlife Sanctuary, Rajasthan, India. Environmental Management 40 (3):365-378

Rudd MA (2004) An institutional framework for designing and monitoring ecosystem-based fisheries management policy experiments. Ecol Econ 48 (1):109-124

Saberwal VK (1996) Pastoral Politics: Gaddi Grazing, Degradation, and Biodiversity Conservation in Himachal Pradesh, India. Conserv Biol 10 (3):741-749

Sanderson E, Forrest J, Loucks C, Ginsberg J, Dinerstein E, Seidensticker J, Leimgruber P, Songer M, Heydlauff A, O'Brien T, Bryja G, Klenzendorf S, Wikramanayake E (2006) Setting Priorities for the Conservation and Recovery of Wild Tigers: 2005-2015. The Technical Assessment. WCS, WWF, Smithsonian, and NFWF-STF, New York – Washington, D.C.

Seidensticker J (2010) Saving wild tigers: A case study in biodiversity loss and challenges to be met for recovery beyond 2010. Integrative Zoology 5 (4):285-299. doi:10.1111/j.1749-4877.2010.00214.x

Seidensticker J, Christie S, Jackson P (eds) (1999) Riding the tiger: tiger conservation in human-dominated landscapes. Cambridge University Press, Cambridge, UK

Stoll-Kleemann S (2001) Barriers to nature conservation in Germany: A model explaining opposition to protected areas. Journal of Environmental Psychology 21 (4):369-385

Strauss AL, Corbin JM (1998) Basics of qualitative research : techniques and procedures for developing grounded theory. 2nd edn. Sage Publications, Thousand Oaks

Tilson R, Nyhus PJ (eds) (2010) TIGERS OF THE WORLD: The Science, Politics, and Conservation of *Panthera Tigris*. Second Edition edn. Academic Press, London, Burlington, San Diego

Walston J, Robinson JG, Bennett EL, Breitenmoser U, da Fonseca GAB, Goodrich J, Gumal M, Hunter L, Johnson A, Karanth KU, Leader-Williams N, MacKinnon K, Miquelle D, Pattanavibool A, Poole C, Rabinowitz A, Smith JLD, Stokes EJ, Stuart SN, Vongkhamheng C, Wibisono H (2010) Bringing the Tiger Back from the Brink--The Six Percent Solution. PLoS Biol 8 (9):e1000485. doi:10.1371/journal.pbio.1000485

Wasserman S, Faust K (1994) Social network analysis: Methods and applications. Cambridge University Press, Cambridge, New York

Wikramanayake E, Dinerstein E, Seidensticker J, Lumpkin S, Pandav B, Shrestha M, Mishra H, Ballou J, Johnsingh AJT, Chestin I, Sunarto S, Thinley P, Thapa K, Jiang G, Elagupillay S, Kafley H, Pradhan NMB, Jigme K, Teak S, Cutter P, Aziz MA, Than U (2011) A landscape-based conservation strategy to double the wild tiger population. Conservation Letters 4 (3):219-227. doi:10.1111/j.1755-263X.2010.00162.x

Wikramanayake E, McKnight M, Dinerstein E, Joshi A, Gurung B, Smith D (2004) Designing a Conservation Landscape for Tigers in Human-Dominated Environments. Conserv Biol 18 (3):839-844. doi:10.1111/j.1523-1739.2004.00145.x

Wilshusen PR, Brechin SR, Fortwangler CL, West PC (2002) Reinventing a Square Wheel: Critique of a Resurgent "Protection Paradigm" in International Biodiversity Conservation. Society & Natural Resources 15 (1):17-40

Yin RK (2003) Case study research : design and methods. Applied social research methods series, v. 5. Sage Publications, Thousand Oaks, Calif.

Yin RK (2009) Case study research: design and methods. 4th edn. Sage Publications, Los Angeles

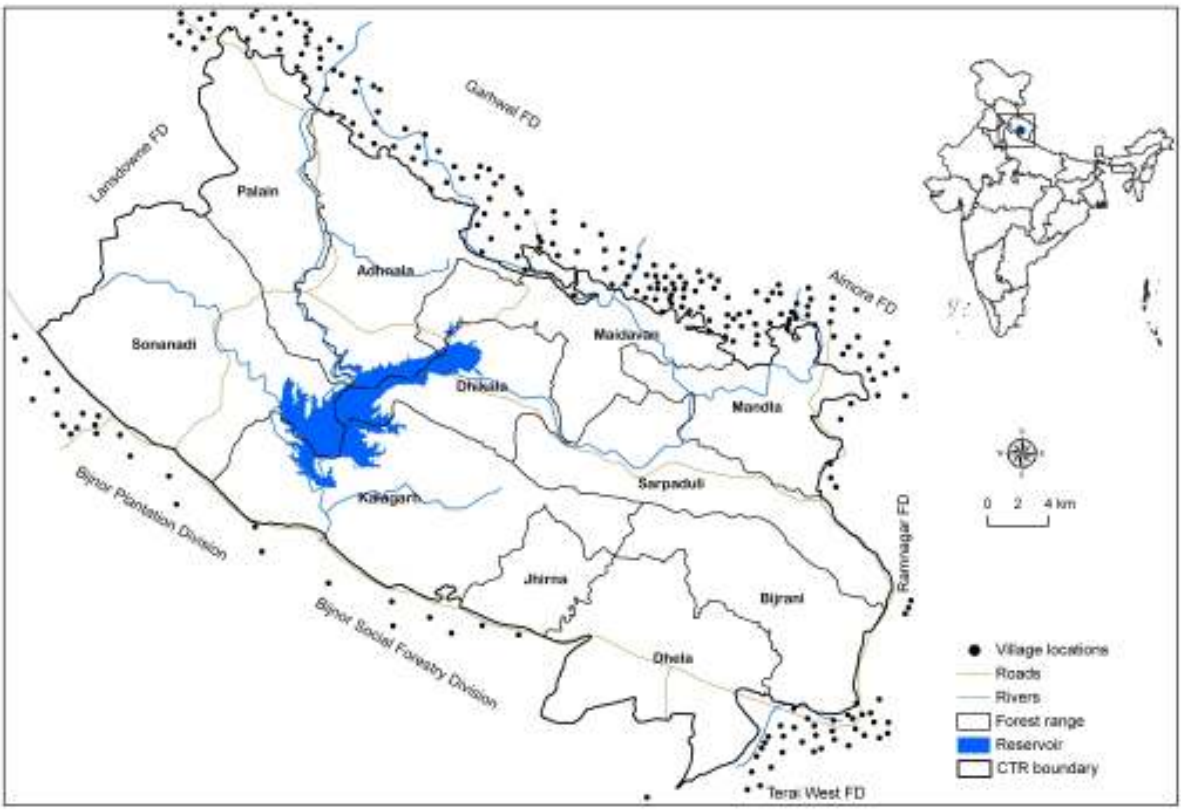

Figure 4-1 Map of Corbett Tiger Reserve, India, depicting boundaries, major rivers and roads.

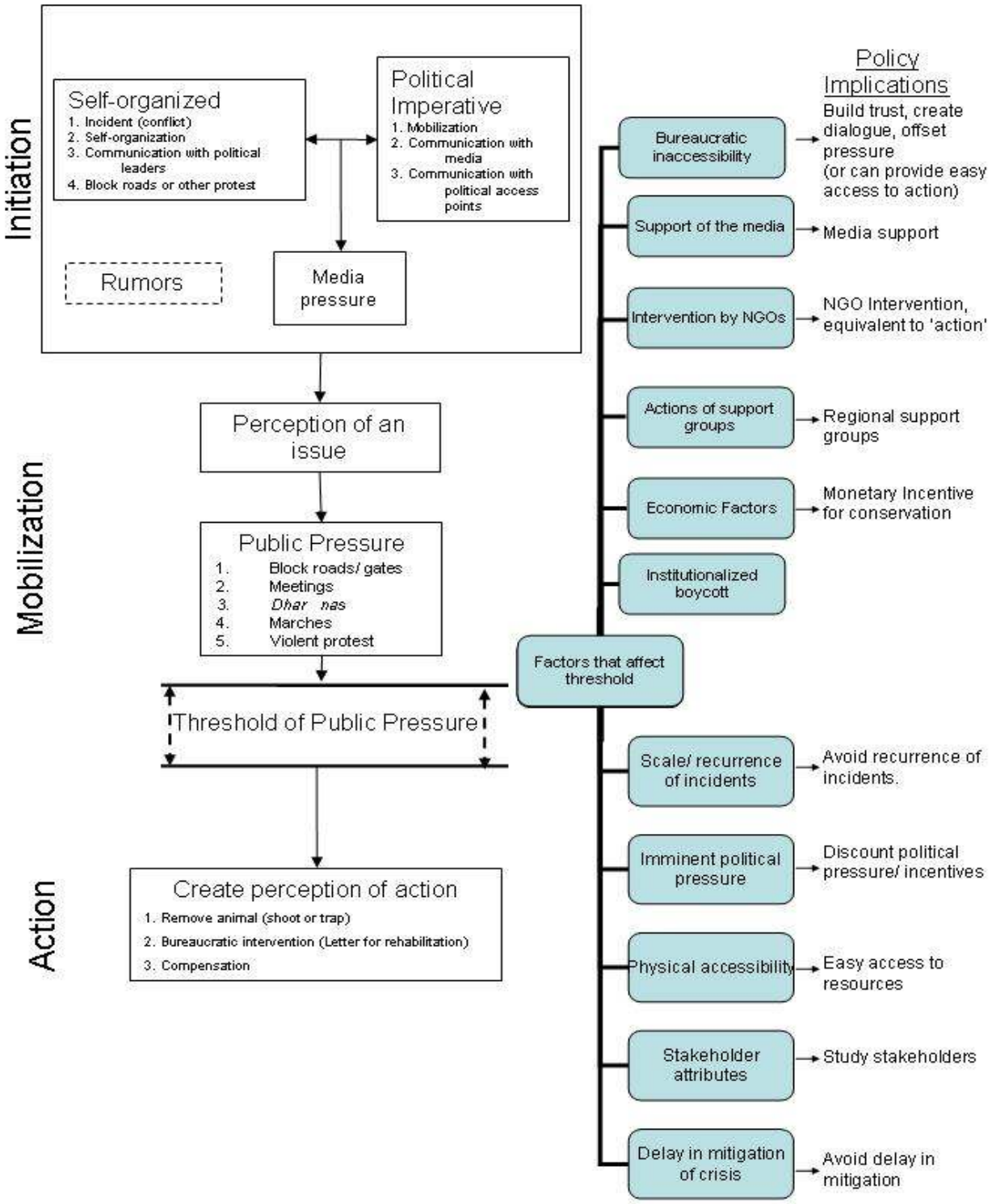

Figure 4-2 Socio-Political process through which stakeholder issues are articulated in Corbett Tiger Reserve, India. Stakeholder issues were observed to be articulated through three phase: initiation of an issue, mobilization (including crossing of 'threshold of public pressure' and subsequent action (management reaction).

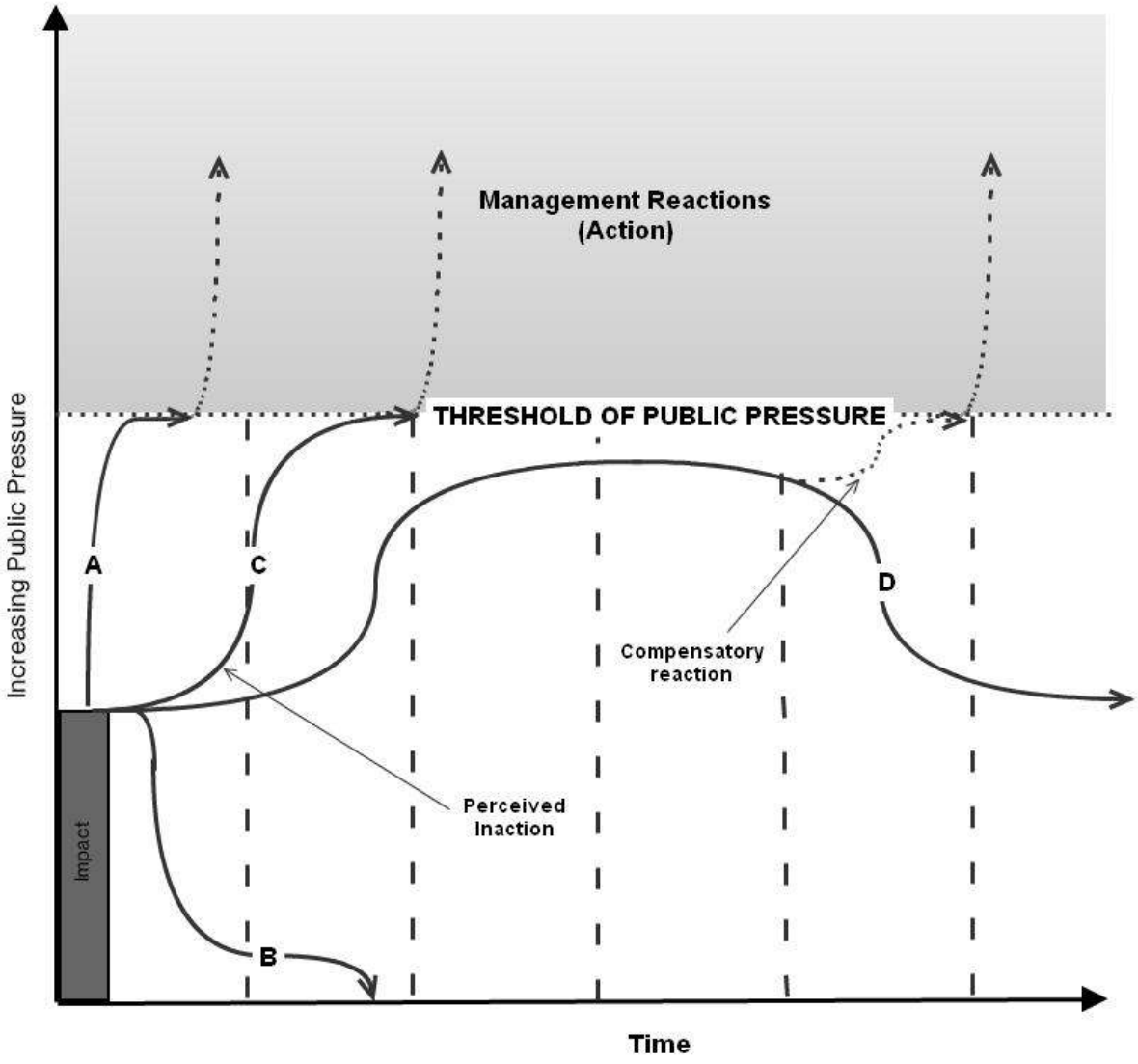

Figure 4-3 Different possible scenarios in development of Public Pressure, measured against the scale of time.

Initial pressure depends upon Impact (function of who is affected, to what degree). After initial Impact, the Public Pressure can follow four different scenarios.

Scenario A: High Impact: Rapid creation of high public pressure, followed by urgent management reaction.

Scenario B. Low Impact: Public Pressure may be created, but rapidly decays, without management reaction. Issues in this scenario may have low legitimacy.

Scenario C. High Impact: Rapid creation of public pressure. However, without an urgent management reaction, there is the perception of delay. This results in rise in public pressure, which necessitates management reaction.

Scenario D. Medium Impact: Public pressure is created and sustained. However, the desired management reaction is not within scope of management. The PA management may offer a compensatory reaction to address the issue and reduce public pressure.

Preface to Chapter 5

In the preceding chapter we explored the political processes used by local stakeholders and local communities around Corbett Tiger Reserve to affect change in reserve management. However, it is also important to better understand the inherent capacities of local communities to utilize these political processes through collective action, either for or against tiger conservation.

I explore this issue by assessing the social capital of three village communities around Corbett Tiger Reserve. This analysis provides insights to some of the ways in which tiger conservation schemes may have impacted local communities and the implications for tiger conservation efforts.

CHAPTER 5: ASSESSING THE ROLE OF SOCIAL CAPITAL IN SUPPORTING COLLECTIVE ACTION FOR IMPROVED TIGER CONSERVATION OUTCOMES IN INDIA

Abstract

Tiger conservation often requires local level support, and needs to create effective partnerships to avoid facing serious political challenges. For this, social capital of communities can be utilized to create collective action, and it can be a useful concept to help understand local dynamics and meet challenges inherent in tiger conservation. We undertook a study of social capital in three villages around Corbett National Park, India. We found that non-monetary benefits of conservation and tourism can also lead to subtle changes in demographic profiles, altering social capital. Our study also shows that overall social capital can be indirectly compromised if monetary benefits of conservation schemes are directed at select sections of the community, reducing mutual trust. It is therefore important to consider equity in distribution of benefits of conservation, to help positively utilize social capital of communities to support tiger conservation. Further, members with higher social capital were highly likely to create collective action in case of a tiger-attack. It is important to direct such collective action towards positive change (such as collective management of fences), and establish linkages to pre-empt collective actions against conservation.

5.1. Introduction

Tiger conservation has an inherent challenge: it requires the establishment of large protected areas, which can lead to local antagonism, creating challenges for local conservation management, and threatening the survival of tiger populations (Rastogi et al. 2012). Specifically, scientists have determined that the key threats facing tiger populations are, a) reduction in prey (Karanth et al. 2004), b) habitat depletion (Walston et al. 2010b), and c) poaching (Gratwicke et al. 2008). To counter these threats, there is a need to establish protected areas (PAs) that are large enough to contain both viable populations of these solitary predators and sufficient prey densities (Wikramanayake et al. 2011). However, establishing such protected areas in developing countries often leads to local conflict, especially if strict government control compromises the rights and interests of local stakeholders, leading to disagreement, antagonism or even hostility (Wilshusen et al. 2002; Lele et al. 2010). The literature suggests that local communities can create collective action against conservation through political means (Chhatre and Saberwal 2005), or by creating direct threats to the tiger, for example through community assistance, acquiescence, or even active involvement in poaching or killing tigers (Damania et al. 2003; Mukherjee 2009). The recent disappearance of tigers from two key Tiger Reserves in India provides the practical evidence of local-level conservation challenges (Project Tiger 2005). Although the concept of social capital can provide useful information about the capability of local communities to organize collective action, yet, to our knowledge, previous studies on tiger conservation have not considered it in detail.

Although there is diverse scholarship on different aspects of social capital (Poder 2011; Lynch et al. 2000; Sobel 2002), Putnam (1993) provides the most widely accepted definition of social capital, as "networks, norms, and trust, that facilitate coordination and cooperation for mutual benefit" (Putnam 1993). Fundamentally, social capital is understood as the assortment of various resources required by communities to act collectively (Pretty and Smith 2004), including: networks, flow of information, trust, reciprocity and shared norms. Social capital helps improve cohesion and trust within a community and reduces the transaction costs to facilitate collective action (Isham 2002). Higher amounts of social capital have been demonstrated to facilitate community action, useful in achieving multiple objectives at once (Krishna 2007), for issues operating at multiple spatial and temporal levels (Brondizio et al. 2009), in situations which require societal adaptation (Adger 2003), and for the complex challenges associated with sustainable natural resource management (Pretty 2003; Pretty and Smith 2004; Adger 2003). Based on this body of work, it appears likely that tiger conservation objectives can be significantly aided if local communities have higher levels of social capital and ability for collective action. In such instances, local communities will be better placed to support many of the enabling factors of successful tiger conservation: effective partnerships (Kawanishi and Seidensticker 2010), support for management (Rastogi et al. 2012), increased control over poaching (Project Tiger 2005), reduction in 'revenge killing' of tigers (Damania et al. 2003), and political support for conservation (Sanderson et al. 2010). Contrarily, if communities with high social capital become antagonistic towards tiger conservation, they will be more likely to be able to create significant challenges for conservation management through political means (Chhatre and Saberwal 2005), collective non-cooperation or retaliation (Middleton 2003;

Mukherjee 2009), and incendiary action (Damania et al. 2003). This makes understanding the social capital dynamics of local communities crucial to developing successful local conservation strategies, especially because tiger populations are considered extremely sensitive to local-level actions and habitat disturbances (Damania et al. 2003; Kawanishi and Seidensticker 2010; Karanth et al. 2004). Despite the significance of community social capital to successful tiger conservation outcomes, no studies have assessed the social capital dynamics of local communities affecting, and affected by, tiger conservation.

In this paper we assess the social capital that exists in villages bordering Corbett Tiger Reserve (CTR), India. We assess the social capital in three comparable villages, and then draw inferences relevant to tiger conservation policy and management. In particular, we consider the ability of the community to organize collective action in support or against tiger conservation and identify the implications for policy and practice.

5.2. Methods

In order to better understand the relationship between social capital and conservation, we purposively sampled three villages bordering CTR: Dhikuli, Sawaldeh and Anwlakot (see Figure 5-1). These villages have been affected by the establishment of CTR to varying degrees, providing a gradient of influence and enabling comparison between different contexts. We sought to better understand the specific contexts of each village through qualitative research, collecting village-level data through interviews with village heads and other key informants. We then collected village-level data on population composition, identified a sample population, and then conducted a household survey using a stratified random sample, ensuring representation of all social groups.

In developing our survey instrument, we utilized the 'Social Capital Assessment Tool' (SCAT), developed for use in developing area contexts (Krishna and Shrader 2000) and the Integrated Questionnaire for the Measurement of Social Capital (SC-IQ) (Grootaert et al. 2003). These instruments have been commonly used in studies of social capital (Krishna 2007; Harpham et al. 2002; Jones 2005; Adhikari and Goldey 2010). As suggested by the authors of the questionnaires (Grootaert et al. 2003; Krishna and Shrader 2000), we adapted the tool to our research context by amending different sections, making it culturally sensitive, locally relevant, and adjusting it to the local language. The questionnaire sought data on the following dimensions:

1. *Demographic profile:* we collected information on the religion/ caste, age, sex and education of the respondent. For the household, we inquired about the key source of livelihood, family size and composition, kind of house (thatched, semi-permanent or concrete), sources of energy (electricity, fire-wood, kerosene, LPG or others), distance from CTR boundary, whether the household collected fuel-wood or fodder from the forest and whether any members of the household were employed in CTR or had any other business with CTR.
2. *Divisions in village society:* participants were asked if they perceived the village to be divided on any social basis. We also asked participants if they thought that the village society was divided on the basis of the following differences: education, new/ old generations, immigrant-related, political, religious, ethnic/ communal, financial, land-ownership, social-status, gender-related or others. The answers were recorded on a likert-scale (low/ medium/ high differences, or not applicable), providing us with information on any divisions specific to the village.

3. *Social capital*. Adapting the SCAT to context-specific conditions (Krishna 2007), we measured the following dimensions of social capital:

    a. Cognitive. Cognitive social capital describes the norms, reciprocity, sharing, attitudes, beliefs, and trust between members of the society. We measured cognitive social capital through questions regarding: 1) solidarity (example: perception of leaders; would villagers cooperate during a crisis; would they help each other?), 2) reciprocity (example: do people care for each other, who would control deviant behavior of children?), 3) trust (would villagers trust one-another with property, money or sharing resources; do villagers trust each-other in general?). In addition, we also asked participants if they perceived the levels of trust in their village as having changed in the past 10 years (reduced/ remained the same/ increased).

    b. Structural. Structural social capital measures the networks, roles, rules, precedents, and overall 'connectedness' that help facilitate social action. To ascertain structural social capital, we framed questions regarding: 1) collective action (examples: spirit of participation in the village; opportunity to participate in decision making), networks (examples: if the local school did not have teachers for sometime or if a village road was broken, who would take action; who would help in case of a disaster?), and conflict resolution (examples: who would intervene in case of conflict between village residents, or conflict with an outsider or tourist?).

As the specific measures of social capital can be context-specific (for example, there may be few formal networks in villages) (Ballet et al. 2007), we used local

details to tailor the design of the questionnaire (for example, asking about calamities such as tiger-attacks) (Krishna and Shrader 2000). We recorded the answers on a likert-scale, developed individually for each question, with higher scores awarded to answers which demonstrated higher social capital.

We also supplemented the quantitative component of the survey with qualitative comments from the respondents, in order to develop a deeper understanding and contextualization of the various characteristics of social capital.

The survey instrument was translated into the local language of Hindi, pre-tested with key-informants and potential participants, and adjusted as needed. The household surveys were then conducted between January and March 2012, with a target of 80 households per village. In cases where the head of the household was not available, we surveyed the next available senior member of the household. After cleaning and sorting the data, we had 226 complete surveys for analysis.

Descriptive statistics aided in understanding the socio-economic structure of the three villages. We subsequently analyzed the data using analyses of variance (ANOVA), descriptive statistical analyses, and factorial ANOVA techniques. We use one-way ANOVA to test if the mean social capital and perceived increase in trust were equal for all three villages. To estimate the relationship between social capital and perceived exclusions, we use factorial ANOVA. Factorial ANOVA is particularly useful in cases where explanatory variables are ordinal, like in our data for perceived exclusions.

5.3. Results

5.3.1. Socio-economic status of villages

Our results indicate that the three villages (Dhikuli, Sawaldeh and Anwlakot) were heterogeneous societies of similar composition (Table 5-1). The number of households ranged from 500-800, and the village-population from 1,700-4,000. The villages also had a comparable societal diversity (castes and religions); however, the societies were distinguishable on the basis of livelihood patterns and general income levels. While Dhikuli was the site of intense tourist activity, the majority of the lands had been converted to tourist resorts (majority owned by outsiders) (Anon 2011; Bindra 2010). The overall livelihood patterns had also undergone change, with the majority (about 60-70%) of the laborers now employed as labor in resorts, with low incomes reported. Bindra (2010) suggests that there were approximately 102 tourist resorts in various stages of operation around CTR in 2010 and the majority of these tourist resorts (between 47- 65) were concentrated on the south-eastern boundary of CTR, close to Dhikuli. Sawaldeh, undergoing relatively less tourist-activity at the time of study, comprised mainly families that were dependent on agricultural and other labor (about 80% and 20% respectively), and the village heads classified them in low-income categories. In Anwlakot, the majority (about 50%) of households practiced agriculture, and was reported to have low-middle income.

Overall, the majority of our respondents reported ages between 18-40 years, with a mean household size of about 5.3 (Table 5-2). Our sample was heterogeneous, with diversity in the level of education, livelihood patterns, and level of dependence on CTR (Table 5-2).

5.3.2. Inherent levels of exclusion

Political differences were reported as a basis for division from across the villages. Nearly 34% and 15% of the respondents in Anwlakot reported the division over political views as 'medium' and 'high' respectively. In Sawaldeh, 56% of respondents reported political divisions as 'medium' and 29% as 'high', while in Dhikuli, 19.2% reported 'medium' and 1.3% reported 'high' levels of political division. Elections to the state government had recently been conducted (on January 30, 2012), and this helps explain the emphasis laid on political differences.

Although political differences were comparable, the villages can be more clearly distinguished on the basis of how respondents perceived the inherent differences along other dimensions. In Dhikuli, differences between generations (6%), financial status (14%) and size of land holdings (11%) were reported to be key bases for division ('medium' or 'high'). These differences were reported as medium or high by only 1-4% of the participants from other villages. Below, we discuss how these divisions were created by tiger conservation.

5.3.3. Social capital and perceived exclusions

The mean social capital score was the highest for Dhikuli (Mean Social Capital: 42.08). Dhikuli also reported the lowest levels of perceived exclusion (Mean perceived exclusion: 10.77) (Table 5-4). Anwlakot recorded the lowest social capital score and highest perceived exclusion (Mean social capital: 40.01; mean perceived exclusion: 11.11). However, one way ANOVA results indicated no statistically significant difference between the mean social capital scores and the perceived exclusions for the three villages (at 10% significance

level). We failed to reject the null hypothesis that the difference between means across villages was statistically different from 0 for social capital (F-stat 1.86; p-value 0.1582) and perceived exclusions (F-stat 2.75; Prob>F 0.0659). Pairwise comparisons using Bonferroni and Sidak multiple comparison tests also failed to reject the null hypothesis (at 5% level of significance) that there was no statistically significant difference between the mean social capital scores and the perceived exclusions for any two villages. Therefore, for the subsequent analyses, we pooled the survey data from the three villages.

5.3.4. Change in community levels of trust

The answers to the questions concerning change in trust levels could be differentiated between Dhikuli and Sawaldeh. Pair-wise analysis revealed these villages were significantly different (Bonferroni test p-value 0.048; Sidak test p-value 0.048). Nearly 6.4% of participants from Dhikuli suggested that trust had increased in the preceding 10 years, while 69.2% reported a decrease (see Table 5-5). In contrast, 84% of respondents from Sawaldeh reported a decrease in trusts levels, 16% reported trust remained the same, and no respondents reported an increase in trust. The overall loss of trust was also assessed through open ended interview questions in Dhikuli:

> *"Moneyed lords are evil. They won't lift a bucket if you asked them* [indicative of lack of mutual connection and trust]*."*
>
> -Respondent in Dhikuli, February 8, 2012
>
> *"These days, brothers are fighting among themselves!"*
>
> -Respondent in Dhikuli, February 3, 2012

"There has been no trust because since 1990, the world has become fast-paced and the humans have become fast-paced. As money rises, trust reduces. People have sold off their lands since 1990s and this has reduced trust."

-Respondent in Dhikuli, February 6, 2012

"We will help each other in cases of emergency, but for own benefit [Indicating self-interest in helping others]*".*

-Respondent in Dhikuli, February 2, 2012

"People have money. These days it is hard to trust (one another)*, because people have a hunger* (for money). *Jitna jyada hai, utna kam hai* (the more one has, the more one wants).

-Respondent in Dhikuli, February 3, 2012

"Up to 10-20 years back there was less money available and people trusted each other. Now there is more money and so trust has reduced."

-Respondent in Dhikuli, February 3, 2012

The respondents suggested that trust had reduced on account of the rise in financial disparity, and the source of this disparity was identified as wildlife tourism in CTR. Our results suggest that while the implementation of tiger conservation had led to the growth of tourism in the area, the financial benefits were not evenly distributed, and this reduced the overall levels of trust and social capital in the communities.

5.3.5. Factors affecting social capital

Controlling for household characteristics, age, education, and sex of respondents, we performed factorial ANOVA for the various dimensions of 'perceived exclusions' and

social capital (Table 5-6). We found that perceived differences in educational status was a strong determinant of social capital. Expectedly, the coefficients for medium and high exclusions were negative; this indicates that participants, who reported medium or high differences in education, had significantly lower scores for social capital by factors of approximately 6-15 respectively. We also found significant relationships between social capital and exclusions on different basis: religious beliefs (factor: 16.4, significant at 10%), old and new generations (factor: -5.3, significant at 10 %), and old and new settlers (-19.3, significant at 1%).

The growth of wildlife tourism led to changes in society, making education available to part of the population, and inviting local immigrants. This has led to an overall decrease in social capital levels, with implications for conservation (discussed below).

5.3.6. Predicting community responses to tiger-attacks

Our questionnaire included questions regarding the community dynamics after a hypothetical tiger-attack on livestock or humans. We tested the impact of perceived social capital on how respondents perceived solidarity after a tiger-attack on a fellow resident of the village. We ran an ordered logit model controlling for demographic attributes of the interviewees as well as household characteristics (Greene 2003; Greene and Hensher 2010). In our maximum likelihood model, we found that social capital, as a whole and also as cognitive and structural, is a significant determinant of villagers' perception of how the village would react to tiger-attacks on a member of the community or livestock (Table 5-7). Respondents with higher social capital were more likely to suggest that the entire village would act together to respond to a tiger-attack (Isham 2002, Nooteboom 2007).

5.4. Discussion

Our exploratory study of social capital in three villages bordering CTR was designed to offer pragmatic findings that can inform the policy and management of tiger conservation. Based on our results, we are able to make the following salient inferences:

5.4.1. Tourism creating inequities

The first major inference of our study was that tourism in CTR contributed to an increase in perceived exclusion. Aside from political differences – which were uniformly reported across the villages and could be attributed to recent assembly elections - the respondents from different villages reported different levels of perceived exclusion on different bases. For example, the primary bases for exclusions in Dhikuli were identified as differences in financial status, land-holdings and different generations. These differences were attributed by the respondents to the rapidly growing wildlife tourism in Dhikuli. Over the preceding 10-15 years, many agricultural lands were sold to outside investors and converted to tourist resorts (Bindra 2010; Anon 2011). This had directly increased differences in financial and social status (and affected the solidarity of the village). The inequitable financial benefits derived from tourism are known to be largely accrued by younger generations (Ishii 2012), and this phenomenon likely led our participants to emphasize differences among new and old generations in the village.

It has been noted that conservation projects can selectively target community members to provide public goods such as education, employment and health services (Project Tiger 2005; Wells et al. 1993); and attract regional immigrants eventually leading to differences with traditional residents. Our results suggest that such monetary and non-monetary

demographic changes can create social inequities and eventually create social exclusions. While India's tiger conservation projects do consider the generation of benefits for local communities, the equities of distribution often remain unaddressed (Project Tiger 2005; Karanth et al. 2012; Karanth 2007; Krishna 2007). Our results indicate that it may be necessary to pay more attention to the *equitable* distribution of benefits in tiger conservation policy and management. Specifically, the main instrument to generate benefits for local communities in CTR is tourism. However, unplanned wildlife tourism has created unforeseen demographic changes, leading to significant long-term challenges. One such challenge is ecological (the intensive tourism infrastructure affecting the ecology of the area outside CTR jurisdiction), and the other is social (disproportionate distribution of benefits leading to some community-members feeling antagonized towards conservation, making this model of distributing benefits self-defeating).

5.4.2. Tiger tourism compromises village social capital?

Considering that wildlife tourism created social exclusion (primarily, financial and inter-generational), and that these perceived exclusions affected social capital and trust (sections 5.3.3, 5.3.4), we identify a possible causal link between conservation-related tourism and village social capital. This link was illustrated most vividly by our results from Dhikuli. Through the discussions with village heads, respondents and key informants in the area, Dhikuli was reported to have historically been a "model village" known for its strong unity despite religious heterogeneity. While Dhikuli may have had high levels of social capital historically, our participants also reported that overall levels of trust had decreased, with many participants attributing this to increased financial disparity (in turn, an impact of

intensive wildlife tourism). It is important to underline that 6.4% respondents from Dhikuli reported an increase in trust- the only participants of the study to report an increase in trust. These respondents were typically male, between 18-45 years and involved with tourism. Such direct beneficiaries of tourism are often reported to have increased social capital - a finding corroborated by other studies (Jones 2005; Park et al. 2012). Significantly however, the same studies found the overall social capital among local communities had declined (Jones 2005; Park et al. 2012). Although we did not directly measure an increase or decrease in social capital, the evidence suggests that intensive tourism had created exclusions among local communities, and these exclusions had negatively affected the overall social capital. This is a significant finding for tiger conservation policy and management, where tourism is often considered a useful means to develop linkages with local communities which can provide popular support to tiger conservation (Banerjee 2012; Karanth and Karanth 2012). Further, this tourism-led reduction in social capital may compromise the ability of local communities to act collectively (refer following section).

It is important, however, to underline that our results pertain to exclusions and not overall economic growth. For example, the *difference* on the basis of financial capital is shown to reduce social capital in our study. Our results do not address the possibility of an overall rise in financial capital of *all* members of the community raising the social capital. It can be explained that when rural societies transform into market-based or industrial-societies, the highly personalized trust relationships undergo change (Nooteboom 2007). In economically-advanced societies, mutual reliance is based less on personal trust and more on institutional conditions of law and enforcement. As the village societies in CTR advance

economically, the nature of social capital will transform and there may be a need to reinforce mutual trust through formalized institutions to ensure collective action.

5.4.3. Possibility of collective action

Finally, and more crucially, social capital helps improve cohesion and trust within a community and reduces the transaction costs to facilitate collective action (Isham 2002). How does the reduced social capital around CTR impact the potential for collective action? Our results indicate that participants with higher social capital were likely to suggest that the village would collectively act in response to a disaster such as a tiger-attack on a villager. This result was expected, since it is known that social capital acts as an enabling factor for collective action (Garcia-Amado et al. 2012). Prior to our household survey there had been a series of tiger-attacks, resulting in community-level mobilization. Such precedents for collective action are further known to create social capital and enable further actions (Nooteboom 2007).

Given the sensitivity of tiger populations to local community actions (Damania et al. 2003; Jalais 2005; Karanth et al. 2004), it will be important for CTR managers to actively address and resolve tiger-related issues in communities with high social capital and high capacities for collective action. More specifically it will be important to ensure that this potential for collective action is not targeted against the tiger, but utilized to support community actions such as upkeep of fences in the CTR landscape to prevent human-wildlife conflict, and better regulate tourism impacts. Local communities, being small-scale, often intimate and culturally homogenous are capable of generating collective action in support of conservation that may not be possible through governments and markets (Ballet et al.

2007). It could therefore be useful to establish multi-level partnerships between local communities, government and private sector interests in delivering successful tiger conservation outcomes (Kawanishi and Seidensticker 2010). Another potential utilization of social capital is in organization of tourism. Tourism in CTR shares many features of community common resources: non-excludability (members of the community being able to partake) and subtractability (a determinate number of tourists visiting the area). This makes tourism a locally available resource that can be conceptualized as a common pool resource (Moore and Rodger 2010). Like common pool resources elsewhere, tourism in CTR can potentially be managed by community-based institutions driven by social capital. We therefore need to foster the social capital of communities to devise effective institutions for management of tourism (Zeppel 2011; Plummer and Fennell 2009). Not only does this support more effective management, but it can also arrest the perverse ecological effects of tourism.

However, it is important to note that this cannot be a prescriptive solution. The social processes are difficult to pre-determine, and given the current levels of knowledge, the solutions will have to remain site-specific. In the current state, however, tourism in CTR remains an open resource, vulnerable to the tragedy of open-access. Further, it is also important to consider collective action in view of the economic inequities created by tourism in CTR, and the overall impacts on social capital. The literature presents mixed evidence regarding the effects of economic inequities on collective action (Ballet et al. 2007). It is suggested that if the interests of the elite coincide with common goals, collective action is easily achieved (Ballet et al. 2007). In this way, economic heterogeneity can promote collective action (Gaspart and Platteau 2007). However, inequities can also

weaken trust, as demonstrated through our data, and skew collective decision (Neupane 2003; Seabright 1993). Further, we did not distinguish between bonding social capital (ties within a defined socioeconomic group; may be based on family and kinship) and bridging social capital (economic and other ties external to the group, relying more on legal and formal institutions). With changes in the socio-economic composition of the village societies around CTR, it is possible that while bonding social capital may have decreased, bridging social capital may have risen. Bridging social capital is considered especially important for institutional arrangements where collective resources have to be managed under weak state control (Ballet et al. 2007). Yet a combination of both is required to deal with vulnerability, and to take advantage of new opportunities (Woolcock and Narayan 2000).

5.5. Conclusion

There are many governance models available for the management of natural resources: led by the government, the markets and communities. In the CTR landscape the PA is managed by the government, and tourism outside the PA boundaries is driven by market forces. However, to create effective multi-layered institutional governance for sustainable tiger conservation outcomes, the literature suggests the need to formally involve the local communities in decision-making. To enable this, CTR will need to utilize and build the social capital of the communities bordering its management area. The social capital can be instrumental in organizing community institutions to support CTR management, with the ultimate goal of addressing the ecological impacts created by tourism outside of the CTR jurisdiction.

Many authors have suggested the need for 'political will' and political support for successful tiger conservation. Indeed, one of the biggest challenges facing tiger conservation is "insufficient demand [among local communities affecting tiger conservation] for the survival of wild tigers" (Seidensticker 2010). To better address the socio-political challenges of tiger conservation, we need to look beyond disciplinary boundaries, and apply useful concepts such as social capital. Utilizing the concept of social capital, our study was able to highlight key areas for strategic intervention, for effective tiger conservation. Our study underlines the importance of equitable distribution of benefits, addressing indirect changes in community attributes, and the importance of targeting communities with high social capital. Incorporating such findings in policy and management strategies will help address the significant socio-political challenges facing tiger conservation initiatives. Upon applying the theories to multiple contexts and further advancements, such studies can provide management with specific ways in which the latent strength, resources and social capital of local communities will be an aide in conservation, rather than an ill-understood challenge.

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References

Adger WN (2003) Social Capital, Collective Action, and Adaptation to Climate Change. Economic Geography 79 (4):387-404. doi:10.1111/j.1944-8287.2003.tb00220.x

Adhikari KP, Goldey P (2010) Social Capital and its "Downside": The Impact on Sustainability of Induced Community-Based Organizations in Nepal. World Development 38 (2):184-194

Anon (2011) Noding establishment in and around Corbett National Park. Ministry of Tourism. http://tourism.gov.in/writereaddata/CMSPagePicture/file/marketresearch/New/Corbette_Report.pdf. Accessed October 25 2012

Ballet J, Sirven N, Requiers-Desjardins M (2007) Social Capital and Natural Resource Management: A Critical Perspective. The Journal of Environment & Development 16 (4):355-374. doi:10.1177/1070496507310740

Banerjee A (2012) Is wildlife tourism benefiting Indian protected areas? A survey. Current Issues in Tourism 15 (3):211-227. doi:10.1080/13683500.2011.599367

Bindra PS (2010) Report on impact of tourism on tigers and other wildlife in Corbett Tiger Reserve. Ministry of Tourism, New Delhi

Brondizio ES, Ostrom E, Young OR (2009) Connectivity and the governance of multilevel social-ecological systems: The role of social capital. Annual Review of Environment and Resources, vol 34.

Chhatre A, Saberwal V (2005) Political incentives for biodiversity conservation. Conserv Biol 19 (2):310-317

Damania R, Stringer R, Karanth K, Stith B (2003) The economics of protecting tiger populations: linking household behavior to poaching and prey depletion. Land Economics 79 (2):198-216

Garcia-Amado LR, Ruiz Pérez M, Iniesta-Arandia I, Dahringer G, Reyes F, Barrasa S (2012) Building ties: social capital network analysis of a forest community in a biosphere reserve in Chiapas, Mexico. Ecology and Society 17 (3). doi:10.5751/es-04855-170303

Gaspart F, Platteau J-P (2007) Heterogeneity and collective action for effort regulation: Lessons from the Senegalese small-scale fisheries. In: Baland JM, Bardhan P, Bowles S (eds) Inequality, cooperation and environmental sustainability. Russell Sage Foundation, New York, pp 159-204

Gratwicke B, Bennett EL, Broad S, Christie S, Dutton A, Gabriel G, Kirkpatrick C, Nowell K (2008) The world can't have wild tigers and eat them, too. Conserv Biol 22 (1):222-223

Greene WH (2000) Econometric analysis. 4th edn. Prentice Hall, Upper Saddle River, NJ

Greene WH, Hensher DA (2010) Modeling ordered choices : a primer. Cambridge University Press, Cambridge

Grootaert C, Narayan D, Woolcock M, Nyhan-Jones V (2003) Integrated Questionnaire for the Measurement of Social Capital (SC-IQ). The World Bank, Social Capital Thematic Group,

Harpham T, Grant E, Thomas E (2002) Measuring social capital within health surveys: key issues. Health Policy and Planning 17 (1):106-111. doi:10.1093/heapol/17.1.106

Isham J (2002) Can investments in social capital improve local development and environmental outcomes? In: Isham J, Kelly T, Ramaswamy S (eds) Social capital and economic development. Well-being in developing countries. Edward Edger, Cheltenham, UK, pp 89-107

Ishii K (2012) The impact of ethnic tourism on hill tribes in Thailand. Ann Touris Res 39 (1):290-310

Jalais A (2005) Dwelling on Morichjhanpi: When Tigers Became ‘Citizens’, Refugees ‘Tiger-Food’. Economic and Political Weekly 40 (17):1757-1762

Jones S (2005) Community-Based Ecotourism: The Significance of Social Capital. Ann Touris Res 32 (2):303-324

Karanth KK (2007) Making resettlement work: The case of India's Bhadra Wildlife Sanctuary. Biological Conservation 139 (3-4):315-324

Karanth KK, DeFries R, Srivathsa A, Sankaraman V (2012) Wildlife tourists in India’s emerging economy: potential for a conservation constituency? Oryx 46 (03):382-390

Karanth KK, Karanth KU (2012) A Tiger in the Drawing Room. Can Luxury Tourism Benefit Wildlife? Economic & Political Weekly XLVII (38):38-43

Karanth KU, Nichols JD, Kumar NS, Link WA, Hines JE (2004) Tigers and their prey: Predicting carnivore densities from prey abundance. Proceedings of the National Academy of Sciences of the United States of America 101 (14):4854-4858. doi:10.1073/pnas.0306210101

Kawanishi K, Seidensticker J (2010) Collaborations and Partnerships Are Essential to Sustain Wild Tiger Populations. In: Tilson R, Nyhus PJ (eds) TIGERS OF THE WORLD: The Science, Politics, and Conservation of *Panthera Tigris*. Second Edition edn. Academic Press, London, Burlington, San Diego, pp 175-184

Krishna A (2007) How Does Social Capital Grow? A Seven-Year Study of Villages in India. Journal of Politics 69 (4):941-956. doi:10.1111/j.1468-2508.2007.00600.x

Krishna A, Shrader E (2000) Cross-Cultural Measures of Social Capital: A Tool and Results from India and Panama. Social Capital Initiative Working Paper Series, vol 21. The World Bank

Lele S, Wilshusen P, Brockington D, Seidler R, Bawa K (2010) Beyond exclusion: alternative approaches to biodiversity conservation in the developing tropics. Current Opinion in Environmental Sustainability 2 (1-2):94-100

Lynch J, Due P, Muntaner C, Smith GD (2000) Social capital: Is it a good investment strategy for public health? Journal of Epidemiology and Community Health 54 (6):404-408. doi:10.1136/jech.54.6.404

Middleton B (2003) Ecology and Objective Based Management: Case Study of the Keoladeo National Park, Bharatpur, Rajasthan. In: Saberwal VK, Rangarajan M (eds) Battles over nature : science and the politics of conservation. Permanent Black, New Delhi, pp 86-117

Moore SA, Rodger K (2010) Wildlife tourism as a common pool resource issue: enabling conditions for sustainability governance. Journal of Sustainable Tourism 18 (7):831-844. doi:10.1080/09669582.2010.483281

Mukherjee A (2009) Conflict and Coexistence in a National Park. Economic and Political Weekly XLIV (23):52-59

Neupane H (2003) Contested impact of community forestry on equity: some evidences from Nepal. Journal of Forest and Livelihood 2 (2):56-61

Nooteboom B (2007) Social capital, institutions and trust. Review of Social Economy 65 (1):29-53

Park D-B, Lee K-W, Choi H-S, Yoon Y (2012) Factors influencing social capital in rural tourism communities in South Korea. Tourism Management 33 (6):1511-1520

Plummer R, Fennell DA (2009) Managing protected areas for sustainable tourism: prospects for adaptive co-management. Journal of Sustainable Tourism 17 (2):149-168. doi:10.1080/09669580802359301

Poder TG (2011) What is Really Social Capital? A Critical Review. American Sociologist 42 (4):341-367

Pretty J (2003) Social Capital and the Collective Management of Resources. Science 302 (5652):1912-1914. doi:10.1126/science.1090847

Pretty J, Smith D (2004) Social Capital in Biodiversity Conservation and Management. Conserv Biol 18 (3):631-638. doi:10.1111/j.1523-1739.2004.00126.x

Project Tiger (2005) Joining The Dots: The Report of the Tiger Task Force Union Ministry of Environment and Forests, Government of India, New Delhi

Putnam R (1993) The prosperous community: Social capital and public life. The American Prospect 13 (13):35-42

Rastogi A, Hickey GM, Badola R, Hussain SA (2012) Saving the Superstar: A review of the social factors affecting tiger conservation in India. Journal of Environmental Management 113:328-340. doi:10.1016/j.jenvman.2012.10.003

Sanderson EW, Forrest J, Loucks C, Ginsberg J, Dinerstein E, Seidensticker J, Leimgruber P, Songer M, Heydlauff A, O'Brien T, Bryja G, Klenzendorf S, Eric W (2010) Setting Priorities for Tiger Conservation: 2005-2015. In: Tilson R, Nyhus PJ (eds) TIGERS OF THE WORLD: The Science, Politics, and Conservation of *Panthera Tigris*. Second Edition edn. Academic Press, London, Burlington, San Diego, pp 143-173

Seabright P (1993) Managing Local Commons: Theoretical Issues in Incentive Design. The Journal of Economic Perspectives 7 (4):113-134

Seidensticker J (2010) Saving wild tigers: A case study in biodiversity loss and challenges to be met for recovery beyond 2010. Integrative Zoology 5 (4):285-299. doi:10.1111/j.1749-4877.2010.00214.x

Sobel J (2002) Can We Trust Social Capital? Journal of Economic Literature 40 (1):139-154

Walston J, Robinson JG, Bennett EL, Breitenmoser U, da Fonseca GAB, Goodrich J, Gumal M, Hunter L, Johnson A, Karanth KU, Leader-Williams N, MacKinnon K, Miquelle D, Pattanavibool A, Poole C, Rabinowitz A, Smith JLD, Stokes EJ, Stuart SN, Vongkhamheng C, Wibisono H (2010) Bringing the Tiger Back from the Brink--The Six Percent Solution. PLoS Biol 8 (9):e1000485. doi:10.1371/journal.pbio.1000485

Wells M, Brandon K, Hannah LJ (1993) People and parks: linking protected area management with local communities. World Bank: World Wildlife Fund: U.S.Agency for International Development, Washington, D.C.

Wikramanayake E, Dinerstein E, Seidensticker J, Lumpkin S, Pandav B, Shrestha M, Mishra H, Ballou J, Johnsingh AJT, Chestin I, Sunarto S, Thinley P, Thapa K, Jiang G, Elagupillay S, Kafley H, Pradhan NMB, Jigme K, Teak S, Cutter P, Aziz MA, Than U (2011) A landscape-based conservation strategy to double the wild tiger population. Conservation Letters 4 (3):219-227. doi:10.1111/j.1755-263X.2010.00162.x

Wilshusen PR, Brechin SR, Fortwangler CL, West PC (2002) Reinventing a Square Wheel: Critique of a Resurgent "Protection Paradigm" in International Biodiversity Conservation. Society & Natural Resources 15 (1):17-40

Woolcock M, Narayan D (2000) Social Capital: Implications for Development Theory, Research, and Policy. The World Bank Research Observer 15 (2):225-249. doi:10.1093/wbro/15.2.225

Zeppel H (2011) Collaborative governance for low-carbon tourism: climate change initiatives by Australian tourism agencies. Current Issues in Tourism 15 (7):603-626. doi:10.1080/13683500.2011.615913

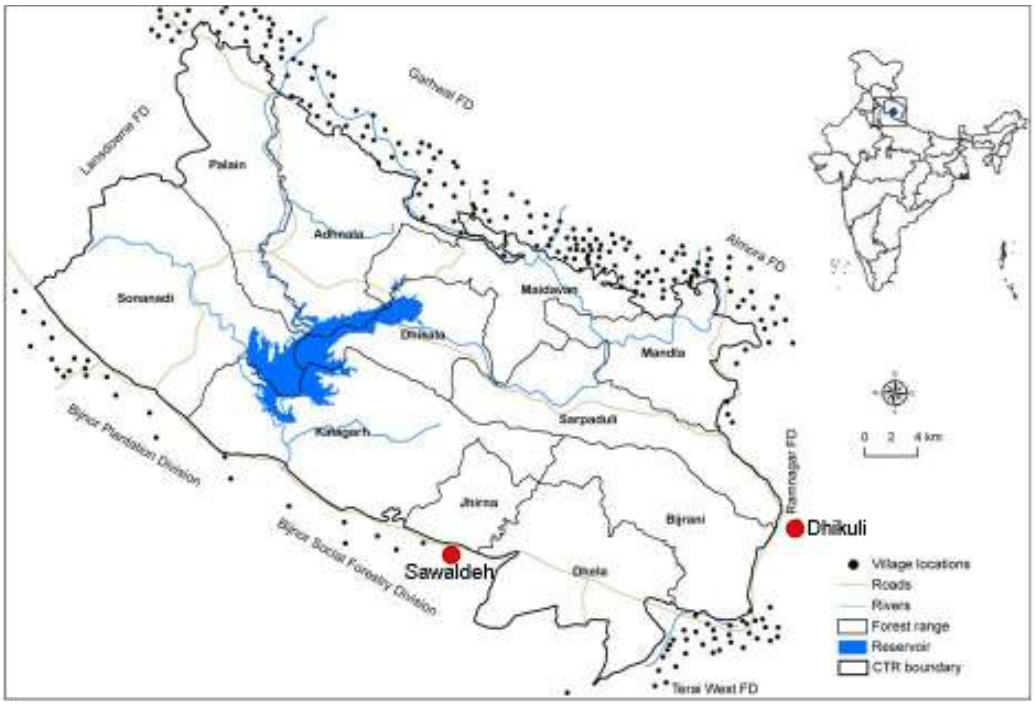

Figure 5-1 Map of Corbett Tiger Reserve, showing the boundaries, major rivers, roads and the locations of Dhikuli and Sawaldeh. Anwlakot, not seen on map, is 30 km east of the boundary.

Table 5-1 Socio-economic descriptions of three villages near Corbett Tiger Reserve, India.

		Dhikuli	**Sawaldeh**	**Anwlakot**
Block		Ramnagar	Ramnagar	Kotabag
District		Nainital	Nainital	Nainital
Distance from CTR boundary (km)		0	0	>10
Approximate number of household		500	700	800
Approximate total population (not including recent migrants)		1700	3000	4000
Major resident communities		Hindu (high caste, low caste), Muslim	Hindu (high caste, low caste), Muslim, Tribal	Hindu (high caste and low castes)
Approximate number of families per category of major occupation patterns (most households were reported to utilize a combination of livelihoods)	Agriculture	-	150	400
	Fishing	-	-	-
	Animal Husbandry	10	-	-
	Labour	100	550	250
	Cottage industry	50	-	-
	Govt. Employee	50	-	-
	Priv. Sector/ Business	-	-	150
	Any other	250 (hotel staff)	-	-
Approximate number of households for income categories	High Income	25	-	80
	Medium income	50	150	560
	low income	425	550	160

Table 5-2 General description of the respondents from three villages around Corbett Tiger Reserve.

Variable	Description	Mean	Std. Dev.	Min	Max
Age of the interviewee	1 – <18 years 2 – 18 to 25 years 3 – 25 to 40 years 4 – 40 to 60 years 5 – >60 years	3.29	0.99	1	5
Interviewee's educational status	1 – None 2 – Primary School 3 – X 4 – XII 5 – > XII	2.42	1.11	1	5
Number of individuals in the household	Household size (number of members)	5.29	1.99	1	12
House	1 – Thatched/ *Katcha* 2 – Metal roof 3 – Concrete	2.54	0.78	1	3
Primary Occupation	1 – Agriculture 2 – Government jobs 3 – Business 4 – Labour 5 – Others	2.62	1.62	1	5
Collect fuel wood or fodder from CTR	1 – No 2 – Only fuel wood 3 – Fuelwood and fodder	1.54	0.60	0	2

Table 5-3 Responses of participants regarding societal divisions in their respective villages. Participants were asked if their village was divided on the basis of different criteria, and their responses were recorded as low/ medium/ high divisions. Dhikuli was primarily divided on the basis of generations, financial status, land ownership, and social status. While Anwlakot was divided on the basis of education, all the villages recorded division on the basis of political differences.

		Dhikuli (%)	Anwlakot (%)	Sawaldeh (%)	Total (n=226)
Education	Low	94.9	76.7	97.3	203
	Medium	3.84	21.9	2.7	21
	High	1.3	1.4	0	2
New/Old Generations	Low	93.6	95.9	100	218
	Medium	5.1	4.1	0	7
	High	1.3	0	0	1
New/Old Settlers	Low	100	95.9	100	223
	Medium	0	2.7	0	2
	High	0	1.4	0	1
Political	Low	79.5	50.7	14.7	110
	Medium	19.2	34.2	56	82
	High	1.3	15.2	29.3	34
Religious	Low	98.7	98.6	100	224
	Medium	1.3	0	0	1
	High	0	1.4	0	1
Ethnic	Low	98.7	98.6	100	224
	Medium	1.3	1.4	0	2
	High	0	0	0	0
Financial	Low	85.9	98.6	100	214
	Medium	9.0	1.4	0	8
	High	5.1	0	0	4
Land Ownership	Low	88.5	98.6	97.3	214
	Medium	6.4	1.4	1.3	7
	High	5.1	0	1.3	5
Social Status	Low	96.1	95.9	100	220
	Medium	2.6	4.1	0	5
	High	1.3	0	0	1
Gender	Low	100	100	100	226
	Medium	0	0	0	0
	High	0	0	0	0

Table 5-4 Social Capital in three villages around Corbett Tiger Reserve also compared with mean of total perceived exclusion. Dhikuli has the highest social capital.

	Mean Structural Social Capital (Based on the weighted sum of answers to likert-scale questions; maximum score: 40)	**Mean Cognitive Social Capital** (Based on the weighted sum of answers to likert-scale questions; maximum score: 34)	**Mean total Social Capital** (Sum of structural and cognitive social capital)	**Mean total perceived exclusion** (Based on the weighted sum of answers to likert-scale questions; maximum score: 30; detailed analysis in Table 3)
Dhikuli	21.62	20.46	42.08	10.77
Anwlakot	21.16	18.85	40.01	11.11
Sawaldeh	22.92	18.24	41.16	11.21
Mean	21.90	19.20	41.11	11.03

Table 5-5 Analysis of variance for perceived increase in trust.

	Respondents reporting change in trust in last 10 years in their village (% participants of total in each village)		
	Increased	*Remained the same*	*Decreased*
Sawaldeh	0	16.0%	84.0%
Dhikuli	6.4%	24.4%	69.2%
Source	*SS*	*df*	*MS*
Between groups	1.59	2	0.79
Within groups	57.39	223	0.26
Total	58.99	225	0.26
	F-stat 3.09		

Table 5-6 Factorial ANOVA for social capital and perceived exclusions.

Dependent Variable: Total perceived Social Capital		
Variable	**Coefficient**	**Standard Error**
Perceived exclusion based on differences in:		
(a) Social status		
Medium	-2.08	3.65
High	5.74	8.13
(b) Landownership		
Medium	0.48	2.49
High	-0.50	3.78
(c) Financial status		
Medium	1.15	2.64
High	-1.85	4.28
(d) Ethnicity		
Medium	-7.15	5.95
(e) Religion		
Medium	16.39*	8.35
High	-4.01	5.91
(f) Political views		
Medium	0.14	0.96
High	-1.08	1.33
(g) Old and new settlers		
Medium	-3.32	4.36
High	-19.32***	7.07
(h) New and old generations		
Medium	-5.28*	2.93
High	13.84	9.01
(i) Education		
Medium	-6.04***	1.66
High	-15.57**	6.36
n= 223		
R-squared: 0.4146		
Adjusted R-squared: 0.2657		
F(45, 177) = 2.79		
*** = significant at 1%; ** = significant at 5%; * = significant at 10%		

Table 5-7 Results of maximum likelihood model (ordered logit) between social capital (dependent variable) and solidarity after a tiger-attack (independent variable).
The models are valid, indicating that social capital (structural, cognitive and total) are strong determinants of a participant's perception of how the village society reacts to tiger-attacks on livestock and humans.

Dependent Variable: Solidarity after tiger kill		
Variables	**Model 1**	**Model 2**
Total social capital	0.186*** (0.027)	
Structural social capital		0.246*** (0.047)
Cognitive social capital		0.099** (0.049)
	Log pseudolikelihood = -248.89 Wald chi2(20)= 111.33	Log pseudolikelihood = -246.58 Wald chi2(21)= 109.57
n= 226 Standard errors in parentheses *** = significant at 1%; ** = significant at 5%; * = significant at 10%		

Preface to Chapter 6

Having established the linkages between social capital of communities and their capacity to support/ oppose tiger conservation, Chapter 6 focuses on a village-level case study of the impacts associated with wildlife tourism on village solidarity – a fundamental component of social capital (Dudwick et al. 2006). I identify a number of conservation-related impacts resulting from the rapid and unplanned growth of wildlife tourism. A number of significant challenges are identified for the village community and the local village institutions, revealing the perverse socio-ecological impacts of unregulated tourism development. The majority of these impacts are occurring outside the jurisdiction of the reserve, and compromise the capacity of local communities to support tiger conservation objectives.

CHAPTER 6: WILDLIFE-TOURISM, LOCAL COMMUNITIES AND TIGER CONSERVATION: A VILLAGE-LEVEL STUDY IN CORBETT TIGER RESERVE, INDIA

Abstract

This paper presents the results of research conducted in a village on the south-eastern boundary of Corbett Tiger Reserve (CTR) which has experienced rapid and dramatic social-ecological change as a result of tiger-related tourism. Our aim was to better understand the impacts of wildlife tourism on village structure, solidarity and institutions and consider the implications of this for tiger conservation management and policy. Our results indicate that while wildlife tourism established linkages between the village society and the global economy, it negatively impacted the local community. It also created a new village entity, tourist resorts, which are neither an individual nor a village member, making dispute-resolution impossible under existing institutional structures. Based on our results, future policy and management strategies that focus on building social capital and strengthening local institutions will increase the adaptability and resilience of villages to tourism impacts and will likely reduce the significance of the associated ecological impacts.

6.1. Introduction

6.1.1. Corbett Tiger Reserve and Tourism

More than half the world's wild tiger populations are located on the Indian subcontinent (Chundawat et al. 2011), and 58-95% of this population live within India's 21 Tiger

Reserves (Ranganathan et al. 2008). Corbett Tiger Reserve (CTR) is one these reserves; it is among the oldest protected areas (PAs) in India, providing crucial habitat for international tiger conservation efforts (Jhala et al. 2011b; Jhala et al. 2008). CTR hosts approximately 214 (190-239) tigers from a national population of 1520-1909 (Khan, Kumar et al. 2008; Kumar, Khan et al. 2008; Jhala, Qureshi et al. 2011). Importantly, due to its excellent prey densities, CTR is one of only four reserves in India that offer the potential for long-term species survival without immigration (Kumar et al. 2008; Jhala et al. 2011a; Khan et al. 2008).

A critical threat facing tiger populations in India is reducing habitat connectivity. Based on two recent estimates, tiger occupancy from connecting habitats in India has decreased by 12.6% between 2006 and 2009-10 (Jhala et al. 2011b; Jhala et al. 2008). In CTR, habitat connectivity is seriously threatened by the recent growth of privately-managed tourism infrastructure around the park boundaries. According to a recent study (Bindra 2010), there were approximately 102 tourist resorts in various stages of operation around CTR in 2010. The majority of these tourist resorts (between 47- 65) were concentrated on the south-eastern boundary of CTR (Bindra 2010), where CTR forests connect with Ramnagar Forest Division, an administratively separate habitat unit with a contiguous tiger population (Contractor 2007; Jhala, Qureshi et al. 2011). The rapid and unplanned growth of infrastructure in the area has negatively impacted the ecological corridor between CTR-Ramnagar Forest Division (see, Figures 6-2, 6-3, 6-4), threatening to split a globally important tiger population (Jhala et al. 2011b). Data were not available to quantify the extent of this land-use change; however, the negative impacts on ecology have been reported by numerous authors (Anon 2011; Bindra 2010; Jhala et al. 2011b). Rapid urban

development is also considered a serious threat to the Terai Arc Landscape, a larger area targeted for biodiversity conservation (Dinerstein et al. 2006; Bindra 2010; Jhala et al. 2011b). According to a recent government report (Jhala et al. 2011b): "[u]rgent intervention is required to legally secure the remaining two corridors between Corbett and Ramnagar" (Jhala et al. 2011b; Ranganathan et al. 2008). However, the expanding tourism infrastructure is primarily built on privately-held lands in the villages of Dhikuli and Garjia located on the south-eastern boundary of CTR (see Figures 6-1 and 6-2).

Focusing on the rapid tiger-related tourism development occurring around CTR as a case study, this research aimed to inform PA management efforts to more effectively manage the negative impacts on tiger conservation in areas outside of their jurisdiction. More specifically it explored the societal dynamics of wildlife-related tourism in CTR to offer grounded insights of value to strategic conservation policy and planning processes in India.

6.1.2. Tourism in Tiger Reserves

Wildlife tourism has been identified as having the potential to address many conservation challenges associated with exclusively-managed PAs, such as Tiger Reserves by: providing opportunities for local communities to derive benefits rather than bearing the cost of conservation (Ghate 2003); offering employment that can provide alternatives to traditional livelihoods that are not deemed compatible with conservation efforts (Negi and Nautiyal 2003); creating local incentives for conservation and ecological maintenance (Jamal and Stronza 2009); and driving economic change and empowerment that can make local communities less-dependent on local natural resources (Billgren and Holmén 2008). Further, by allowing tourists into the PA, wildlife tourism could help create a global

constituency for conservation and mainstream biodiversity conservation (Karanth et al. 2012).

However, in practice, there are mixed reports on the utility of tourism to local tiger conservation efforts. Recent studies have suggested that tourism is neither necessary for tiger conservation, nor the main threat (Karanth and Karanth 2012; Post 2010). For example, Post (2010) did not find any statistically significant relationship between the presence of tourism and the success/ failure of a Tiger Reserve. Many successful Tiger Reserves are popular destinations for wildlife tourism (Project Tiger 2005; Banerjee 2012). Yet, tigers recently disappeared from PAs such as Sariska and Panna, which were also significant tourism destinations (Project Tiger 2005; Ali 2009).

Advantageously, local communities are reported to be generally supportive of wildlife tourism (Udaya Sekhar 2003; Karanth and Nepal 2011). However, recent studies have questioned whether any tourism-related benefits are really passed to local communities (Sandbrook 2010; Karanth and Nepal 2011). These studies suggest that local populations receive little employment from tourism in PAs, with one finding that tourism provided employment to less than 0.001% residents living within 10km of an Indian PA (Bajracharya et al. 2006; Banerjee 2012; Karanth and DeFries 2011). Further, tourism in Tiger Reserves often remains tiger-centric, detracting from other biodiversity values (Karanth et al. 2012; Karanth and DeFries 2011).

Recognizing these concerns, the Supreme Court of India briefly banned tourism in core areas of Tiger Reserves in 2012 until the notification of fresh guidelines were prepared by the responsible authority. This judgment resulted in a polarized discourse in conservation policy circles (Karanth and Karanth 2012). Significantly, while this debate was focused on

tourism within the boundaries of Tiger Reserves, cases such as CTR underline the significant ecological challenges created by tourism *outside* of the PA jurisdiction. In order to better design site-specific management interventions, we first need to more thoroughly understand the social impacts of wildlife tourism, and how those may be linked to ecological changes. In this paper we present the results of exploratory grounded theory-case study research conducted in a village on the south-eastern boundary of CTR which has experienced rapid and dramatic social-ecological change as a result of tiger tourism. Our aim was to better understand the impacts of tourism on village structure, solidarity and institutions and then consider the implications of these findings for tiger conservation management and policy.

6.2. Methods

In order to explore the social-ecological impacts of wildlife tourism in CTR, we utilized a combined grounded theory-case study research design (Glaser and Strauss 1967; Stoll-Kleemann 2001; Creswell 2009). Grounded theory involves the generation of substantive theory without testing a pre-conceived hypothesis (Glaser and Strauss 1967), providing a suitable framework for our exploratory research (Locke 2001). We also utilized case-study research for its suitability to studying contemporary phenomena not readily distinguishable from context using multiple sources of evidence (Creswell 2009; Yin 2009).

6.2.1. Dhikuli village, Corbett Tiger Reserve, India

Easy access by road/railways contributes to making CTR a prime destination for wildlife-tourism in India. CTR management strictly controls the tourist traffic inside the Tiger

Reserve through a system of advance-bookings. However, outside the CTR boundary the number and scale of tourist-resorts has grown rapidly without any clear central planning or controls. In particular, the village of Dhikuli has been dramatically affected by tourism-infrastructure over the past ten years (see Figure 6-1, 6-2). This village has about 500 households and a resident population of between 1,600 and 1,700. There is also a similar-sized transient population living in the village, employed as staff in various tourist-resorts and associated service industries. Prior to the introduction of tourism, the resident population was heterogeneous, comprised of various castes of predominantly Hindu and Muslim families. Historically, the major livelihoods were agriculture and livestock rearing, both now largely discontinued because of low land availability due to conversion to tourist-resorts (see Figure 6-2) and the threat of tiger-attacks on free-ranging livestock. The majority of the households in this village were categorized as 'poor', while about 25 families were categorized as 'high-income' by the Village Head. Further details are described in relevant sections below.

6.2.2. Data collection

We collected data between October 2010 and January 2011; and December 2011 to April 2012. Our principal sources of data were interviews, focus-group discussions and participant observation in their natural setting (Glaser and Strauss 1967; Yin 2009). We conducted 35 in-depth interviews with a purposive sample of Dhikuli villagers and other stakeholder groups around CTR to ensure representation of various demographic profiles (different castes, religious groups, livelihood patterns, age-groups, sexes, education levels and relationship to CTR). Further data were collected through six focus-group discussions

involving different stakeholder groups: non-government organizations (NGOs), tourists, villagers and tourism professionals (ranging from 3-10 participants per group). We followed a snowball sampling strategy by asking respondents to suggest further relevant participants (Wasserman and Faust 1994). We followed a semi-structured pattern for interviews and focus group discussions (in Hindi/ English) to give the participants an opportunity to speak freely and to allow for new issues to emerge during discussions (Huberman and Miles 2002). We regarded interview/ discussion data as "verbal reports", with inherent issues of bias, poor recall and poor articulation (Yin 2003). To overcome these issues and increase accuracy we considered other sources of data (Wasserman and Faust 1994): primarily participant-observation of interactions, for example between tourists-tourism professionals, and residents-tourism professionals. This allowed us to develop deeper insights on village dynamics, values and community structures (Nandhakumar and Jones 2002).

6.2.3. Data analysis

Interview and discussion data were fully transcribed and coded (Huberman and Miles 2002; Creswell 2009). We also utilized memo-writing as a key tool, using the software MaxQDA for our data-analysis (Glaser and Strauss 1967). Each relevant unit of data was assigned to tentative codes to describe the process and impact of wildlife tourism in CTR (Huberman and Miles 2002; Strauss and Corbin 1998). As more data were analyzed, the initial list of codes was amended to capture the emergent data. Simultaneously, these codes were placed into provisional categories and themes. As the analysis progressed, we followed the

constant comparison method (Glaser and Strauss 1967), eventually defining the properties of the categories and themes, and identifying their interrelationships.

6.2.4. Assumptions and limitations

This research was guided by the societal imperative of tiger conservation. This provided an assumption and an initial bias. The qualitative case-study is not directly generalizable to populations, rather to theory (Creswell 2009; Yin 2009). Therefore, while this study informs other contexts, the results remain specific to the site. Further, the researchers, although 'insiders' in the case study (stationed in the village; able to use the language), were also 'outsiders' (not traditional residents of the village; non-local; products of different societal conditioning), impacting data collection. We addressed the general limitations of qualitative research through the triangulated research design and replicable analytical procedures (Huberman and Miles 2002). To enhance reliability, we ensured verification of the transcripts with interview material, undertook explicit constant comparison to analyze the data, collected data from different sources for triangulation, conducted follow-ups with participants and key informants, used detailed descriptions, and specified inherent biases (Glaser and Strauss 1967; Huberman and Miles 2002; Merriam 2009). Internal validity was enhanced by utilizing multiple sources of evidence, establishing the chain of evidence, and reviewing the results with key informants.

6.3. Results

CTR and Ramnagar Forest Division lie on either side of the Kosi River, forming a contiguous ecosystem for tiger populations, and a significant component of the Terai Arc

Landscape (Jhala et al. 2011b). These two administrative units are separated by (west-to-east): Ramnagar-Ranikhet road, village Dhikuli and the Kosi River (see Figure 6-1). Dhikuli is oriented linearly between the river and the road on non-forestland (outside of CTR jurisdiction). In recent years, many tourist-resorts have been established in Dhikuli on lands bought from villagers by outside developers. This land use change is reported to have accelerated in the last 10-15 years, severely degrading the ecosystem connectivity between CTR and Ramnagar Forest Division (see Figures 6-2, 6-3, 6-4). Our analysis focuses on the social changes in the village community resulting from a dramatic expansion in tourist-resorts and other tourist-facilities in the village and considers the implications of this for tiger conservation management and policy.

Our respondents suggested that tourism had altered the geography of the village, with resorts now regarded as common village landmarks. An illustration was found in the village conversations, as villagers often shared rides in local three-wheeler taxis to commute to Ramnagar (the closest town, 7 km away). Before starting the trip from Ramnagar, the driver confirms the destinations of individual passengers to determine the fare. The destinations, however, were often names of resorts in increasing distance from Ramnagar. "*Infinity*", "*Hideaway*", "*CRVR*", were locally used names for specific resorts, and also acted as units of distance for local residents to describe the village and its geography.

Overall, the degree of change was summarized by a village elder, who observed: "*Dhikuli has become Italy*". For this resident, Dhikuli was no longer his homeland, with 'Italy' representing a foreign landscape, with an urban lifestyle, where the resident found himself alienated. This statement is a cogent reflection of the central issue, applicable to the four major themes that emerged from our data analysis.

6.3.1. An ally to conservation?

Many respondents reported the negative ecological impacts of tourist-resorts for conservation. Besides the direct transformation of the landscape from subsistence and small-holder agriculture to a more urban setting, the tourist-resorts were described as using harsh lights and loud sound-systems to entertain tourists within their premises. This was observed to negatively affect the wildlife, particularly the birds. Further, the blocking off of the ecological corridor was heavily criticized, captured by the following respondent:

> "*Does anyone agree that if there are 100 resorts within a 3km patch of land, where will the wildlife go? There is no difference between Delhi, Mumbai and Corbett*"
>
> —Respondent, nature guide.

Additionally, given the popularity of CTR as a tourist destination, respondents reported that tourism acted as a distraction for CTR management. When a government review panel visited the area, one of the members recalled having been a teacher to an incumbent manager of CTR. The member of the panel said: "*The director for tourism and field management should be different so that he* (the director of tourism) *can receive phone calls and the field manager can fully dedicate himself to management*."

The large investment in tourism was also criticized, with suggestions that tourists were not concerned for the ecology or the local cultural values, and that such tourists were promoted by resorts who were concerned with short-term monetary gains: "*They have no responsibility. Look at the litter* (in CTR). *They take guests* (tourists) *for night-safaris, and throw meat* (to attract tigers, and organize better sightings for tourists). *Won't the park be affected?* ", said another nature guide. Many nature guides and drivers also expressed

frustration with tourist groups who did not respect CTR, and were only 'thrill-seeking'. "*Ninety percent of them* (tourists) *are annoying. They want to see a tiger right at the gate... Many of them are regretful after coming here and say they won't come again…it is a headache for us*", stated a safari-driver. Another driver recalled, "*This morning I showed* (fresh tiger) *pugmarks, and he* (the tourist) *doubted and said that the pugmark is put there by the staff*".

6.3.2. Further societal stratification

It can be assumed that, like any other rural society, Dhikuli was previously stratified according to multiple criteria, likely including socio-economic status, education, and kinship. However, many participants alluded to additional axes of stratification in the village society, created by the recent and rapid growth of tourism.

a. *Economic Divide:* Land prices in the area were reported to have risen 100-200 percent in the last 10-15 years due to the intense growth of tourism. For landowners in the village, the value of land-assets had increased manifold over a relatively short period of few years (this was otherwise perceived to be a rare trend for rural landscapes). As a result, many residents had sold their lands and acquired large financial gains in a very short span of time. The sudden rise in the financial capital of only a few villagers increased the socio-economic disparity in the village. As a result, the residents often perceived a new class-divide. The issue was also cited by a manager of CTR who said: "*That Dhikuli is no longer a village. Now it is a jungle of resorts. You cannot call it a village from any angle. It is a village, because it is a village on government records. Disparity has increased a lot. On the same site, you*

have a 100-crore (crore= 10 million Indian Rupees) *resort, even 500-crore. And in its backyard there are* (poor households) *in which people work at night with kerosene lamps. This is very difficult*."

Although it was generally agreed that employment in tourist-resorts had become available, the local employment in tourist-resorts was not considered respectable. "*The salary is not high here. And the reason is that they* (the tourist-resorts) *misguide them* (the villagers) *by saying that you are local and don't need to spend more and if you go out of the village to look for work, you will have to spend more money*", said a member of a local NGO. This respondent also suggested that because village laborers often competed for employment, the wages remained low. Respondents also suggested that although employment had become available, it was at the cost of previous agriculture-based livelihoods.

Contributing another perspective, one respondent stated his support for tourism, "*People were exploited earlier, but they are not exploited any more because of the development. I am also educated, so I can pay my debts.*" However, this diversity of viewpoints was indicative of the divisions in the village society over tourism. For CTR management, this raised a challenge particularly because of the additional exposure of locals to visitors who were evidently from superior socio-economic backgrounds. Combined, this was reported to create the perception that "no-benefits" from CTR was equivalent to "bearing the costs of CTR". "*People start harboring a feeling of jealousy, such as "we protect this area, we face certain issues from it, and yet these people come in large cars, and they do these things, and they enjoy themselves", this creates a feeling of negativity*", a manager stated.

He further added, *"…Rich people come to the village. Their lifestyle directly dominates, as we have seen. With that…the villagers feel poor. If someone passes by me in a* (expensive car)*, then I will* (feel inferior about something cheaper)*. Otherwise, it is good enough for me 'til it is not compared to* (the expensive car)." This respondent suggested that this can reinforce the perceived costs of conservation. The direct interaction and exposure to urban elite, coupled with increase disparity of wealth could result in deep-rooted feelings of alienation.

b. *Cultural Divide:* The regular exposure of the rural society to urban elite tourists was described as leading to a loss of local cultural values. "*It is said that coyness is a woman's ornament* [vernacular idiom]*. But today they wear jeans and do everything in a different way*", said a villager referring to the change in women's way of dressing. A CTR manager recognized this challenge by saying, "(due to tourism), *there is increase in the presence of outsiders. So the local culture, local customs, local traditions, they are adversely affected. That is not visible. But this works very slowly*." Further, this urban lifestyle could only be afforded by the new elite of the village, those who benefitted by the rise in land values. This further intensified feeling of alienation among those not benefitting from tourism. A native of the village, working with a local NGO, suggested: "*The environment has become very bad by observing them* (the tourists and other non-residents involved with tourism)*. Earlier the villagers had their own way to live, now they have changed their living style like that of Delhi and Mumbai*". An employee of a tourist-resort said, "*The new generations have come under the influence of money and become spoilt. This new generation hasn't seen their parents work hard for the money, so they find it hard to*

cope with it. Once they get the money, they want to associate less and less with people who are not so rich."

In particular, it is important to highlight the strong overlap in the interests of the park management and local communities. Both groups described a preference for low-impact tourism, reduced modification of the local ecosystem, and greater alignment of tourist-activity with the village lifestyle. However, tourist-activity is concentrated on lands outside of CTR management's jurisdiction and not regulated by existing institutional arrangements. The scale and nature of the tourist-activity has exacerbated economic divisions in the village, impacting the village solidarity and institutions and reducing the capacity of the village to support CTR management in controlling the negative ecological impacts of tourism.

6.3.3. Loss of pre-existing solidarity

The increased disparity in wealth and socio-economic status was described as creating an impact on the pre-existing solidarity among the villagers. Since CTR was identified as the source of wealth, the beneficiaries and non-beneficiaries often found themselves divided. One village resident summarized: "*They* (tourism professionals) *have broken the local communities and whichever person they could bring under their influence, and they have done it. After this they have completely broken the Gram Sabha* (village committee)." For example, it was widely believed that the village elite and leaders (who were also believed to be direct/ indirect beneficiaries of tourism, often through land-ownership) were allies of the tourist-resorts. A resident, who was also involved in village-level politics, suggested: "*The Gram Pradhan* (village head) *gives the permission for any kind of construction* [implies

illegal construction for tourist-resorts]. *He doesn't say anything about illegal activities and land encroachment. He keeps quiet.*" When asked if the village leaders would favor the tourist-resorts over villagers, the respondent added, "*Yes, the Gram Pradhan rarely favors the villagers. Otherwise, these days everyone just wants money*." Another respondent succinctly summarized the perception by quoting the Hindi idiom "*jiski laathi uski bhains*" (literally, 'the one who wields the cane also owns the cattle'); implying that the elite controlled the society.

Our respondents reported increasing mutual distrust with inequitable rise in wealth. When asked if the village was divided on the basis of landholdings, a resident employed in a resort for maintenance, stated: "*Even brothers fight for land these days. The differentiation is not within society but within families*." Land, being of very high monetary value, had become a centre of conflict in the village. Many respondents implied that the high monetary value of land had led to family disputes for ownership. This respondent added, "*Corbett has given rise to money in the villages, and this has made people to look for benefits before they help each other*."

The divide was particularly manifested during conflict involving an aspect of CTR or tourism, which tended to cleave the village society. For example, many participants referred to recent incidents where tigers attacked or charged at humans in the forests adjoining the village. It was perceived that the privately-run elephant safaris into the forests had familiarized the tigers with humans, making them fearless of humans and increasing attacks on humans. The village society approached CTR management to request intervention, who, in turn asked the village to make a collective decision on elephant safaris. The village society was initially divided, and it was ultimately decided to ban the

safaris. "*They decided that even if a resident does not benefit from tourism, they should not be at a loss either*", said a manager at CTR. The decision polarized the village into beneficiaries/ non beneficiaries.

The polarization of village society into beneficiaries and non-beneficiaries of tourism was corroborated by many participants. A resident member of an NGO recalled, "*I even saw the same opposition in my family. Those who were against tourism were also against* [a particular issue]. *But the one who was in favor of tourism, favored* [the issue]. *Regular discussions were held at our home."* This divide also became particularly evident, for example, when the villagers organized a protest after a tiger-attack on a resident, and the beneficiaries were asked to participate. "*They supported but they were looking for their own profit. They were not asked to come and sit in the protest. They were coming and asking the other villagers not to block the road*", alleged a non-beneficiary respondent.

Interestingly, Dhikuli had a regional reputation of being a 'model' village, where religious heterogeneity and other issues did not allow the village to be strongly divided. A respondent in another village, 30 km away, stated: "*One could not find such a village!*" Indeed, a respondent in Dhikuli said that the formal relations did still exist, "*Villagers do exchange invitations and visit each other for ceremonies*". However, in stating this, the respondent implied the slow decay in village societal structure. This decay in societal structure and village institutions compromised the capacity of the community to assist with managing the negative ecological impacts associated with village life. In contrast, a strong and cohesive village may have been able to work with CTR management to avoid or mitigate negative tourism impacts on the local social-ecological system.

6.3.4. Village institutions in flux

The rapid growth of tourism within a rural landscape presented major challenges for the village institutions. The day-to-day activities of the resorts have the potential to come into conflict with everyday village and CTR management activities, for example, by using loud lights and music for entertainment. In cases of conflict, the formal/informal village institutions did not have mechanism in place for conflict-resolution. As a result, the outcome of the subsequent negotiation depended largely on the power and status of the involved parties. This flux in local institutions can be illustrated through recent challenges:

6.3.4.9. Increasing pre-existing pressures on local resources

The village head reported that the resident population of the village was 1,600-1,700. However, at any time, nearly equal numbers of people lived in the village as staff of tourist-resorts. Combined with a fluctuating population of tourists, this extra population was perceived to add pressures to the village resources such as roads and water. A politically active member of the village stated, "*Earlier water was freely available everywhere…but now the connections are increasing and resorts are also using this water…Why did they give connections to the resorts when they* [resorts] *could use their own tube wells?*" The respondent further added, "[resort-owners] *should also open new schools because their children are also going to school. Now there are more students than available seats* [at the school]."

Another common issue raised by the villagers was access and traffic on the village roads. A village resident stated: "…*So, many accidents have taken place here. So, when there are 4-5 buses* [indicating high number of tourists in one resort]*, he*

[owner of the resort] *hires cars for them… So, he runs them constantly, picking them up and dropping them. So, they have made it a hub for traffic. Now, we have our families and young children, and the vehicles are running continuously. Now, there are chances of accidents. Young children don't know about vehicles. So, who is responsible for that?*" In particular, residents often stated that the village roads were not designed for tourist traffic. Also, roads and adjacent spaces often served as locations for everyday social interactions, which were reportedly impacted because of construction activities and tourist traffic.

6.3.4.10. Creating additional pressures

In addition to increasing pressures on resources, tourism was also reported to create additional pressures on the village society and institutions:

a) Immigrant labor: Many participants suggested that the immigrant labor had created new issues of class, petty crime, and general disorder. The laborers belonged to a particular region of India, and were ethnically distinguishable by the respondents. Further, a resident of the village stated "*It is so dirty here, these people throw plastic, garbage here. They are also perfect with theft. They can pick up small items from homes"*.

b) Sound and light: When asked whether they approved or disapproved of tourism, the majority of respondents stated that they were disturbed by the sounds and light used by the tourist-resorts. This referred to outdoor parties and music used to entertain guests within the premises of the resorts. "*They are not resorts any more* [for wildlife tourists]. *They have become banquet halls and wedding halls. People only*

come here for weddings and parties. They make noise and music is played all night, and coloured lights disturb the animals", said a participant. A resident, who worked as a Nature Guide in CTR, said, *"*... [The music] *was played at 3 AM at night. It was so loud that I couldn't sleep. I called every guide at 3 AM at night. I asked them "you used to say that you live in a good area then listen to this music on my mobile* [the loud music would be audible through a phone]. *You people are sleeping at your homes and my child is sick and my family couldn't sleep. You think that tourism should be protected here, and I say that it should not be protected!"* This is an issue known to disturb wildlife (Bindra 2010; Jhala et al. 2011b) (refer, section 1.1). Another resident stated that the general nature of life in the village had been affected: "*The problem is that if I am living at my home peacefully and my neighbour has rented his house* [to staff of resorts] *and the person is coming in on unusual timings, as his job may get over by 10-12 PM, it creates a disturbance. It creates a burden on everything.*"

c. New nature of conflict: The intensification of existing pressure and the addition of new pressures often created situations of conflict without precedents of a resolution-mechanism. For example, access to roads was reported to create conflicts. A resident gave an example, "*When this resort was built, it had no road...* [The resort utilized a village road]*...you cannot use the road commercially. So it was a natural thing that when the resort was getting constructed, the villagers allowed them to carry their material. Now* [after the resort is functional] *a person from Delhi comes at a speed of 70 (kmph) and the children are playing outside. Now what will happen? The villagers should definitely oppose this.*" He recalled another incident

of conflict with a resort over traffic, where *"*[a fellow Dhikuli-resident] *asked them not to build the road or to give him 10 feet of land for raising a wall of 4 feet so that his children should not come outside and there should be no accident. Was his demand wrong? But he was refused. Then he told them that if it was not his land, then the land did not belong to them either. It belongs to everyone.*"

Another resident recalled a particular conflict where the villagers blocked access for tourist traffic on a village-road: "*They said how you can jam a road? Then I replied that it is our right. We are the villagers and we want this. He* [Village Head] *started talking about taxes. I said that this is not the highway. You pay tax to use the highway, but this is the road of the Village Committee, which is paying you and not paying us* [implying corruption by the Village Head]*."* The issue of access to roads often became contentious, involving viewpoints regarding villager-rights. One participant recalled that the Village Head supported the tourist-resort, because they were a legitimate owner of land within the village, and with right to access. The participant reported his own reaction, "*We replied that he has bought the land but not the road. He has bought his land and he can do anything on his land. He better brings a helicopter for tourists or makes a ropeway or trolley system here; we have no problem with that. But we will not allow any vehicle to move on our road*."

Most participants did not believe a solution was possible. A participant stated, "*But most hotel owners are money oriented. No matter what you say to them...he wants business because he has invested and he wants money. Till you don't bring in a law, he will not stop…Even they are aware* [of ecological changes, and village issues] *but they want money, so they will not stop.*"

Together, tourism was reported as having increased some of the existing pressures and created some fresh challenges for the village institutions, without precedents or mechanisms for resolving conflict. The village now included numerous tourist-resorts, which were owned and managed by outsiders, with local employees. Such resorts were not individual members of the village community, and therefore, not subject to existing formal and informal village institutions. Such interactions have been identified as having profound effects on local institutions (Grzymala-Busse 2010), creating a state of flux resulting in overall modifications and social learning (Cundill and Rodela 2012).

6.4. Discussion

Through this exploratory study, we were able to identify some of the key patterns in which rapid growth of tourism affected a village community in the CTR landscape. Rapid and significant growth of tourism within the village created several challenges for the village society and the ecosystem. These findings have important implications for the policy and science of conservation and PA management.

6.4.1. Tourism for conservation?

Many respondents suggested that the management of CTR concentrated too much on tourism. This was ironic because a) tourism had given rise to uncontrolled urbanization severely impacting the ecology; b) many tourists did not appear satisfied with their experience; and c) CTR was said to attract tourists not entirely interested in the ecosystem (Banerjee 2012). This also corresponds with other studies which suggest that tiger-centric tourism detracts from other biodiversity values (Karanth et al. 2012).

The general ecological decline of the area described by respondents corresponds with the Tourism Area Life Cycle (TALC) (Butler (1980), where a tourist area typically follows a cycle of development, finally ending in either decline or rejuvenation, depending on the carrying capacity. Subsequently Butler (2010) suggested that for tourism practices to conform to sustainable development practices, it is critical to have clear controls and common direction or goal and control mechanisms. In CTR, although the tourism traffic within the PA was restricted, there were no regulations on the growth of tourism outside the PA boundaries. The unregulated growth led to a situation of open-access (subject to financial capital), around a global common (the PA), leading CTR towards a phase of decline (following the TALC framework).

Studies have suggested that individual gains from exploiting shared resources in tourism are generally preferred over the long-term shared losses (Dodds and Butler 2010). Individual owners of resorts in CTR did not have motivations for long-term protection, or for sustainable tourism (Dodds and Butler 2010). To prevent further degradation of the ecosystem, it will be necessary to develop mechanisms that engage resort owners in the long-term future of tourism in CTR. However, it is also evident that while owners of tourist resorts may have the financial capital to bear the downfall of the tourism-value of the area, local residents may not.

Interestingly, the literature indicates that the local attitude towards tourism transforms from initial euphoria, to apathy, annoyance and finally antagonism (Andriotis 2006). In our case study, we found that the initial euphoric attitude had concluded, and the current attitudes ranged from apathetic to antagonistic. Our results further provide empirical evidence on how wildlife tourism can affect village residents in rural landscapes. Importantly, in this

regard, CTR management and village residents were revealed as having shared preferences for low-impact tourism, which didn't compromise the ecology of the landscape.

6.4.2. New divisions in village society

Rapid economic developments, in general, are known to challenge traditional institutions (Jegadeesan and Koichi 2011) and favor the elite (Brohman 1996). In Dhikuli, the recent rise in the value of land had resulted in the relatively abrupt acquisition of wealth by a few land-holding residents of the village. As a result, the previous differences in socio-economic status were amplified, increasing disparity within the village. In addition, there was increased exposure to urban-elite tourists, and a general transformation of the rural landscape to resemble a more urban morphology (Andriotis 2006). This further intensified the perception of disparity. Appropriation of benefits by outsiders, and inequity in distribution of employment and benefits have also been reported by other studies (Walpole and Goodwin 2000). In comparable contexts, these studies have found that when tourism leads to inequitable wealth accumulation, it can impact traditional patriarchal social systems (by directing income generation towards younger residents) (Ishii 2012), change the morphology of the village spaces (Andriotis 2006), increase economic marginalization, class division and social tensions (Cohen 2001), affect the informal economy and even displace the marginalized groups (Hampton 2005). Our findings support these observations. In Dhikuli, tourism created another axis of stratification within the village society: 'involvement with CTR'. Such undesirable social consequences of tourism are counter-productive to objectives of sustainable conservation management (Ghate 2003; Borrini-Feyerabend et al. 2004).

6.4.3. Loss of pre-existing solidarity

Fafchamps (1992) suggested that many rural communities in developing countries have solidarity mechanisms in place, such as punishing opportunistic behavior and rewarding cooperative behavior, for example, to reinforce ethical values, ensure insurance-mechanisms, and encourage reciprocity (Fafchamps 1992). Our respondents suggested that such mechanisms were declining in the village society in Dhikuli. Our results indicate a loss of solidarity due to excessive distrust and alienation on account of the disparity in socio-economic status. Such inequitable acquisition of wealth may erode inherent social systems (Platteau 2006), for example, by undermining the incentives to rely on the village social networks, or to stay invested in the village governance mechanisms. In Dhikuli, the village society was undergoing transformation from a rural, network-dependent, organic society, to a more polarized and cleaved society. Rapid change has created alienation among residents who did not benefit directly from tourism, and therefore created a stakeholder group that is non-supportive, or even antagonistic to tiger conservation (Andriotis 2006). This is a highly undesirable effect of wildlife tourism for sustainable development and conservation in CTR. The recent literature and conservation policies have strongly emphasized the need to develop meaningful partnerships with local communities, to increase general support for conservation and increase management efficiency (Jamal and Stronza 2009; Kawanishi and Seidensticker 2010). While tiger researchers have stressed on 'political will' as crucial to protecting the tiger, this objective is being heavily undermined by local antagonism created by wildlife tourism (Dinerstein et al. 2006; Chhatre and Saberwal 2005; Rastogi et al. 2012).

The creation of a local feeling of alienation also counters some of the recent collaborative efforts made by CTR management. In previous years, CTR management had actively established local linkages, primarily by offering employment to many local residents, intended to generate local support for ecological management. However, this effort was undermined when a a number of local stakeholders became unsupportive of tourism and CTR.

6.4.4. Policy challenges and implications

In CTR, wildlife tourism has had two simultaneous impacts: (a) direct ecological impacts and, (b) social impacts which weakened the institutional capacity to deal with (a). The social impact may be even more serious for tiger conservation management and policy than the ecological impacts, being near-irreversible, poorly understood and difficult to resolve. Tourism has discernibly affected community solidarity - a crucial component of social capital (Dudwick et al. 2006) - and subsequently impacted the ability of the village to initiate collective action to more sustainably govern common resources and participate in conservation (see (Moore and Rodger 2010; Mishra et al. 2009)). In the context of CTR, innovative community-driven institutions designed to regulate tourism could have potentially mitigated some of the negative ecological impacts being experienced *outside* PA boundaries. Contrarily, the existing model of tourism development has weakened social structures (Figure 6-5), affected the solidarity, reduced social capital and eroded the adaptive capacity of village institutions (Folke 2006; Jones 2005; Adger 2006; Smit and Wandel 2006).

Based on our results, future conservation and land use policy and management strategies that focus on building social capital and strengthening local institutions will likely increase the adaptability and resilience of villages to the potential negative impacts of wildlife tourism and reduce the significance of ecological impacts. PA management and policy could also improve outcomes by actively de-emphasizing the monetary functions associated with conservation, and creating larger stakes in other, equally-important ecological services (Badola et al. 2010b). This would increase the likelihood of equitable benefit-sharing, minimize the alienation of perceived non-beneficiaries, and create a stronger conservation support group.

Researchers have recently recommended other models of tourism in India's Tiger Reserves, involving the conversion of nearby private lands to tiger habitat before being available for tourism (Karanth and Karanth 2012). Our results suggest that implementing such models will benefit from careful social impact assessment and controlled pre-testing to increase the likelihood of success.

6.5. Conclusion

This study has identified a number of negative impacts associated with the unmanaged introduction of wildlife tourism in CTR, with particular implications for village institutions and land use change. More specifically, our results indicate that while tourism established linkages between the village society and the global economy, it has negatively impacted the residents, the societal structure, and the institutions. It also created a new village entity, tourist resorts, which are neither an individual nor a village member, making dispute-resolution impossible to manage under existing formal and informal institutional structures.

Greater focus by CTR to develop and support more adaptive community-based institutions may have improved the outcomes of wildlife tourism for local communities and ecosystems. However, this option is likely no longer available in Dhikuli, as many of our respondents did not distinguish between the conservation and tourism functions of CTR, and expressed strong antagonism against both. There is, however the opportunity to learn valuable lessons from how wildlife tourism evolved and has impacted the social-ecological system in Dhikuli with a view to ensuring that such negative impacts can be avoided or mitigated in future developments.

Many practitioners and conservation biologists have argued for creating an economic incentive for communities in conservation. However, our study suggests that we need a more cautious approach to exposing village societies to the external pressures of the formal market economy. An unplanned and insensitive process has the potential to negatively affect the village, and polarize potentially supportive stakeholders against conservation objectives. A manager of CTR underlined the challenge by stating, "*Not just village institutions, no institutions yet have the force that they can run these things with community participation.* [There is no model] *where communities too feel proud of themselves, where they have a sense of ownership that "within our village we have such an ecotourism destination within our village", one that they call their own or that feels like their own. We have not been able to develop such a thing anywhere yet*." This indicates the need to establish wider linkages between conservation and communities to frame more effective management responses to the complex social-ecological challenges facing successful tiger conservation.

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References

Adger WN (2006) Vulnerability. Global Environmental Change 16 (3):268-281

Ali FM (2009) Indian tiger park 'has no tigers' BBC News. http://news.bbc.co.uk/2/hi/south_asia/8150382.stm. Accessed August 18 2009

Andriotis K (2006) Hosts, guests and politics: Coastal Resorts Morphological Change. Ann Touris Res 33 (4):1079-1098

Anon (2011) Noding establishment in and around Corbett National Park. Ministry of Tourism. http://tourism.gov.in/writereaddata/CMSPagePicture/file/marketresearch/New/Corbette_Report.pdf. Accessed October 25 2012

Badola R, Hussain SA, Mishra B, Konthoujam B, Thapliyal S, Dhakate P (2010) An assessment of ecosystem services of Corbett Tiger Reserve, India. The Environmentalist 30 (4):320-329. doi:10.1007/s10669-010-9278-5

Bajracharya SB, Furley PA, Newton AC, Hawksworth DL, Bull AT (2006) Impacts of community-based conservation on local communities in the Annapurna Conservation Area, Nepal. Biodiversity and Conservation 3 (15):425-446. doi:10.1007/978-1-4020-5283-5_24

Banerjee A (2012) Is wildlife tourism benefiting Indian protected areas? A survey. Current Issues in Tourism 15 (3):211-227. doi:10.1080/13683500.2011.599367

Billgren C, Holmén H (2008) Approaching reality: Comparing stakeholder analysis and cultural theory in the context of natural resource management. Land Use Policy 25 (4):550-562

Bindra PS (2010) Report on impact of tourism on tigers and other wildlife in Corbett Tiger Reserve. Ministry of Tourism, New Delhi

Borrini-Feyerabend G, Kothari A, Oviedo G, IUCN World Commission on Protected Areas., University College Cardiff. (2004) Indigenous and local communities and protected areas : towards equity and enhanced conservation : guidance on policy and practice for co-managed protected areas and community conserved areas. Best

practice protected area guidelines series, vol no 11. IUCN--the World Conservation Union, Gland, Switzerland ; Cambridge

Brohman J (1996) New directions in tourism for third world development. Ann Touris Res 23 (1):48-70

Butler R (2010) Sustainability or Stagnation? Limits on development in tourist destinations. European Journal of Tourism, Hospitality and Recreation 1 (1):10-23

Butler RW (1980) The Concept of a Tourist Area Cycle of Evolution: Implications for Management of Resources. Canadian Geographer / Le Géographe canadien 24 (1):5-12. doi:10.1111/j.1541-0064.1980.tb00970.x

Chhatre A, Saberwal V (2005) Political incentives for biodiversity conservation. Conserv Biol 19 (2):310-317

Chundawat RS, Habib B, Karanth U, Kawanishi K, Ahmad Khan J, Lynam T, Miquelle D, Nyhus P, Sunarto S, Tilson R, Wang S (2011) Panthera tigris. www.iucnredlist.org. Accessed 04 July 2012

Cohen JH (2001) Textile, tourism and community development. Ann Touris Res 28 (2):378-398

Creswell JW (2009) Research design : qualitative, quantitative, and mixed methods approaches. Sage Publications, Thousand Oaks

Cundill G, Rodela R (2012) A review of assertions about the processes and outcomes of social learning in natural resource management. Journal of environmental management 113:7-14

Dinerstein E, Loucks C, Heydlauff A, Wikramanayake E, Bryja G, Forrest J, Ginsberg J, Klenzendorf S, Leimgruber P, O'Brien T, Sanderson E, Seidensticker J, Songer M (2006) Setting Priorities for the Conservation and Recovery of Wild Tigers: 2005-2015. A User's Guide. WWF, WCS, Smithsonian and NFWF-STF, Washington, D.C. - New York

Dodds R, Butler R (2010) Barriers to Implementing Sustainable Tourism Policy in Mass Tourism Destinations Tourismos: An International Multidisciplinary Journal Of Tourism 5 (1):35-53

Dudwick N, Kuehnast K, Jones VN, Woolcock M (2006) Analyzing Social Capital in Context: A Guide to Using Qualitative Methods and Data. vol Stock No. 37260. World Bank Institute, Washington, D. C.

Fafchamps M (1992) Solidarity networks in preindustrial societies: rational peasants with a moral economy. Economic Development & Cultural Change 41 (1):147-174

Folke C (2006) Resilience: The emergence of a perspective for socialâ€“ecological systems analyses. Global Environmental Change 16 (3):253-267

Ghate R (2003) Global gains at local costs: Imposing protected areas: evidence from central India. International Journal for Sustainable Development & World Ecology 10 (4):377-389

Glaser BG, Strauss AL (1967) The discovery of grounded theory: strategies for qualitative research. Aldine Pub. Co., Chicago

Grzymala-Busse A (2010) The Best Laid Plans: The Impact of Informal Rules on Formal Institutions in Transitional Regimes. Studies in Comparative International Development 45 (3):311-333. doi:10.1007/s12116-010-9071-y

Hampton MP (2005) Heritage, local communities and economic development. Ann Touris Res 32 (3):735-759

Huberman AM, Miles MB (2002) The qualitative researcher's companion. Sage Publications, Thousand Oaks, CA

Ishii K (2012) The impact of ethnic tourism on hill tribes in Thailand. Ann Touris Res 39 (1):290-310

Jamal T, Stronza A (2009) Collaboration theory and tourism practice in protected areas: stakeholders, structuring and sustainability. Journal of Sustainable Tourism 17 (2):169-189

Jegadeesan M, Koichi F (2011) Deterioration of the Informal Tank Institution in Tamil Nadu: Caste-based Rural Society and Rapid Economic Development in India. Southeast Asian Studies 49 (1):93-123

Jhala YV, Gopal R, Qureshi Q (eds) (2008) Status of Tigers, Co-predators and Prey in India. National Tiger Conservation Authority, Ministry of Environment and Forests, Government of India and the Wildlife Institute of India, Dehradun,

Jhala YV, Qureshi Q, Gopal R (2011a) Counting India's Wild Tigers Reliably: A Response. Science

Jhala YV, Qureshi Q, Gopal R, Sinha PR (eds) (2011b) Status of the Tigers, Co-predators, and Prey in India, 2010. National Tiger Conservation Authority, Govt. of India, New Delhi, and Wildlife Institute of India, Dehradun,

Jones S (2005) Community-Based Ecotourism: The Significance of Social Capital. Ann Touris Res 32 (2):303-324

Karanth K, Nepal S (2011) Local Residents Perception of Benefits and Losses From Protected Areas in India and Nepal. Environmental Management 49 (2):372-386. doi:10.1007/s00267-011-9778-1

Karanth KK, DeFries R (2011) Nature-based tourism in Indian protected areas: New challenges for park management. Conservation Letters 4 (2):137-149. doi:10.1111/j.1755-263X.2010.00154.x

Karanth KK, DeFries R, Srivathsa A, Sankaraman V (2012) Wildlife tourists in India's emerging economy: potential for a conservation constituency? Oryx 46 (03):382-390

Karanth KK, Karanth KU (2012) A Tiger in the Drawing Room. Can Luxury Tourism Benefit Wildlife? Economic & Political Weekly XLVII (38):38-43

Kawanishi K, Seidensticker J (2010) Collaborations and Partnerships Are Essential to Sustain Wild Tiger Populations. In: Tilson R, Nyhus PJ (eds) TIGERS OF THE WORLD: The Science, Politics, and Conservation of Panthera Tigris. Second Edition edn. Academic Press, London, Burlington, San Diego, pp 175-184

Khan JA, Kumar S, Khan A, Musavi A, Malik PK, Kushwaha SPS, Khati DS, Sarin GD (2008) An ecological study in the buffer zone of the Corbett Tiger Reserve: Prey abundance and habitat conditions. International Journal of Ecology and Environmental Sciences 34 (2):121-131

Kumar S, Khan JA, Khan A, Musavi A, Malik PK, Kushwaha SPS, Khati DS, Sarin GD (2008) An ecological study in the buffer zone of the Corbett Tiger Reserve: Tiger abundance and cattle depredation. International Journal of Ecology and Environmental Sciences 34 (2):133-140

Locke K (2001) Grounded Theory in Management Research. Sage Series in Management Research. Sage Publications Ltd., London, Thousand Oaks, New Delhi

Merriam SB (2009) Qualitative research : a guide to design and implementation. The Jossey-Bass higher and adult education series. Jossey-Bass, San Francisco

Mishra B, Badola R, Bhardwaj AK (2009) Social issues and concerns in biodiversity conservation: experiences from wildlife protected areas in India. Tropical Ecology 50 (1):147-161

Moore SA, Rodger K (2010) Wildlife tourism as a common pool resource issue: enabling conditions for sustainability governance. Journal of Sustainable Tourism 18 (7):831-844. doi:10.1080/09669582.2010.483281

Nandhakumar J, Jones M (2002) Development gain? Participant observation in interpretive management information systems research. In: Qualitative Research, vol 2. vol 3. Sage Publications, London, Thousand Oaks, New Delhi, pp 323-341

Negi CS, Nautiyal S (2003) Indigenous peoples, biological diversity and protected area management -- policy framework towards resolving conflicts. International Journal of Sustainable Development and Wold Ecology 10:169-179

Platteau J-P (2006) Solidarity Norms and Institutions in Village Societies: Static and Dynamic Considerations. In: Serge-Christophe K, Jean Mercier Y (eds) Handbook of the Economics of Giving, Altruism and Reciprocity, vol Volume 1. Elsevier, pp 819-886

Post G (2010) Evaluation of Tiger Conservation in India: the use of comparative effectiveness research. Duke University,

Project Tiger (2005) Joining The Dots: The Report of the Tiger Task Force Union Ministry of Environment and Forests, Government of India, New Delhi

Ranganathan J, Chan KMA, Karanth KU, Smith JLD (2008) Where can tigers persist in the future? A landscape-scale, density-based population model for the Indian subcontinent. Biological Conservation 141 (1):67-77

Rastogi A, Hickey GM, Badola R, Hussain SA (2012) Saving the Superstar: A review of the social factors affecting tiger conservation in India. Journal of Environmental Management 113:328-340. doi:10.1016/j.jenvman.2012.10.003

Sandbrook CG (2010) Local economic impact of different forms of nature-based tourism. Conservation Letters 3 (1):21-28. doi:10.1111/j.1755-263X.2009.00085.x

Smit B, Wandel J (2006) Adaptation, adaptive capacity and vulnerability. Global Environmental Change 16 (3):282-292

Stoll-Kleemann S (2001) Barriers to nature conservation in Germany: A model explaining opposition to protected areas. Journal of Environmental Psychology 21 (4):369-385

Strauss AL, Corbin JM (1998) Basics of qualitative research : techniques and procedures for developing grounded theory. 2nd edn. Sage Publications, Thousand Oaks

Udaya Sekhar N (2003) Local people's attitudes towards conservation and wildlife tourism around Sariska Tiger Reserve, India. Journal of environmental management 69 (4):339-347

Walpole MJ, Goodwin HJ (2000) Local economic impacts of dragon tourism in Indonesia. Ann Touris Res 27 (3):559-576

Wasserman S, Faust K (1994) Social network analysis: Methods and applications. Cambridge University Press, Cambridge, New York

Yin RK (2003) Case study research : design and methods. Applied social research methods series, v. 5. Sage Publications, Thousand Oaks, Calif.

Yin RK (2009) Case study research: design and methods. 4th edn. Sage Publications, Los Angeles

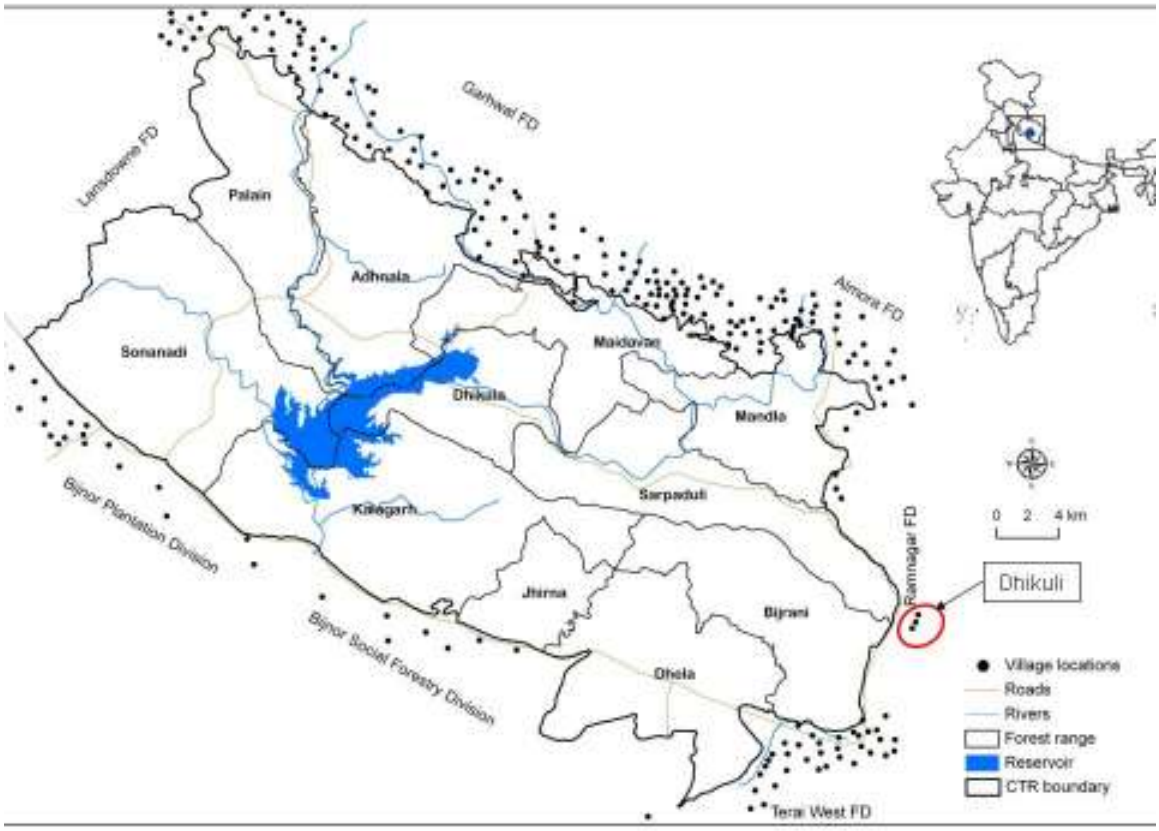
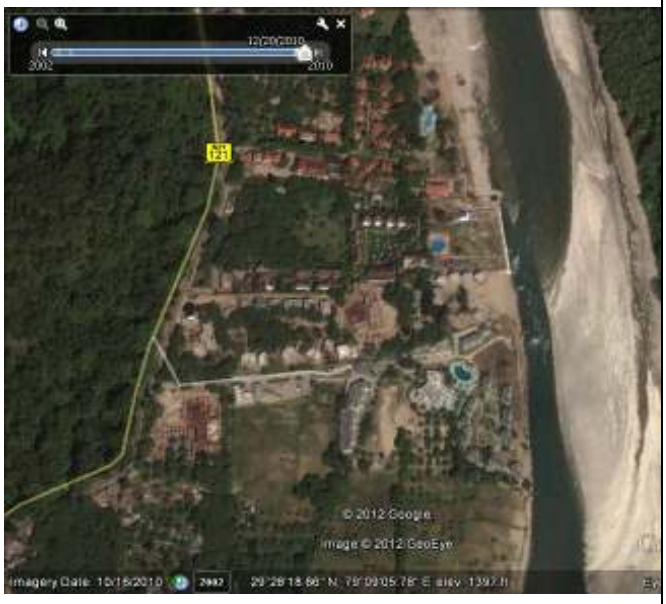


Figure 6-1 Map of Corbett Tiger Reserve, showing the boundaries of the reserve, major forest divisions, rivers and roads. River Kosi and Ramnagar Forest Division are located to the east of CTR. Dhikuli is the central of the three villages encircled.

A 1. Dhikuli December 2002

B 1. Dhikuli December 2010

A 2. Dhikuli December 2002



B 2. Dhikuli December 2010

A 3. Dhikuli December 2002

B 3. Dhikuli December 2010

A 4. Dhikuli December 2002

B 4. Dhikuli December 2010

Figure 6-2 Satellite-images of Dhikuli, Corbett Tiger Reserve (CTR), depicting the growth of infrastructure between 2002- 2010. Images A1 and B1 represent the entire village, and the other images depict parts of the village. CTR is located to the west of the village, beyond National Highway (NH) 121 (indicated in yellow). The river Kosi and Ramnagar Forest Division lie to the east of the village respectively. Previous agriculture and farm-based land use permitted wild animals to use the area as an ecological corridor between CTR and Ramnagar Forest Division. However, growth of infrastructure has heavily modified the ecological corridor. (Image courtesy: Google Earth)

Figure 6-3 The growth of infrastructure has modified the ecological corridor in Corbett Tiger Reserve (CTR). The picture was taken from Ramnagar Forest Division, looking west toward Dhikuli (CTR in the far distance). River Kosi (not seen) flows north-south, a short-distance from the infrastructure. (Picture taken: November 2010)

Figure 6-4 Sign-boards along the National Highway 121, indicating the number of tourist-resorts and related activities in Dhikuli. The picture was taken looking east towards Dhikuli and Kosi from the CTR side of the road (Picture taken: April 2012).

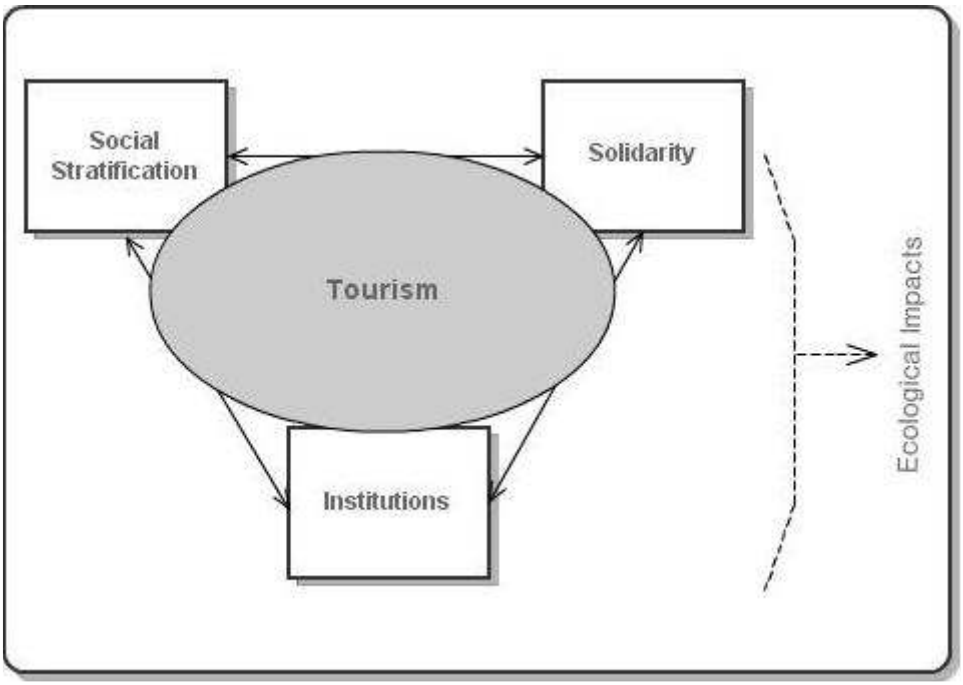


Figure 6-5 Impact of tourism on ecology and village structure in Corbett Tiger Reserve. Before the establishment of tourism, the village operates with intrinsic linkages among social stratification, solidarity and village institutions. After establishment of tourism, social stratification, solidarity and institutions were heavily impacted, affecting their relationships and also the local ecology.

CHAPTER 7: GENERAL CONCLUSIONS

The conservation of tigers is an acute representation of the many intense issues facing biodiversity conservation and management across the world. It is a complex social, political, ecological and management challenge. While scientists recommend saving the tiger for its ecological and inherent values, the ecosystems where tigers live are often valued differently by different stakeholders (with different capacities to affect policy). This divergence among values and the resulting stakeholder negotiations play out at different spatial and temporal scales. For example, the government represents many different interests, including the extraction agencies and conservation agencies, creating inter-agency competition. Local communities can often disagree with the objectives of conservation, especially when legally applied to forests in which they have customary rights. To compound matters, after a conservation-area is established, the regulations may be weakly implemented, resulting in antagonistic communities and poor biodiversity conservation outcomes. At each of these levels, the conservation imperative is exposed to significant political challenge. Many of the above issues are common to other challenges of biodiversity conservation elsewhere on the planet. Similarly, many of the general conclusions of this research, although specific to tiger conservation in India, could be transferable to other contexts.

While scientists working on tiger conservation continue to discuss whether or not to allow local communities to use the forests where tigers live (refer, Carter et al. 2012; Carter et al. 2013; Harihar et al. 2013; Goswami et al. 2013; Karanth et al. 2013), the results of this

research could assist the discourse to advance in potentially significant ways (Chapter 3). The results also point to ways in which the managers of Tiger Reserves could better pre-empt the responses of local stakeholders that might jeopardise tiger conservation (Chapter 4), the potential of local communities to better support tiger conservation objectives (Chapter 5), and some of the ways in which components of the local social-ecological system interact to negatively affect tiger conservation (Chapter 6). Taken collectively, this research identifies numerous challenges and opportunities for tiger conservation policy and management.

The science and practice of tiger conservation have recognized the enormous complexity of tiger conservation, with various sub-parts affecting one another in various ways, and dynamic components that interact in ways that can be unpredictable and are weakly understood (Kawanishi and Seidensticker 2010, Rastogi et al. 2012). However, an appreciation of this complexity is not yet evident in India's tiger conservation policy framework. The challenge is how best to frame appropriate policies that cater to the diverse contexts to which they are applicable, strong enough for effective tiger conservation, yet flexible enough to be adjusted to the local contexts.

To more effectively meet the social challenges facing tiger conservation in India, we need pragmatic approaches. This is not to suggest that proponents of tiger conservation have not used pragmatic approaches in the past. Indeed, even the establishment of Project Tiger, which led to the establishment of Tiger Reserves, was a pragmatic utilization of an opportunity provided through engagement with the most powerful political figure of post-colonial India, Prime Minister Indira Gandhi (Lewis 2005). Nevertheless, there remains a

real need for more empirical socio-ecological evidence to inform sustainable tiger conservation policy and management in India. More specifically, further clarity is needed on the social and political dimensions of tiger conservation. This information will allow more pragmatic approaches to conservation that better recognize the political challenges inherent to the system. Importantly, tiger conservation will likely not be a key political priority for India in the foreseeable future, and will therefore require realistic strategies for effective policy advocacy and negotiation.

It is important to recognize that the conservation of tigers is one possible societal imperative of many. Indeed, there is often disagreement among conservation biologists on how much emphasis to place on species-specific conservation, compared with the merits of alternative approaches such as landscape-based conservation or community-based conservation. I have sought to inform this thinking with a view to designing more pragmatic management solutions for effective tiger conservation. Recognizing that tiger conservation is only one among many possible worldviews; pragmatic approaches will have to recognize that solutions will likely need to compromise with other competing societal objectives. The extent to which negotiations between competing worldviews may be acceptable to tiger conservation objectives remains an open question.

When I began the PhD program in 2008, the conservation discourse in India was dominated by the implementation of the *Scheduled Tribes (and Other Traditional Forest Dwellers) Recognition of Forest Rights Act 2006*, and its potential impact on protected areas. As I write the thesis towards the end of my PhD, the conservation discourse in India is dominated by a recent (2012) case in the Supreme Court of India, which is considering a

ban on tourism in core areas of Tiger Reserves. In both cases, the discussions have been divided between 'preservationists' and 'other stakeholders', where the preservationists recommend that there should be absolutely no human entry in Tiger Reserves (including local communities or tourists), and the 'other stakeholders', including development professionals, tourism professionals, and individuals, express opinions ranging from 'sustainable development' to the need for extractive management. Such discussions are ultimately led by individual values, leading to no enduring resolution of the issues, let alone identification of a productive way forward. Greater clarification of the inherent values associated with conservation will help clarify the priorities, the compromises that are acceptable to the conservation community, and also more pragmatic means to achieve targets. This research contributes to domestic and international efforts to ensure an appropriate balance between providing for biodiversity conservation and community needs. While the literature on tiger conservation has, to date, primarily focused on the ecology of tigers, I have sought to contribute to the body of knowledge concerning the politics, policy and practice of tiger conservation. More practically, the results of my research may be useful in both administering short-term solutions within the existing policy framework, and in devising long-term trajectories for tiger conservation policy and management in India. The results may also enable policy makers to frame more appropriate policies, by better projecting the potential socio-political implications of tiger conservation.

7.1. General Summary

My thesis was directed at understanding and exploring the social dimensions of tiger conservation in India. A detailed literature review helped underline a dilemma: tiger

conservation requires the establishment of extensive protected areas but these protected areas can antagonize local communities and create additional challenges for tiger conservation.

A national-level survey of conservation professionals in India helped outline five distinct worldviews on tiger conservation. Conservation professionals in India largely supported a viewpoint that regarded tiger conservation as a moral duty. While conservation debates in India are generally regarded to be divided along the tiger-tribal viewpoints, the survey revealed that there were many areas of potential agreement.

Through a case-study in Corbett Tiger Reserve, I outlined the political process through which local stakeholders articulate their issues and pressure reserve management into taking desired actions. I proposed that local conservation management is susceptible to issues that cross the 'threshold of public pressure'. For more effective management outcomes, these issues should be pre-emptively addressed where possible.

It is also important to understand whether local communities have the capacity to organize collective action in support of, or against, tiger conservation objectives. By assessing the social capital in communities around Corbett Tiger Reserve, I found that the potential for collective action is affected by inequitable distribution of benefits from tiger conservation. It will be important for reserve management to ensure that potential collective action through social capital is directed in support of tiger conservation where possible.

Lastly, I explored the social and ecological impacts associated with intense wildlife tourism around Corbett Tiger Reserve. Through this study I propose that the rapid economic changes have created disparity within the village society, affecting the solidarity of the

village residents, and creating challenges for the local institutions. This is important, because a village with high solidarity and strong institutions could act as a significant ally to reserve management when trying to address with the perverse ecological effects of intense wildlife tourism.

7.2. Future directions

This research on the social dimensions affecting tiger conservation in India was exploratory. As a result, it offers a number of areas that require further research:

1. A detailed analysis of popular media would be useful to help understand the societal discourse on tiger conservation at various scales. Media discourse is understood to reflect and affect social discourse, and drive policy changes. Understanding media discourse will help outline the societal thrust for tiger conservation, and also the different ways in which challenges of tiger conservation are popularly perceived.

2. Having identified the viewpoints of conservation professionals in this research, it will be important to further explore the potential for more effective coalitions of advocacy for tiger conservation in India. Understanding the characteristics and capacities of the different coalitions will help to understand strategic tiger conservation management and policy processes in India.

3. As a crucial component of the above point, it will also be important to understand the social networks of the professionals working on conservation issues in India. This will help to understand the importance of knowledge exchange, leadership and professional associations to the process. A clearer understanding of professional

networks will help policy makers to better consult stakeholders on future tiger policy decisions.

4. While I explored the viewpoints of conservation professionals in India, there is also a need to better understand and contrast the conservation viewpoints of other stakeholders, including local communities.

5. Future research should also explore mechanisms for building trust and communication between local communities and the management of India's Tiger Reserves, recognizing the potential synergies that exist. Greater work in this area will likely improve the sustainability and efficacy of tiger conservation.

6. Many of my research findings are based on case study research conducted in Corbett Tiger Reserve. Therefore, it would be valuable to explore similar research questions in other Tiger Reserves, both in India and internationally, to further develop the emergent theory and consider the generalizability of the findings.

References

Carter NH, Shrestha BK, Karki JB, Pradhan NMB, Liu J (2012) Coexistence between wildlife and humans at fine spatial scales. Proceedings of the National Academy of Sciences 109 (38):15360-15365. doi:10.1073/pnas.1210490109

Carter NH, Shrestha BK, Karki JB, Pradhan NMB, Liu J (2013) Reply to Goswami et al., Harihar et al., and Karanth et al.: Fine-scale interactions between tigers and people. Proceedings of the National Academy of Sciences 110 (2):E111-E112. doi:10.1073/pnas.1217414110

Goswami VR, Vasudev D, Karnad D, Krishna YC, Krishnadas M, Pariwakam M, Nair T, Andheria A, Sridhara S, Siddiqui I (2013) Conflict of human-wildlife coexistence. Proceedings of the National Academy of Sciences 110 (2):E108. doi:10.1073/pnas.1215758110

Harihar A, Chanchani P, Sharma RK, Vattakaven J, Gubbi S, Pandav B, Noon B (2013) Conflating "co-occurrence" with "coexistence". Proceedings of the National Academy of Sciences 110 (2):E109. doi:10.1073/pnas.1217001110

Karanth KU, Gopalaswamy AM, Karanth KK, Goodrich J, Seidensticker J, Robinson JG (2013) Sinks as saviors: Why flawed inference cannot assist tiger recovery. Proceedings of the National Academy of Sciences 110 (2):E110. doi:10.1073/pnas.1216623110

Kawanishi K, Seidensticker J (2010) Collaborations and Partnerships Are Essential to Sustain Wild Tiger Populations. In: Tilson R, Nyhus PJ (eds) TIGERS OF THE WORLD: The Science, Politics, and Conservation of Panthera Tigris. Second Edition edn. Academic Press, London, Burlington, San Diego, pp 175-184

Lewis M (2005) Indian science for Indian tigers? Conservation biology and the question of cultural values. J Hist Biol 38 (2):185-207. doi:10.1007/s10739-004-1486-8

Rastogi A, Hickey GM, Badola R, Hussain SA (2012) Saving the Superstar: A review of the social factors affecting tiger conservation in India. Journal of Environmental Management 113:328-340. doi:10.1016/j.jenvman.2012.10.003