HOW EFFECTIVE ARE TIGER CONSERVATION AREAS AT MANAGING THEIR SITES AGAINST THE CONSERVATION ASSURED | TIGER STANDARDS (CA|TS)?

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ABSTRACT

A global pledge to double wild Tiger populations by 2022 has focused attention on the need for effective conservation management. Conservation Assured | Tiger Standards (CA|TS) was established to identify good management standards for Tigers and promote these within Tiger conservation areas (TCAs). The study reported here assessed TCA management against a simplified version of CA|TS to uncover potential shortfalls in management and provide recommendations for future practices. From 11 Tiger range countries (TRCs), 111 TCAs were surveyed on their implementation of 40 strategic Tiger management activities, making it the largest Tiger management study to date. The study found that over a third of TCAs have major management deficiencies, threatening the survival of wild Tigers, biodiversity and natural resources. These deficiencies are especially prominent in South East Asian countries compared to other TRCs. Non-South East Asian countries had a significantly higher percentage of TCAs that had fully implemented the activities outlined in the survey. The lowest scoring elements of management, excluding tourism since that did not apply to all TCAs, were infrastructure, equipment and facilities, protection, and community relations. Recommendations include increased government funding, capacity building, and the implementation of CA|TS to secure the future of wild Tigers.

Key words: *Panthera tigris*, Tiger, management effectiveness, protection, survey, Conservation Assured | Tiger Standards, CA|TS

INTRODUCTION

The global population of wild Tigers (*Panthera tigris*) has fallen by over 95 per cent since the beginning of the 20th century (Wolf & Ripple, 2017) and Tigers have lost over 93 per cent of their historic range (Wikramanayake et al., 2011; Walston et al., 2010). Much of this decline is recent with Tigers occupying about half the range they did just ten years ago. Tigers are no longer found in the Bali, Caspian and Javan regions and there have been no reliable sightings for the last 25 years in South China. Both Tiger sub-species (Wilting et al., 2015), the continental Tiger (*Panthers tigris tigris*) present across the mainland and the Sunda Tiger (P*anthera tigris sondiaca*) occurring across the island of Indonesia, are endangered and there is no evidence of breeding populations of Tigers in Cambodia, Vietnam, and Lao PDR (Goodrich et al., 2015; Harihar et al., 2018; Knoka et al., 2018). Both the sub-species present across South East Asia are facing severe threat from illegal hunting and snaring, the single biggest cause of decline (Belecky & Gray, 2020). But South East Asia also holds the opportunity to the future Tiger recovery. Effective management and investment in areas where the population is still present, and possibilities of rewilding or reintroduction and breeding, with the availability of vast interconnect habitat provides the future hope for the Tigers in the region.

The Tiger's demise led to a global pledge to double wild Tiger populations by 2022, which was made at the St Petersburg International Tiger Forum ('Tiger Summit') in 2010, providing important political backing for conservation efforts in Tiger landscapes (GTI, 2010). There are some indications that this increased attention is beginning to improve the survival of Tiger populations in the wild (Jhala et al., 2019). However, progress remains inconsistent across the range (Knoka et al., 2018), particularly where recovery of prey species is also required (Harihar et al., 2018).

Some governments of Tiger range countries (TRCs) are failing to invest sufficiently in Tiger conservation, and the dramatic decline of Tigers across South East Asia in particular (Goodrich et al., 2015) is a clear indication that many protected areas in this region are failing to reach the minimum standards for effective management found in other countries with greater success in securing wild Tigers (Jhala et al., 2019). Thus, there is a need to prescribe the protection and management standards needed to secure wild Tigers across the range, and then systematically to assess management effectiveness, to record successes and identify areas of management weakness where actions are needed (Harihar et al., 2018; Pasha et al., 2018).

In response, Conservation Assured | Tiger Standards (CA|TS) was established to identify good management standards for Tigers and promote these within Tiger conservation areas (TCAs) (Pasha et al., 2018). A TCA is defined here as a tract of land that has been recognised as Tiger habitat; it may be a protected area (e.g. nature reserve, park, wildlife sanctuary, community conserved area), land reclamation project, forest unit, or other area recognised for its ability to support Tiger populations or with the potential to do so (Conservation Assured, 2020). CA|TS is an accreditation system in which participating TCAs need to provide evidence demonstrating that they meet a range of criteria relating to management effectiveness (Conservation Assured, 2020). The management standards, drawn up by specialists from around the world, are central to maintaining and building Tiger populations (Pasha et al., 2018). CA|TS has a management structure that includes both global and national committees and an active CA|TS Support Group made up of international NGOs, institutions, intergovernmental organisations, non-Tiger range governments and donor organisations whose role is to support, promote and implement CA|TS and to work closely with government agencies responsible for Tiger conservation. CA|TS differs from other management effectiveness evaluation tools, such as the Management Effective Evaluation for Tiger Reserves (MEETR) (Mathur et al., 2014) in two ways: 1) it identifies management issues and sets out methods for improvement, and 2) provides a range-wide standard for comparison, whereas most other management effectiveness systems set local standards designed for specific regions (Pasha et al., 2018).

In order to understand the level of management actions required across the Tiger range, the CA|TS Support Group carried out a survey of over 100 TCAs using a questionnaire approach based on the full CA|TS

Tiger on the prowl © MKS Pasha

standards and criteria (Conservation Assured, 2020). The aims were:

- to provide an overview of how well TCAs measure against CA|TS;
- to understand broad regional differences in Tiger conservation; and
- to understand the general level of management effectiveness in terms of Tiger conservation and better understand the challenges faced in protecting wild Tigers.

The findings from the study will be used to set priorities for effective management, conservation investment and capacity building.

METHODS

CA|TS is organised around seven 'pillars' and 17 'elements' of management (Table 1), with elements containing a range of management standards that are expressed through detailed criteria and elucidated by guidance notes and best practices (Conservation Assured, 2020). The management standards and criteria under each element focus on issues related to Tiger conservation. The system was designed to have applicability across all TRCs, covering varied geographical, cultural and ecological needs (Pasha et al., 2018).

The survey included 40 questions based on a simplified version of the standards (see Supplementary Online Material), with each question associated with a certain pillar and element from Table 1. For each question, five options were given for the responses: 1 = recognised and action implemented; 0.75 = recognised and action initiated; 0.5 = recognised and action being planned; 0.25 = recognised but no action initiated; 0 = not recognised.

A sample survey was conducted initially in five TCAs from India, Nepal and Russia to resolve any potential methodological and implementation issues, and to ensure that the questionnaire was comprehensible and interpreted correctly.

The Global Tiger Forum, assisted by members of the CA|TS Support Group, approached 180 TCAs in all extant TRCs, plus one site in Cambodia where there is ongoing work to prepare for Tiger reintroduction. The survey was completed by field experts and site managers or their staff. The survey thus represents the opinions of

Table 1. Pillars and elements of the Conservation Assured | Tiger Standards

Pillars	Elements
A: Importance and status	1. Social, cultural and biological significance
	2. Area design
	3. Legal status, regulation and compliance
B: Management	4. Management planning
	5. Management plan/system implementation
	6. Management processes
	7. Staffing (full-time and part-time)
	8. Infrastructure, equipment and facilities
	9. Sustainability of financial resources
	10. Adaptive management (feedback loop)
C: Community	11. Human–wildlife conflict (HWC)
	12. Community relations
	13. Stakeholder relationships
D: Tourism (optional)	14. Tourism and interpretation
	(*Note: this standard is only applicable to TCAs with major tourism operations*)
E: Protection	15. Protection
F: Habitat management	16. Habitat and prey management
G: Tiger populations	17. Tiger populations

those most directly involved in site-based management about management effectiveness, gaps and needs.

The initial analysis of the findings was then made on the sum of the scores assigned to each question in the survey. Additional statistical analysis was carried out on the pillars and elements mentioned in Table 1, with the scores for these grouped into each of the seven pillars and 17 elements. Broad regional comparisons were also made, since the initial analysis of the findings revealed clear differences between the management effectiveness of South East Asian and other TCAs. Two broad categories of sites, South East Asia (20 sites from Cambodia, Indonesia, Malaysia, Myanmar and Thailand) and non-South East Asia (91 sites from Bangladesh, Bhutan, China, India, Nepal and Russia) were used for further analysis. Fisher's exact test (nonparametric version of the Chi square test) was used to compare the percentage of surveyed Tiger sites from South East Asia (n = 20) and non-South East Asian countries (n = 91) by grouping the scores into two categories of ≥ 0.5 and ≤ 0.5 to observe any broad regional trends between the lower and upper halves of the scores, which indicate different levels of action initiation and implementation.

RESULTS

Survey responses were received from 111 TCAs from 11 TRCs (Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Malaysia, Myanmar, Nepal, Russia and Thailand; Figure 1); 62 per cent of those approached. By area the survey covered approximately 28 per cent of the

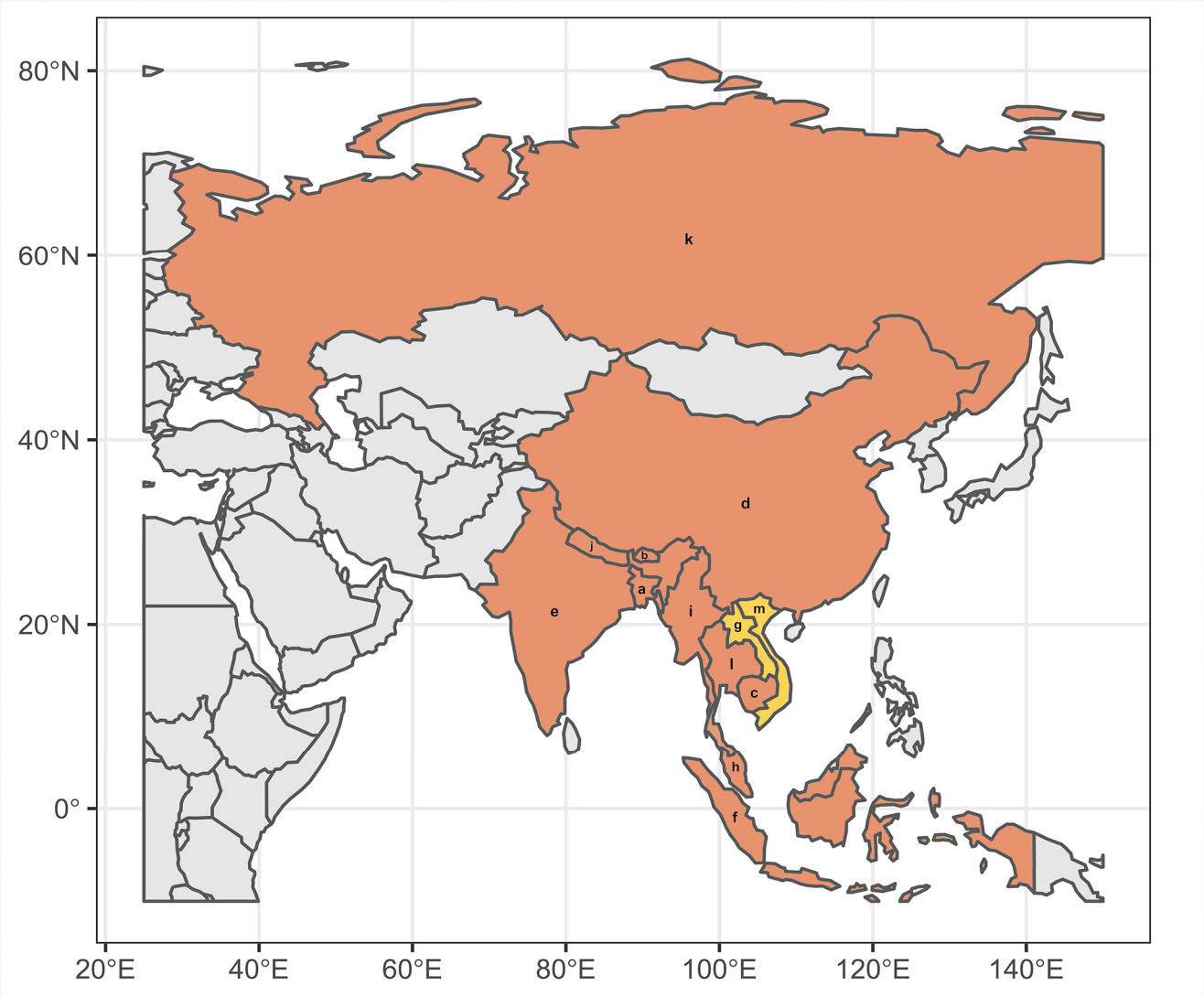

Figure 1. Tiger Range Countries (TRCs) (orange and yellow). The countries that responded to the survey are in orange (11 of the 13 TRCs). The numbers on the map refer to all TRCs which are given in alphabetical order: Bangladesh (1), Bhutan (2), Cambodia (3), China (4), India (5), Indonesia (6), Laos (7), Malaysia (8), Myanmar (9), Nepal (10), Russia (11), Thailand (12) and Vietnam (13)

total 700,000 km² Tiger range (Goodrich et al., 2015), however as Tigers are concentrated in only a small part of this range (200,000 km², Goodrich et al., 2015) the survey represented approximately 70 per cent of global wild Tiger populations. Responses were received from all Tiger range countries except Lao PDR and Vietnam. The majority of the responses were from India (72 sites), followed by Indonesia (9 sites), Bhutan (6 sites), Nepal (5 sites), Russia and Myanmar (4 sites each), Thailand, Malaysia and China (3 sites each), and Bangladesh and Cambodia (one site each); a regional spread that reflects the range-wide distribution and relative abundances of wild Tigers across the TRCs.

The Fisher's test revealed that there was a statistically significant difference ($P < 0.0001$) between the overall scores of South East Asia ($n = 20$) and the other countries surveyed ($n = 91$). South East Asia's scores were divided evenly, with 10 TCAs having scores greater than or equal to 0.5 (actions initiated or implemented) and 10 TCAs with scores lower than or equal to 0.5 (indicating the lack of implementation), resulting in 50 per cent for both. While non-South East Asian countries showed a major difference between these two categories, with 89 TCAs (98 per cent) having scores greater than 0.5, and only two TCAs (2 per cent) having scores lower than 0.5.

Figure 2 provides an overview of the implemented and initiated actions for the TCAs based on the seven CA|TS pillars, and compares South East Asia with other sites, and the overall scores. It suggests that enforcement against poaching (Pillar E), habitat management (Pillar F) and management of community issues (Pillar C) are the weakest management categories across the TRCs (excluding tourism management (Pillar D), since tourism is not suitable or actively pursued in all TCAs). Overall, management is remarkably weaker across South East Asia.

Further insight was provided by separating the results into the 17 elements of CA|TS. Figure 3 shows a more detailed version of the percentage of TCAs that have either implemented or initiated the actions for the seventeen elements and compares the differences in scores for South East Asia, other TRCs and the overall scores more directly. Overall, it was found that the sites surveyed are strongest on management planning and processes, middling on prey management and protection, and weakest on the social issues related to management.

Figure 4 identifies the TCAs that have fully implemented the actions outlined from the 40 survey questions (the questions are summarised here; see Supplementary Online Material for the full questionnaire). This shows that although many TCAs have the basics of good conservation management in place, the lowest scoring questions (i.e. the management actions that the lowest number of TCAs have implemented) are related to social aspects of conservation management (questions 3, 10, 23, 24, 25, 40), staffing capacity (questions 16, 19, 28)

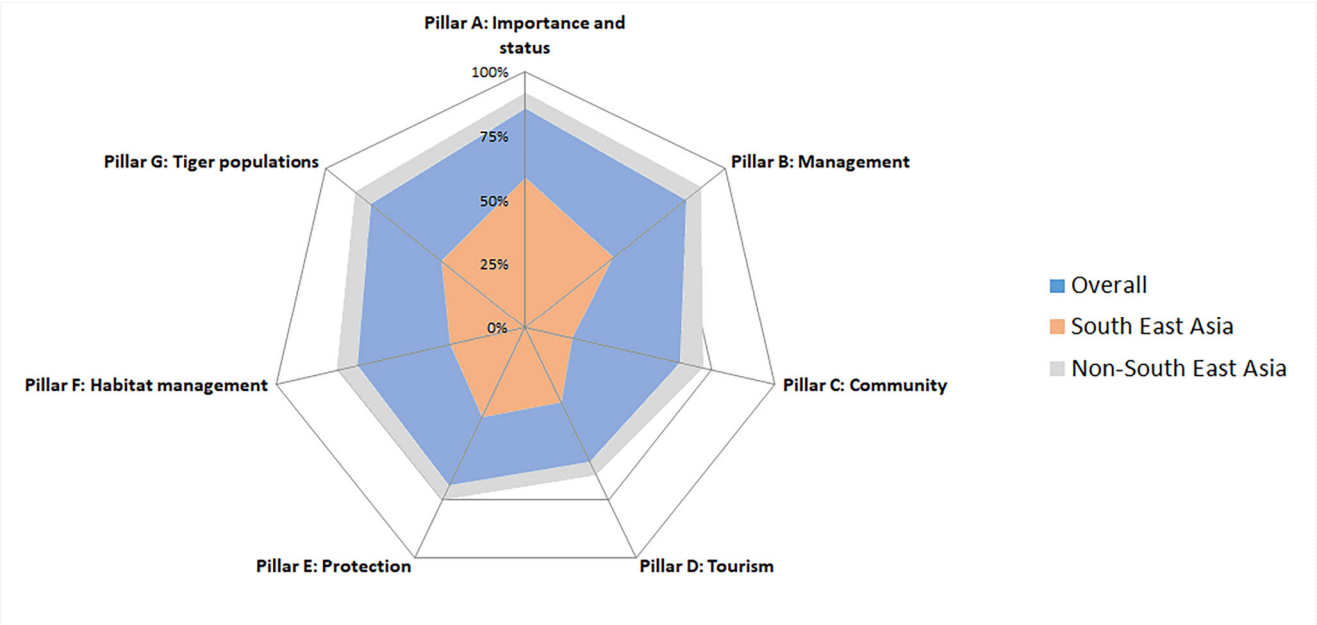

Figure 2. Percentage of surveyed TCAs that have either implemented (score of 1) or initiated (score of 0.75) actions based on the seven CA|TS pillars. Compares responses from TCAs in South East Asia (n = 20) (inner ring), non-South East Asia (n = 91) (outer ring) and overall (n = 111) (middle ring)

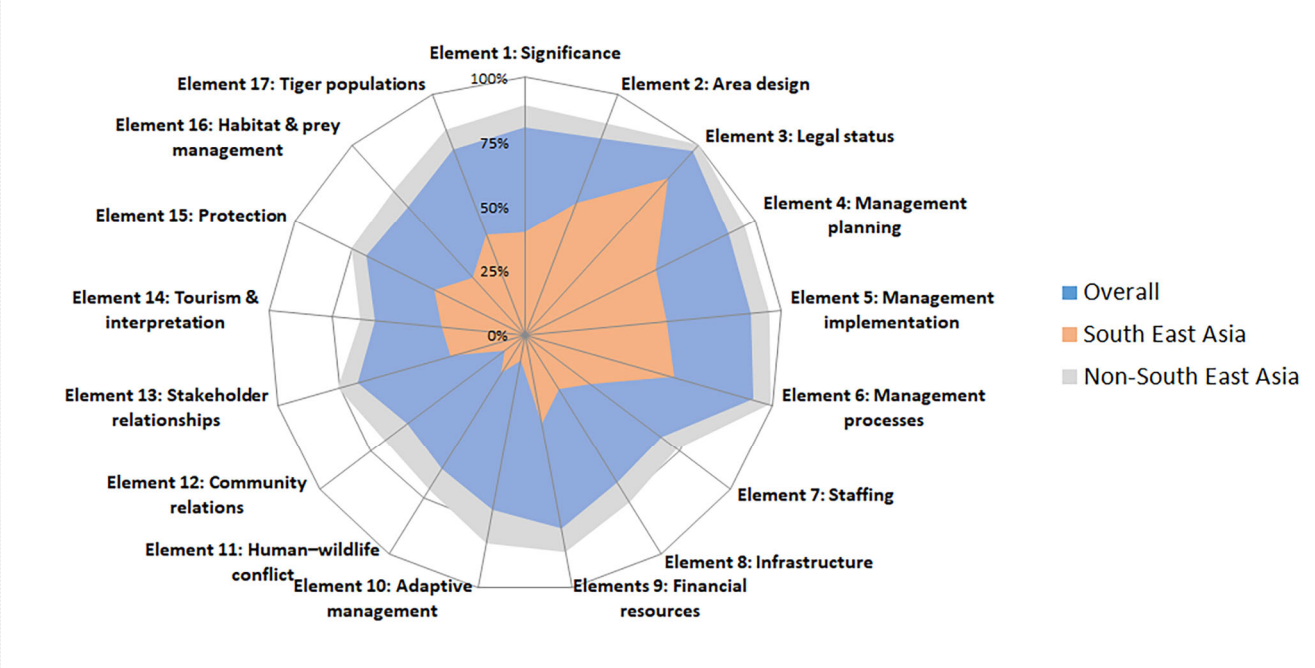

Figure 3. Percentage of surveyed TCAs that have either implemented (score of 1) or initiated (score of 0.75) actions based on the 17 CA|TS elements. Compares responses from TCAs in South East Asia (n = 20) (inner ring), non-South East Asia (n = 91) (outer ring) and overall (n = 111) (middle ring)

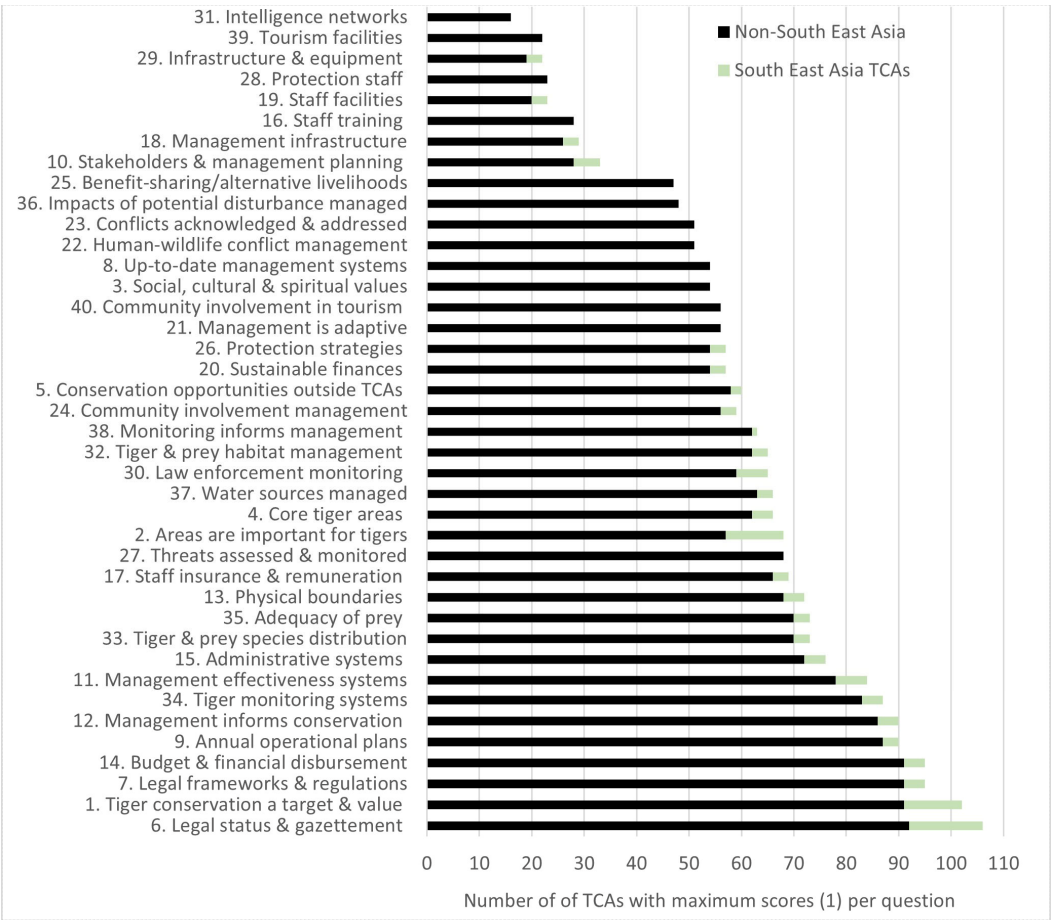

Figure 4. Number of sites surveyed (n = 111) with maximum scores of 1 for each of the 40 questions (see Supplementary Online Material 1). Compares responses from TCAs in South East Asia and non-South East Asia

and protection (questions 26, 28, 29, 31); all amongst the most important aspects of management. The results also indicated weaknesses in management processes; while in total 78 per cent reported that they carry out Tiger monitoring (question 34), fewer (66 per cent) are also monitoring Tiger prey (question 35), and results are not always fed back into management, with 49 per cent of TCAs stating that management is not adaptive (question 21), and 43 per cent stating that they are not using monitoring results to inform management (see question 38). Additionally, three-quarters of TCAs report that they are not sufficiently staffed to fully implement planned management activities (question 16), and a similarly low number of TCAs lack adequate management infrastructure to support staff activities (question 18). The responses from managers in the current survey align with the perceptions of individual rangers surveyed in the region (WWF Tigers Alive Initiative & the Ranger Federation of Asia, 2016).

Figure 4 also reveals that social engagement and community relations are amongst the weakest elements in management. For example, although in total 53 per cent of TCAs report that they involve communities in applicable areas of site management (question 24), only 30 per cent have involved stakeholders in management planning (question 10), meaning that plans have been put together with little engagement of the people that likely affect, or are affected by, a TCA. One exception to this lack of engagement seems to be in the development of tourism. Although many TCAs do not have tourism operations in place, the 56 that do are fully involving communities (question 40). Less than half of the TCAs (42 per cent) have put benefit-sharing/alternative livelihood mechanisms (question 25) in place, and no TCAs in South East Asia have mechanisms of this type fully implemented. While weaknesses exist throughout, TCAs in South East Asia consistently demonstrate weaker management, particularly in community relations, Tiger-specific conservation actions and enforcement of anti-poaching efforts, which prohibit effective protection. Moreover, although many TCAs reported having management plans (54 per cent) (question 8) and annual operational plans (81 per cent) (question 9) implemented or initiated, no TCA in South East Asia reported having management plans fully implemented. These weaknesses are reflected by a continuing decline in Tiger numbers in many of these

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places (Goodrich et al., 2015). There is also a difference between South East Asia and the rest of the TRCs in terms of implementing effective management strategies for human–wildlife conflict (question 22). This includes conflict directly between Tigers and humans and also the impacts of Tiger prey, such as the Wild Boar (Sus scrofa). While 46 per cent of TCAs in South Asia, Russia and China have implemented such systems, only two TCAs in South East Asia have systems initiated and another eight have human–wildlife conflict systems under development.

Poaching is probably the most immediate threat to remaining wild Tigers, making protection strategies critical to their survival (Goodrich et al., 2015; Walston et al., 2010). The survey included six questions (questions 26–31) related to protection and enforcement: protection strategy developed and implemented, threats known and monitored, Tiger protection infrastructure in place, law enforcement monitoring in place, protection efforts intelligence driven, and sufficient staff employed and trained to patrol effectively. The results showed weaknesses in protection and enforcement in general (Figure 4), specifically in South East Asia. Very few TCAs (14 per cent) feel that their protection includes intelligence-driven approaches; the lowest score for any of the 40 questions in the survey (question 31). However, over half (52 per cent) reported that they are in the process of initiating such systems, reflecting considerable capacity development on this issue in the coming years (Conservation Assured, 2018).

Although the survey clearly identified many gaps in management across the Tiger range, it is clear that, for at least some managers, these problems have been recognised and many actions have been planned in response. Across the 20 TCAs surveyed in South East Asia, 196 actions were indicated as being in the planning stage (i.e. an average of 9.8 actions per TCA) as opposed to an average of just four actions per TCA in the rest of the TRCs, where management structures are already clearly more advanced, suggesting a willingness to tackle the current shortfall in management. However, it is not a given that such plans will be realised, as in most cases, existing resources will not be enough. When TCAs report that an action is ‘under development’, future progress is often funding-dependent. While 86 per cent of TCAs in non-South East Asian countries stated that finances are, or are on the way to being, sustainable, with additional revenue streams maximised and linked to management priorities, only 35 per cent of TCAs in South East Asia are in a similar position.

Finally, if the scores for all the TCAs assessed are plotted (Figure 5), we find that about 10 per cent sites report meeting, or almost meeting, all the criteria in the survey, indicating that they are close to fulfilling the CA|TS

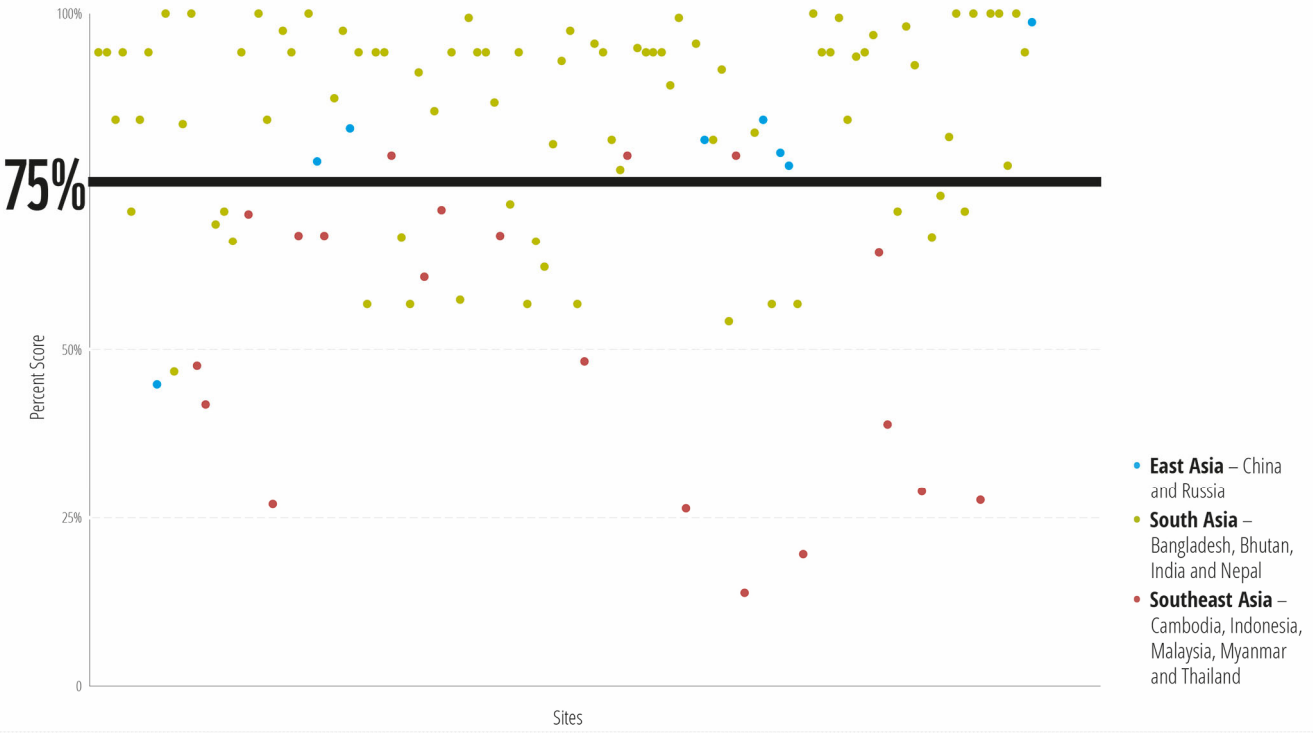


Figure 5. Percent scores for all participating sites in the survey grouped regionally

Approved status requirements. Indeed, six TCAs are now CA|TS Approved and several more are likely to be approved shortly (the current coronavirus pandemic has unfortunately halted much field work and stalled the assessment process). TCAs scoring over 75 per cent (but below 100 per cent) reported fairly strong management, although there are still some improvements needed; 53 per cent fell within this category, suggesting that targeted management investments in these areas could fairly quickly help them reach the CA|TS Approved status and secure wild Tiger populations. Thirty-nine sites fell below the 75 per cent line, indicating relatively weak management or that they are still developing management systems; these sites need to undertake a range of actions. As noted above, all the sites in South East Asia have major gaps in management that prohibit effective protection of their sites.

DISCUSSION

It is critical to have good management in TCAs to halt and reverse the decline of wild Tigers. This study is geographically the widest Tiger-specific assessment of management to date. The results suggest that despite a welcome increase in attention paid to Tiger conservation, serious weaknesses in management remain, even in places that are specially designated for Tiger conservation. This is particularly the case for South East Asia. If the trends indicated here hold true across the region, then 35 per cent of TCAs are at risk of serious declines in their Tiger populations, impacting the chances of reaching the goal of doubling wild Tiger populations by 2022 across the remaining Tiger range.

The rapid survey used to investigate Tiger management practices against the CA|TS criteria was based on self-assessment, with the limitation that this implies,

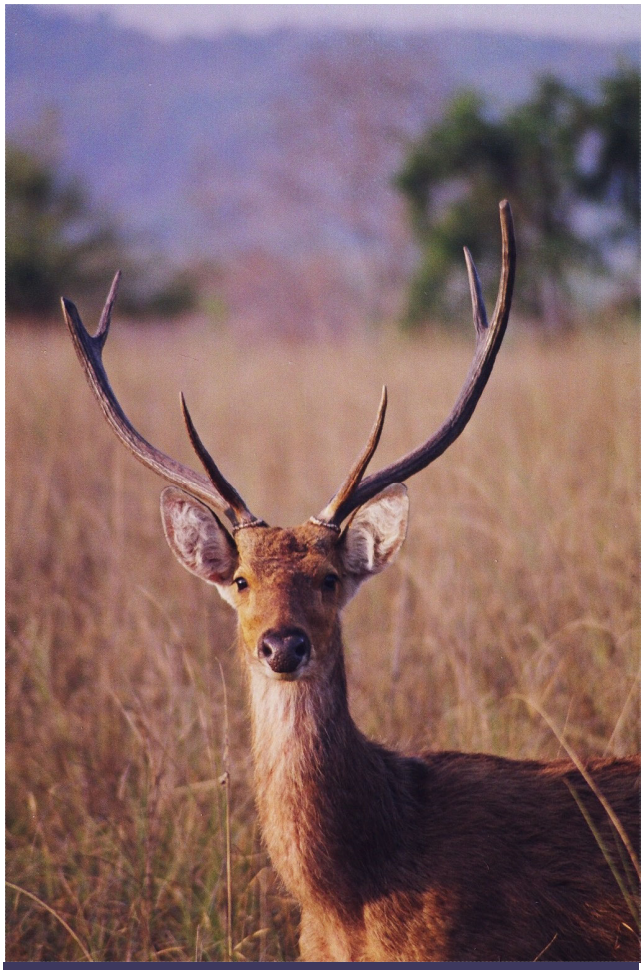
Tiger, Pench Tiger Reserve, India © Shrirish Kathikar

although the results are consistent enough to provide an important contemporary picture of Tiger management and to identify some important next steps in Tiger conservation. Self-assessment surveys are vulnerable to bias, although previous research suggests that, if anything, protected area managers tend to be more self-critical than outside assessors (Hockings et al., 2006). The fact that only a few of the TCAs judged themselves to meet what international experts have identified as effective standards of management for TCA suggests that respondents have not painted an overly optimistic picture of their operations. Indeed, the TCAs that did score highly in the survey have gone on to become CA|TS Accredited (Pasha et al., 2018), meaning that their management has been through the full assessment and independent review process developed by CA|TS (Conservation Assured, 2020). While some issues, like the adequacy of staffing levels, are well-known to be difficult to assess (few protected areas will say they are adequately staffed), the fact that managers' opinions match those of rangers (WWF Tigers Alive Initiative & the Ranger Federation of Asia, 2016) also provides greater assurance.

More worrying for overall Tiger conservation is the large discrepancy in reporting between countries. Indeed, it might be inferred that the better managed and resourced TCAs are more likely to respond to the survey, making the 'at risk' sites an even higher percentage of the total. The strong reporting from India, generally judged to have some of the most effective Tiger conservation based on their increasing wild Tiger populations (Jhala et al., 2019), has likely biased the perception of overall effectiveness; hence the need to disaggregate results into regions. As the survey indicates, few TCAs are truly effective refuges for Tigers, and this has been a contributing factor in the catastrophic decline of Tiger numbers in recent decades.

It is encouraging to find that many governments in the region are already demonstrating commitment to the future of wild Tigers (GTI, 2010). However, it is worrying that the lack of investment in some sites, particularly in South East Asia, is hampering conservation, so that even within protected areas, there have been disproportionate levels of Tiger losses in recent decades (Walston et al., 2010). Addressing this shortfall remains one of the most urgent tasks needed to ensure the future of wild Tiger populations.

From the practical perspective of the next steps in Tiger conservation, the results suggest that actions need to be tailored to a range of contexts (see for example, Harihar et al., 2018). Some TCAs are manifestly failing and need support in the form of both increased funding and policy support from their own governments and targeted support from donors, NGOs and others to aid basic capacity building. In other cases, the remaining requirements are more specific, particularly in terms of policies and training in relation to the management of stakeholder relations and enforcement. In some of these cases, region-wide initiatives and developing training packages may be an efficient way of moving forward. Participatory approaches, for example, require skills; building these with managers and staff is a clear step towards strengthening management.



Barasingha (*Rucervus duvaucelii)* in Kanha Tiger Reserve
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Finally, to continue to track improvements and changes in TCA management and ensure the long-term survival of wild Tigers, a comparative study is being planned to assess progress in TCA management every two years.

SUPPLEMENTARY ONLINE MATERIAL

A blank version of the survey has been provided.

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Tiger, Pench Tiger Reserve, India © Shrirish Kathikar

RESUMEN

El compromiso mundial de duplicar las poblaciones silvestres de Tigres para 2022 ha centrado la atención en la necesidad de una gestión eficaz de la conservación. La herramienta Conservation Assured | Tiger Standards (CA|TS) fue creada para identificar buenas prácticas de gestión para los tigres y promoverlas dentro de las áreas de conservación del Tigre (TCA, por sus siglas en inglés). En el estudio que aquí se presenta se evaluó la gestión de las TCA frente a una versión simplificada de CA|TS para revelar posibles deficiencias en la gestión y ofrecer recomendaciones para prácticas futuras. De 11 países del área de distribución del Tigre (TRC, por sus siglas en inglés), 111 TCA fueron objeto de estudio con respecto a la implementación de 40 actividades estratégicas relacionadas con la gestión de los Tigres, convirtiéndose en el mayor estudio realizado a la fecha sobre la gestión del tigre. En el estudio se constató que más de un tercio de las TCA presentan importantes deficiencias de gestión, que amenazan la supervivencia de los Tigres silvestres, la biodiversidad y los recursos naturales. Dichas deficiencias son especialmente notables en los países de Asia sudoriental en comparación con otras TRC. Los países no pertenecientes al sudeste asiático tenían un porcentaje considerablemente mayor de TCA que habían implementado plenamente las actividades descritas en el estudio. Los elementos de gestión que obtuvieron la puntuación más baja, excluyendo el turismo, por cuanto no se aplicaba a todas las TCA, fueron la infraestructura, el equipo y las instalaciones, la protección y las relaciones con la comunidad. Las recomendaciones incluyen el aumento de la financiación gubernamental, la creación de capacidad y la implementación de (CA|TS) para asegurar el futuro de los Tigres silvestres.

RÉSUMÉ

Un engagement mondial visant à doubler les populations de Tigres sauvages d'ici 2022 a fait ressortir la nécessité d'une gestion plus efficace de leur conservation. Un outil d'avant-garde appelé le Conservation Assured Tiger Standards (désigné par le sigle anglais CA|TS) a été déployé pour identifier de bonnes normes de gestion pour les Tigres puis les promouvoir dans leurs aires de conservation (désignées par le sigle anglais TCA). L'étude présentée ici a évalué la gestion des TCA sur la base d'une version simplifiée du CA|TS afin de découvrir les lacunes potentielles dans la gestion et de fournir des recommandations pour de futures pratiques. Dans 11 pays de l'aire de répartition du Tigre (désignée par le sigle anglais TRC), 111 TCA ont été interrogées sur leur mise en œuvre de 40 activités stratégiques de gestion du Tigre, ce qui en fait la plus grande étude de gestion du Tigre à ce jour. L'étude a révélé que plus d'un tiers des TCA présentent des lacunes de gestion majeures, menaçant la survie des Tigres sauvages, la biodiversité et les ressources naturelles. Ces lacunes sont particulièrement importantes dans les pays d'Asie du Sud-Est par rapport aux autres TRC. Les pays asiatiques hors zone Sud-Est présentent un pourcentage nettement plus élevé de TCA ayant pleinement mis en œuvre les activités décrites dans l'enquête. Les éléments de gestion les moins bien notés, en excluant le tourisme qui ne s'applique pas à toutes les TCA concernées, étaient les infrastructures, les équipements et les installations, la protection et les relations communautaires. Les recommandations de l'étude comprennent l'augmentation du financement gouvernemental, le renforcement des capacités et la mise en œuvre du CA|TS pour assurer l'avenir des Tigres sauvages.

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