Putting People on the Map: An Approach to Integrating Social Data in Conservation Planning

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Abstract

Conservation planning is integral to strategic and effective operations of public and private sector conservation organizations. Largely grounded in the biological sciences, the field of conservation planning has historically made limited use of social data . We offer a simple approach for integrating data on social well-being into conservation planning that captures and contextualizes patterns and trends in human needs and capacities across a conservation planning unit. These social well-being data complement biophysical and threat-oriented social data within a conservation planning process. Building upon existing conservation planning methodologies and insights from multiple disciplines, this systematic approach can easily merge with current planning practices. Incorporating social well-being data into conservation plans can refine the process for selecting conservation targets, highlight opportunities for strategic conservation action, and inform adaptive management.

Keywords: social well-being; political empowerment; social indicators; conservation planning; ecoregion conservation

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Introduction

Conservation planning is integral to strategic and effective operations of public and private sector conservation organizations. Planning provides conservation organizations with direction regarding which areas of biodiversity to protect, allowing them to set priorities and allocate scarce resources more efficiently (O'Connor et al. 2003; Pressey & Bottrill 2008). Ultimately, the goals of conservation planning are to ensure that the most important areas of biodiversity are protected (Margules & Pressey 2000), to maximize the return on conservation investment (Brooks et al. 2006), and to promote effective conservation interventions (Knight et al. 2006).

The field of conservation planning is grounded in the biological sciences. Systematic conservation planning has generated various sophisticated methods to identify global conservation priorities (Brooks et al. 2006). Once these priorities have been delineated, methods to select biological targets, assess their viability, and identify threats further narrow the geographic focus of future conservation interventions (Parrish et al. 2003; Salafsky et al. 2002). Finally, operational planning guidelines (Consevation Measures Partnership 2007) and a suite of standard conservation strategies (Salafsky et al. 2008) provide some guidance on how to protect the prioritized biological targets.

Relatively less attention in conservation planning has focused upon the social factors that may influence (or be influenced by) an organization's choice of strategic action (Cowling & Wilhelm-Rechmann 2007; O'Connor et al. 2003). Conservation scientists and practitioners increasingly recognize the need to incorporate sophisticated and diverse social data into conservation planning (Polasky 2008; Pressey & Bottrill 2008). Given that such social issues as values, norms, institutions, and human well-being underpin most of the opportunities and constraints for effective conservation action (Cowling & Wilhelm-Rechmann 2007), understanding the underlying social phenomena that affect biodiversity targets is fundamental to conservation success (Cowling et al. 2004; Polasky 2008).

Traditionally, social data in conservation planning have been limited to the direct and indirect threats to biodiversity. These direct and indirect threats are represented by direct

measure of human resource use patterns, proxies for human behavior (e.g., population density), and by indicators of human impacts (e.g., tons of fish harvested) (CMP 2007, Salafsky et al. 2008). More recently, novel approaches that rely on a wider range of social data and analyses have emerged to inform conservation action. These include incorporating spatially explicit information about the economic costs of conservation (Naidoo et al. 2006; Wilson et al. 2007); mapping social assets as a foundation for conservation action (del Campo & Wali 2007); predicting conservation return on investment based on social and ecological factors (O'Connor et al. 2003); and integrating data on social institutions and governance structures in conservation planning exercises (Pressey & Bottrill 2008).

In this paper, we extend this recent work by offering a simple approach for integrating data on social well-being into conservation planning. This approach, termed *Putting People on the Map* (P-MAP), captures and contextualizes patterns and trends in human needs and capacities across a conservation planning unit, in order to complement biophysical and threat-oriented social data within a conservation planning process.

P-MAP approach for measuring social well-being

P-MAP is designed to integrate data on social well-being into conservation planning. To develop the approach, we drew upon best practices in other sectors as well as current conservation practice. First, we defined social well-being and its relevant elements by triangulating approaches developed by Nobel laureate Amartya Sen (Sen 1999) and the Millennium Ecosystem Assessment (Millennium Ecosystem Assessment 2005) with those identified in a review of the literature on the social indicators used in protected area monitoring (A. Khurshid & M.B. Mascia, unpublished data). Sen's "Capabilities Approach" was the first to extend the definition of poverty beyond simplistic measures of Gross Domestic Product (GDP) or per capita income (Sen 1999), a perspective now institutionalized in the Human Development Index (United Nations Development Programme (UNDP) 2007) and the Millennium Development Goals (UN Millennium Project 2005). The Millennium Development Goals, and associated indicators, provide a commonly accepted framework for measuring human development. The authoritative Millennium Ecosystem

Assessment (Millennium Ecosystem Assessment 2005) explored the relationships between ecosystems services, direct and indirect drivers of change, and human well-being. The comprehensive review of social indicators used in monitoring social impacts of protected areas provides a snapshot of current conservation practice (A. Khurshid & M.B. Mascia, unpublished data).

Despite their disparate origins, Sen's Capabilities Approach (Sen 1999), the Millennium Ecosystem Assessment (Millennium Ecosystem Assessment 2005), and current conservation practice (A. Khurshid & M.B. Mascia, unpublished data) coalesce around a similar definition of social well-being *the ends that people seek to live a productive, fulfilling life.* Given that social well-being inherently comprises multiple domains (see Table 1), we derived a hierarchical framework with five primary domains: economic well-being, health, political empowerment, education, and culture. Economic well-being represents the resources people use to meet basic consumption and material needs, and access to other sources of well-being (Sen 1999) Health is a state of complete physical, mental, and social well-being and not merely the absence of disease, or infirmity (World Health Organization 1946). Political empowerment refers to people's ability to participate in the decision-making processes that affect their lives (United Nations Development Programme et al. 2005). Education refers to the structures, systems and practices - both formal and informal – used to transfer knowledge and skills in a society. Culture encompasses art, ways of living together, value systems, traditions and beliefs. Cultural diversity is a source of exchange, innovation and creativity (UNESCO 2001).

Table 1: Divergent disciplines, comparable approaches for characterizing social well-being

*The arrows indicate the degree of similarity between the concepts. The dotted arrow in the third row indicates that, while these concepts all relate to the political sphere, each conveys a slightly different meaning about how the political sphere manifests in individual lives and within society.

P-MAP Approach	Social Impacts of Protected Areas	Capabilities Approach	Millennium Ecosystem Assessment
Economic well-being*	Well-being	Economic facilities	Basic material for a good life
Health	Health	Good health	Health
Political empowerment	Governance & Social Capital	Political freedoms	Freedom of choice and action
Education	Education	Access to education	
Culture	Culture		
		Basic human rights	Good social relations
			Security

An operational framework for measuring social well-being

To operationalize this framework, we looked to current conservation practice – particularly the flexible approach developed through the Conservation Measures Partnership. The *Open Standards for the Practice of Conservation* (Consevation Measures Partnership 2007), an operational model of conservation planning, outlines a participatory process for identifying conceptual relationships among elements relevant for place-based or thematically-oriented conservation activities. Two key components of this CMP planning approach guided our work: the processes to (a) define biodiversity targets and (b) assess the viability of the targets in a given conservation area (Table 2; (Consevation Measures Partnership 2007; Parrish et al. 2003). We created analogous systems in P-MAP for measuring those elements of social well-being most relevant for conservation planning.

Similar to the *Open Standards,* we use a hierarchical structure to categorize and quantify social well-being in P-MAP. In this structure, the "domain" represents a broad category of social well-being. Each domain is comprised of numerous social "attributes." Each attribute, in turn, may be measured using one or more social "indicators" (see table 3). For example, to incorporate *health* (social domain) into conservation planning, one might use data regarding *nutrition* (attribute of health) such as *prevalence of underweight children under-five years of age* (indicator).

Through P-MAP, we seek to examine social indicators that both represent the broader social well-being of local residents (construct validity) and are tightly linked to the conservation of biodiversity. These linkages may manifest themselves in the direct effects of a conservation intervention on social well-being, the direct impacts of ecosystem services upon social well-being, or in the secondary impacts of either ecosystem services or conservation interventions. For example, establishment of a marine protected area (conservation intervention) might:

- directly reshape the resource rights of local residents (political empowerment attribute);
- directly influence food security (health attribute) by protecting fish populations (ecosystem services); and

Table 2: Hierarchical frameworks to measure biodiversity and social well-being

CMP Open Standards nested framework for measuring biological status			
Target	Features of a place that are chosen to represent and encompass the biodiversity found in a conservation area. Targets can be focal species, or habitats/ ecological systems.		
	Key Ecological Attributes	An aspect of a target's biology or ecology that if present, defines a healthy target and if missing or altered, would lead to the loss or extreme degradation of that target over time.	
		Indicator	A specific, measurable characteristic of the attribute or a collection of such characteristics combined into an index
		Viability Assessment	Rating to classify the state of the indicator as Poor, Fair, Good, Very Good
P-MAP nested framework for measuring social well-being			
Domain	The specifiable aspects or facets of the concept of social well-being		
	Attributes	Characteristics or qualities that describe each Domain (e.g., Health = Food security + access to medical care + access to clean water	
		Indicator	A specific, measurable observation of the attribute (e.g., Food security is measured by: Proportion of population below minimum level of dietary energy consumption)
		Benchmark	Rating to compare the value of an indicator against the global average.

Table 3: Sample attributes and indicators of social well-being. *Millennium Development Indicator; indicators used to measure progress against the Millennium Development Goals.

Domain	Attribute	Indicator
Economic Well-Being	Income	Proportion of people living below $1 (PPP) per day (MDI)*
	Material assets	Telephone lines/cellular subscribers/Internet users per 100 population (MDI)
	Natural assets	% households using traditional energy sources (i.e. fuel wood, charcoal)
Health	Food Security	Proportion of population below minimum level of dietary energy consumption (MDI)
	Water Security	Proportion of population using an improved drinking water source (MDI)
	Mortality	Under- five/infant mortality rate (MDI)
Political Empowerment	Resource rights	% population whose land/forest/intellectual property rights are recognized by the government
	Political engagement	% population participating in local, regional, national elections
	Women's empowerment	Proportion of seats held by women in national parliament (MDI)
Education	Enrolment	Net enrolment ratio/Ratio of girls to boys in primary education (MDI)
	Achievement	Proportion of pupils starting grade 1 who reach last grade of primary (MDI)
	Literacy	Literacy rate of 15-24 year-olds, women and men (MDI)
Culture	Heritage	% important cultural sites preserved
	Heritage	% population speaking traditional language
	Knowledge	Incidence of traditional ecological knowledge in conservation/land use management

- indirectly enhance educational attainment (education attribute) by enhancing food security and, thus, allowing children to attend school more regularly (secondary impact).

The Millennium Development Indicators (United Nations 2008) provide numerous conservation-relevant indicators of social well-being that are measured by governments around the world.

Data for measuring social well-being

The P-MAP approach explicitly recognizes that social well-being is heterogeneous in space and time. To inform conservation planning, social data must reflect this spatial and temporal heterogeneity at the finest possible resolution. Commonly available social datasets (e.g., government census, Demographic and Health Surveys [DHS], Millennium Development Indicator datasets) tend to track social well-being at the district/county level or larger spatial scales. These datasets can provide valuable coarse scale data for conservation planning, but – in some cases – may not provide sufficient spatial and temporal resolution to inform conservation planning at fine spatial scales or in particularly dynamic social settings. For example, data on economic activity collected at the scale of village development committees (VDCs, each roughly analogous to municipality) in Nepal's Terai region provides information that is useful for planning village-level interventions (Fig. 1 a). Spatial heterogeneity apparent at the VDC level is masked by aggregated district statistics, which reduces the utility for a fine-scale plan, but may be appropriate for ecoregional plans (Fig. 1b).

Similarly, trends in the incidence of acute respiratory infection (ARI, a health indicator tightly linked to human patterns of natural resource use) in Nepal illustrate both the spatial and temporal heterogeneity of social well-being (Fig. 2). Throughout the period 2001-2007, ARI rates in Bardiya district were nearly twice as high as in the three neighboring districts. However, over the six-year period, ARI rates in Banke, Kailali and Kanchanpur districts rose by an average of 300%, as compared to an 18% rate of increase in nearby Bardiya. These numbers highlight the dynamic nature of social well-being across space and time.

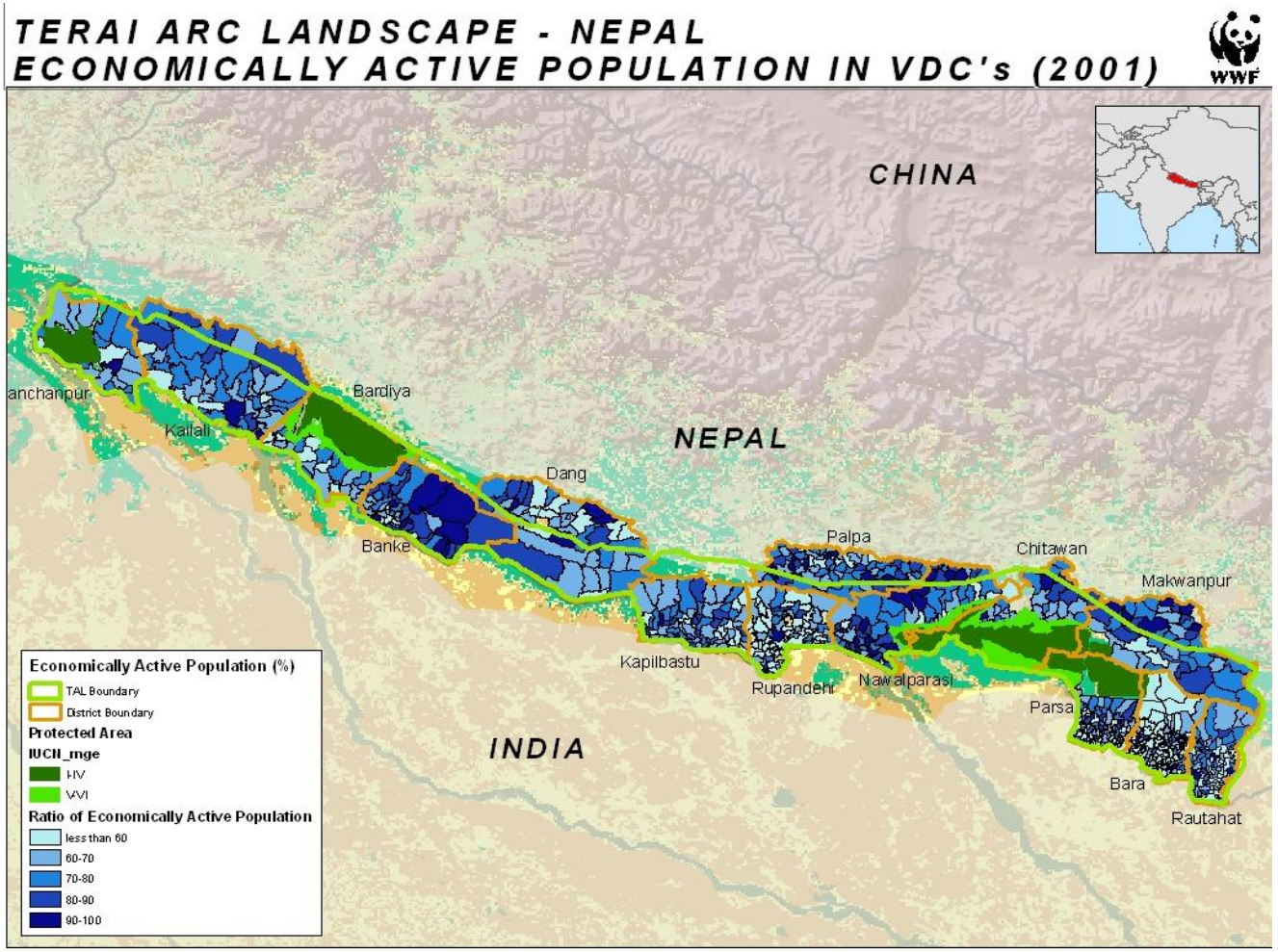

Figure 1a: Spatial heterogeneity of economic activity across the Terai Arc Landscape, Nepal (Source: The Tibetan and Himalyan Digital Library, http://www.thdl.org/collections/cultgeo/nepal/census/index.php?selection=20, accessed June 2008; based on Nepal Central Bureau of Statistics, 2001 Census). Each Village District Committee (VDC) comprises nine villages, providing a finer unit of analysis than the district.

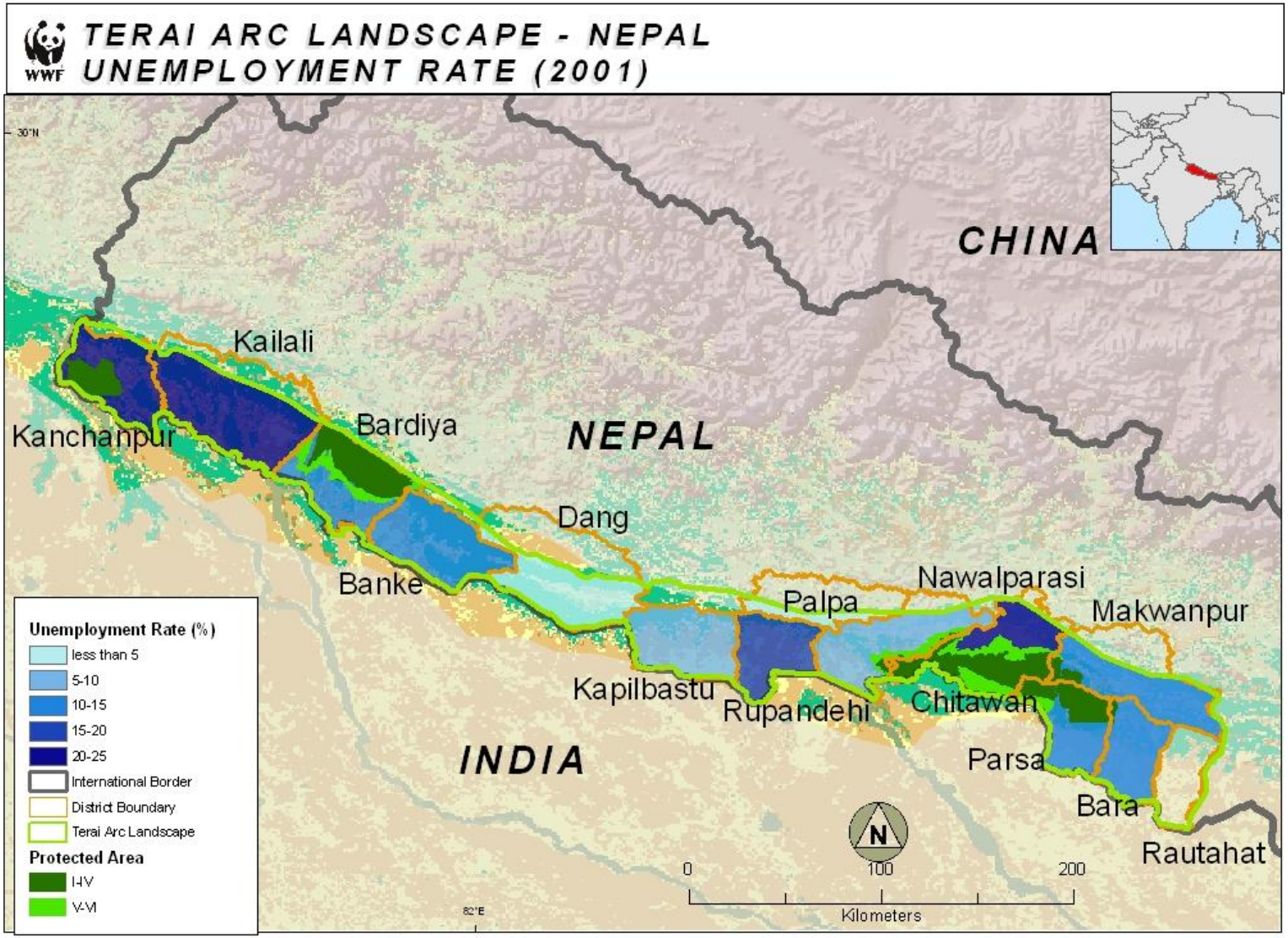

Figure 1b: District level data on unemployment in the Terai Arc Landscape, Nepal (Source: Nepal Central Bureau of Statistics, 2001 Census).

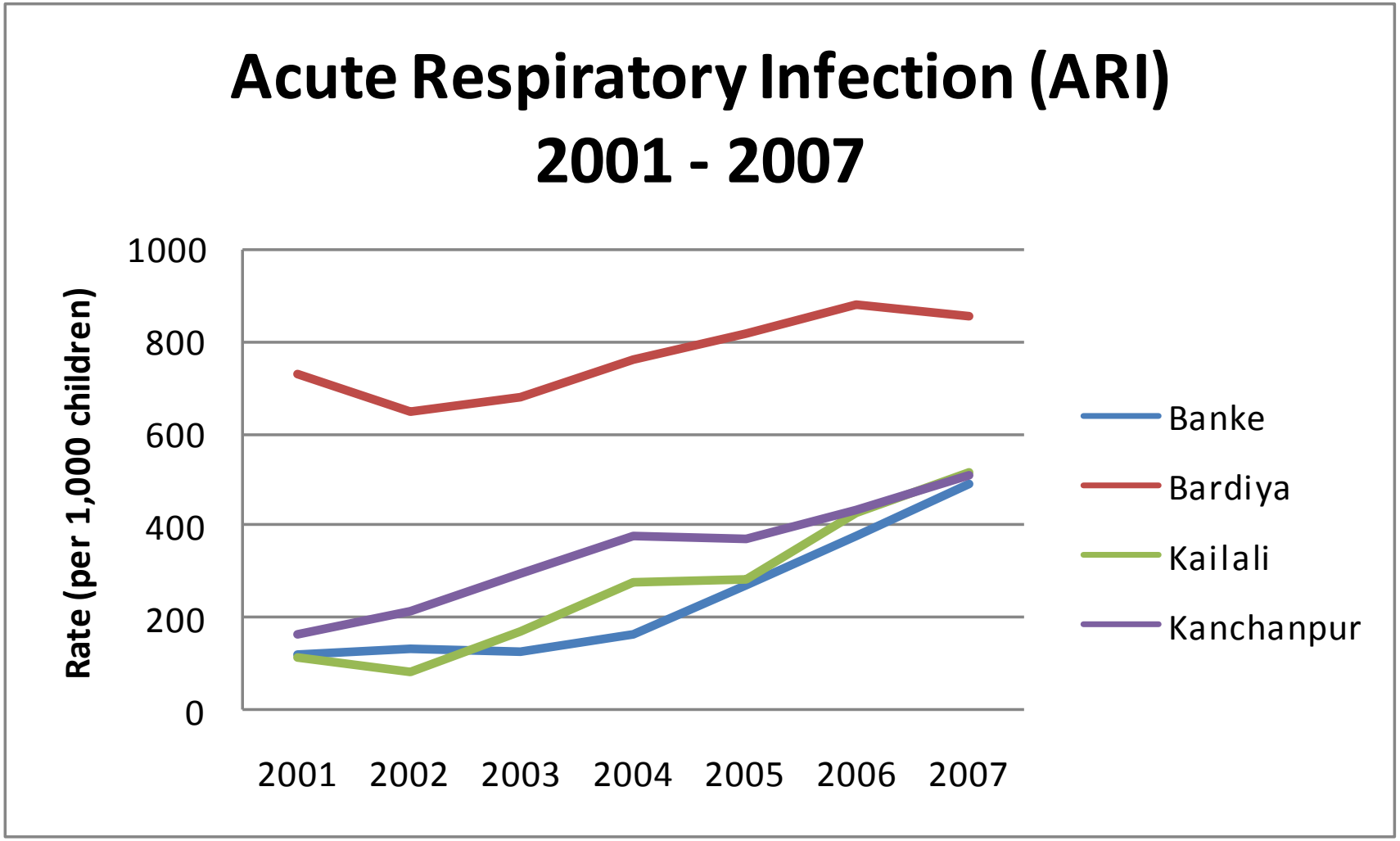

Figure 2: Increasing trend of Acute Respiratory Infection from 2001-2007 in four districts of western Nepal (Source: Nepal Department of Health Services).

The disconnect between ecological boundaries (e.g., ecoregions, landscapes) and the political boundaries of commonly associated with social data (e.g., districts, provinces) within P-MAP presents a challenge for integration of social and ecological data in conservation planning. Ecological and social boundaries sometimes coincide, but more commonly an ecological boundary will weave across fixed political boundaries (e.g., Terai Arc Landscape , southern Nepal; Figure 1). These discrepancies complicate and potentially distort analyses of socio-ecological relationships. Given spatial heterogeneity of social and ecological data, simply cropping disjunct polygons to align with predetermined conservation planning boundaries may result in substantial inaccuracies. Accordingly, data used in conservation planning should attempt to align boundaries, either through targeted collection of fine scale data or through spatially-explicit modeling (e.g., Ramankutty & Foley 1999).

Social data within P-MAP should be collected at the scale of conservation planning and management decisions. That is, if one is setting priorities among countries, national-level data may be sufficient; if allocating resources among districts within a country, then data at the district scale (or finer) are required. In practice, as a rule of thumb, conservation planning at the ecoregion scale should employ social data at the district or subdistrict level; landscape level planning requires subdistrict or community level data; and community-scale planning will require social data at the household level. Social data with a high degree of spatial and temporal resolution (e.g., household, community; annual, seasonal) are more powerful and scalablethan low resolution data, but present tradeoffs in terms of cost and complexity. Although it varies with the indicator, in general social data should be updated at least every 2 – 5 years to monitor trends and inform adaptive management.

Putting social data into context

In current conservation practice, biological data are rated using viability criteria that put numbers into context and provide insights for interpretation (Table 3; CMP 2007; Parrish et al. 2003). To put social well-being data into context, we developed a benchmarking protocol for P-MAP that draws upon the CMP approach to viability assessment (CMP 2007) and the U.N. system for categorization of human development (UNDP 2007; Table 4). U.N.

Table 4: Comparative approaches: Viability assessment of biodiversity indicators & benchmarking of social well-being indicators. (a) Adapted from Parrish et al. 2003. (b) The United Nations divides human development into 3 categories: Low, Medium and High. We split the Medium category for greater precision. (c) Values for indicators were calculated from UNDP Statistics (http://hdr.undp.org/en/statistics/data/), accessed Sept. 2008.

Viability Assessment for biodiversity indicators: Rating derived from data and expert opinion about the conditions necessary for a biodiversity target to persist over time. Biodiversity indicators are classified in one of four categories, representing a continuum from low to high likelihood that the target will persist.[a]

Chinook salmon Key Ecological Attribute	Indicator	Rating			
		Poor	Fair	Good	Very Good
Habitat size	Areas of floodplain habitat	0 acres of floodplain habitat	0-100 acres of habitat	101-1000 acres of habitat	> 1000 acres of habitat
Recruitment: juvenile abundance	Abundance of juveniles	0 – 0.10 catch per hour in a rotary screw cap	0.11 – 0.25 catch per hour	0.26 – 1 catch per hour	>1 catch per hour

Benchmarks for social well-being indicators: Values derived from global averages (calculated from UN datasets) for each UN-HDI category provide a range for each of four categories; representing a continuum from low to high levels of human development.[b] Values for individual social well-being indicators are benchmarked against these categories.[c]

Health		Human Development Category			
Attribute	Indicator	Low	Low-Medium	Medium-High	High
Water access	% Population using an improved water source	<58%	59-79%	80-96%	>97%
Food security	% Children < 5 under weight for age	>29%	18-28%	8-17%	<7%
Mortality	Infant mortality rate	>109 per 1,000 live births	47-108 per 1,000	10-46 per 1,000	<9 per 1,000

HDI classifications are the standard basis for assessing and comparing poverty levels among nations.

We benchmark social data in four categories along a continuum ranging from low to high levels of human development: Low Human Development (LHD), Low to Medium Human Development (LMHD), Medium to High Human Development (MHHD) or High Human Development (HHD). U.N. databases house data on numerous national level social indicators. These databases can be analyzed to produce global averages against which to benchmark specific social indicators. For example, applying the benchmarking system to data on the infant mortality rate in 14 Nepali districts (Fig. 3) generates a clear understanding of where infant mortality is a serious problem (e.g., Dang, LHD), where it is not (e.g., Rupandehi, MHHD) and where it is a concern (e.g., the other 12 districts, LMHD). While commonly collected social indicators can be benchmarked against international levels, more localized or infrequently collected social indicators cannot be benchmarked and must be assessed independently.

Beyond nuts and bolts: process as key

A framework helps to organize data into conceptually distinct categories, but cannot replace the *process* for selecting representative and locally relevant indicators; determining the scale at which to measure the indicators; or for applying the data to a conservation plan. Selecting indicators requires a participatory process, in which stakeholders with regional expertise determine the most appropriate indicators to describe social well-being within the conservation planning unit. The process to define indicators represents an opportunity to explore the relationships between conservation priorities and social well-being, and to begin identifying appropriate conservation interventions. Stakeholder groups should generally comprise a mix of social scientists with local expertise, as well as potential conservation stakeholders and/or partners (e.g., government, local communities, human development NGOs). Stakeholder groups should select a suite of indicators that represent the multiple dimensions of social well-being and that can be measured with consistently available, accessible data (e.g., government statistics, U.N. statistics) – particularly for conservation planning at large spatial scales, where primary data collection is often impractical or impossible for conservation organizations. Indicator selection should be approached as an

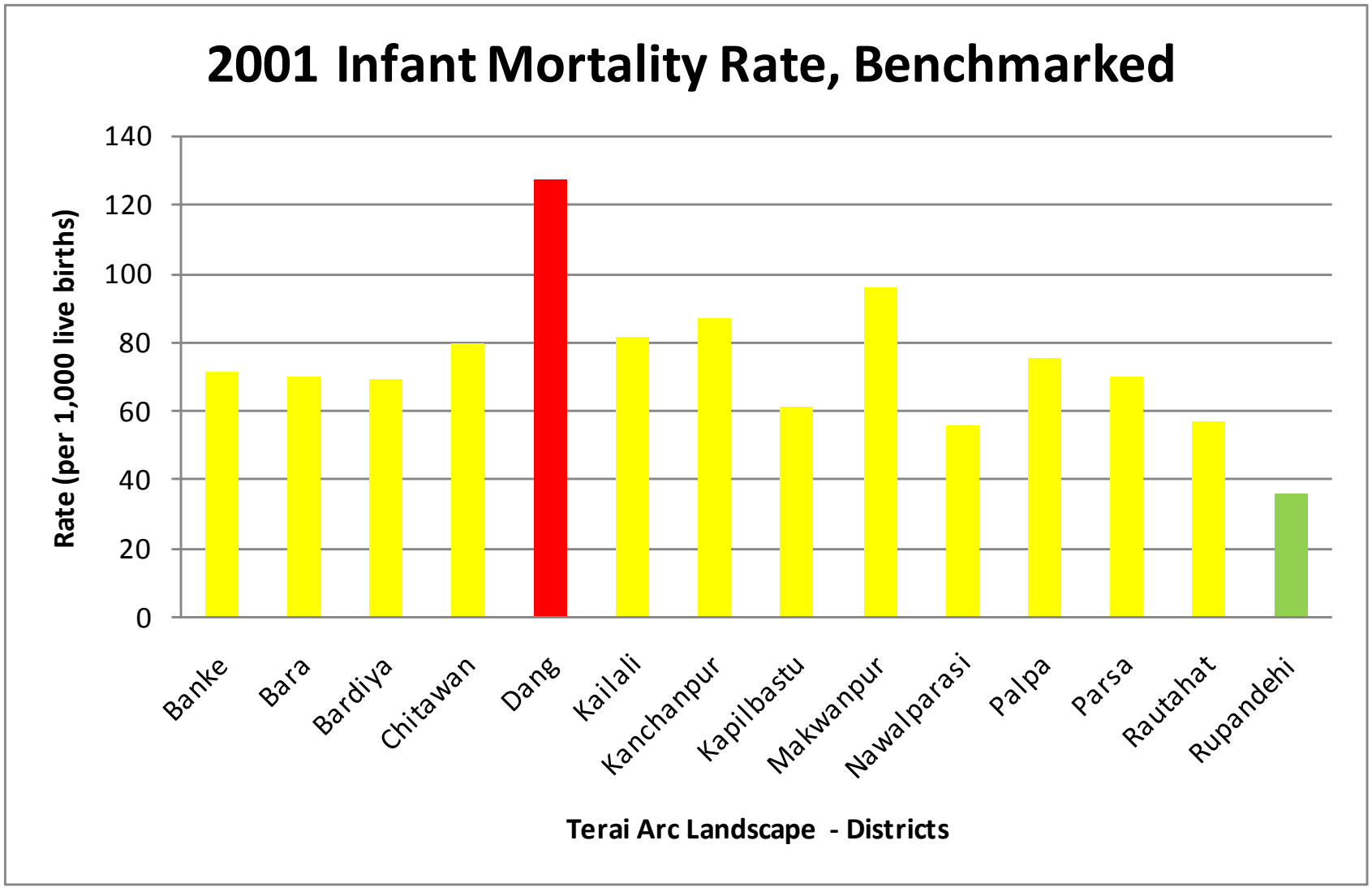

Figure 3: Infant Mortality Rate in 14 districts of western Nepal; benchmarked against UN global averages (Sources: UNDP and UN Statistics).

iterative process that will evolve throughout data collection and analysis, since some of the initially proposed indicators may prove infeasible or inappropriate.

Improved conservation planning

The P-MAP approach can inform conservation planning by providing a rigorous yet flexible method for integrating the multiple dimensions of social well-being into conservation decisions. Representing social context provides conservation planners with a starting point for addressing four sets of key questions:

1. *Defining targets.*
    a. Is social well-being a concern within the conservation geography? Are social targets necessary, for either conservation organizations or their partners?
    b. If so, what aspects of social well-being should be targeted? Where should interventions be targeted?
2. *Designing strategies.* Given local human capacities and needs, what conservation investments – targeting whom, employed where – are most likely to deliver results?
3. *Exploring socio-ecological relationships*. Are there macro-scale win-wins for both conservation and development? Do tradeoffs exist between these two outcomes?
4. *Managing adaptively.* As the social context shifts, what changes to conservation strategy are required?

Defining targets

Conservationists debate the appropriateness of "social targets" as legitimate goals for conservation planning. Some see social targets as distracting from the "core business" of biodiversity conservation (Terborgh 1999), while others see them as a necessary means

to achieving conservation ends (Berkes 2004). Still others see biodiversity conservation as a vehicle for advancing human development, through ecosystem services, ecotourism, political empowerment, and other means (ref). A trend toward recognizing human societies as an integral part of complex, adaptive ecosystems (Berkes 2004) and efforts to incorporate broad swaths of human-dominated landscapes into targeted conservation areas (Brooks et al. 2006) highlight the need to explicitly consider the utility of including social targets in operational conservation plans.

Regardless of one's perspective on this debate, integration of social well-being data into conservation planning provides a richer understanding of the conservation context. Examining patterns and trends in social well-being allows one to determine which social issues (if any) are cause for concern, where problems are particularly acute, and how social dynamics are changing over time. This knowledge does not necessitate action by conservation organizations to enhance human welfare, though some may choose to do so directly, in partnership, or by sharing the data with organizations better equipped to address social well-being concerns. These strategic decisions will depend upon organizational mission, values, and capacities (among other factors).

Designing strategies

Incorporating data on social well-being into conservation planning can facilitate selection of conservation strategies that respond to local human capacities and needs, resulting in more sustainable and effective conservation action (Cowling & Wilhelm-Rechmann 2007; del Campo & Wali 2007; Sheil et al. 2006). A basic understanding of spatial patterns and temporal trends in educational attainment (e.g., literacy rates) or material well-being (e.g., % households owning radios), for example, provides simple yet powerful insights required for the design of environmental education and communication strategies. Similarly, examining patterns and trends in food security can yield valuable information into the risks associated with crop-raiding wildlife and other forms of human-wildlife conflict – and suggest conservation strategies that local residents are most likely to support. Patterns and trends of land tenure (a political empowerment indicator) may reveal that tenure insecurity is an issue that undermines both conservation and social well-being, highlighting the potential for mutually-beneficial and reinforcing reforms of land policies.

Analyzing spatial and temporal trends of social well-being can empower conservation planners can develop strategies that target the right issue, take action in the most strategic locations, and elicit the most effective partnerships.

Socio-ecological relationships

Integrating social and biological data through conservation planning activities can facilitate novel analyses that advance conservation science. Global analyses examining spatial patterns of linguistic diversity and biological diversity, for example, reveal "hotspots" of biocultural diversity and highlight the common threats facing endangered species and indigenous peoples (Stepp et al. 2004; L. Gorenflo unpublished data). Similarly, comparing national indicators of taxonomic endangerment and economic prosperity suggests a complex and multifaceted relationship between social well-being and biodiversity conservation (Naidoo & Adamowicz 2001). Though socio-ecological analyses like these may occur independent of formal conservation planning processes, the problem-oriented analytic framework of conservation planning can productively structure policy-relevant analyses of spatial and temporal socio-ecological relationships.

Adaptive management

Lastly, incorporating social well-being data in conservation planning represents the foundation for adaptive management in the face of shifting social contexts. Declining food security, for example, may increase pressure on natural resources, requiring shifts in conservation strategies and new partnerships to address local livelihood concerns. Similarly, spatial and temporal data on land tenure may highlight areas vulnerable to appropriation and exploitation by extractive industries (von Braun & Meinzen-Dick 2009), suggesting the need for conservation strategies that strengthen local land rights and, thus, prevent industrial exploitation of priority conservation areas. Equipped with this type of information, managers can creatively adapt conservation strategies to respond to shifting challenges (Cowling & Wilhelm-Rechmann 2007).

P-MAP and current practice: where does it fit?

The P-MAP approach builds upon current conservation practice, complementing other protocols for assessing biological and social context. Similar to *The Open Standards for the Practice of Conservation* (Consevation Measures Partnership 2007) approach for measuring the state of biodiversity within a conservation geography, P-MAP uses a hierarchical framework and participatory process to nest contextually-appropriate indicators within broader conservation-relevant domains. Within *the Standards,* however, social factors are included only to the extent that they directly or indirectly represent a threat to biodiversity or (much less frequently) an opportunity for conservation. P-MAP complements *the Standards* by focusing upon one portion of the broader social context within which threats, opportunities, and biodiversity are embedded – thus building a more rigorous foundation for priority-setting, strategy design, and program evaluation.

P-MAP deviates slightly from the commonly employed "sustainable livelihoods" framework, which examines five types of livelihood *assets* (human capital, natural capital, social capital, financial capital, and physical capital) as the foundation for livelihood *strategies* and *outcomes* (Department for International Development 1999)It also deviates from the conservation-oriented Landscape Outcomes Assessment Methodology, which borrows from the DfID framework but focuses on livelihood outcomes, measuring social variables in these five categories to assess the performance of conservation interventions at the landscape scale (Sayer et al. 2007). The P-MAP approach organizes social data differently, following Sen (Sen 1999), the UN Human Development Report (United Nations Development Programme (UNDP) 2007), and the Millennium Ecosystem Assessment (Millennium Ecosystem Assessment 2005) to focus on the state of social well-being rather than the means by which well-being might be attained (i.e., assets) or the outcomes of particular interventions. These differences should not be overstated, however, as P-MAP and the sustainable livelihoods approaches all capture information that defines the social context within which priorities are identified, strategies chosen, and outcomes assessed.

Conclusion

Social data and social considerations represent a new frontier in conservation planning. With its focus on social well-being, P-MAP complements other recent innovations with social data in conservation planning, but many important aspects of social contact remain poorly developed or unexplored in conservation planning. Social arenas ripe for further exploration and operationalizing within conservation planning include enabling conditions (i.e., the macro-scale social factors that foster [or hinder] localized conservation successes); environmental beliefs, values, and sense of place; social networks; and more systematic and evidence-based approaches to operationalizing threats (e.g., direct measures of discrete human behaviors). At a more fundamental level, the potential of appreciative inquiry and asset-based approaches to conservation planning remain unexplored. Given the tremendous challenges facing biodiversity and the people who depend upon it for their survival, it is imperative that we explore diverse conceptual and tactical approaches to conservation planning, and rigorously evaluate their effectiveness in delivering ecologically and social sustainable conservation outcomes.

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