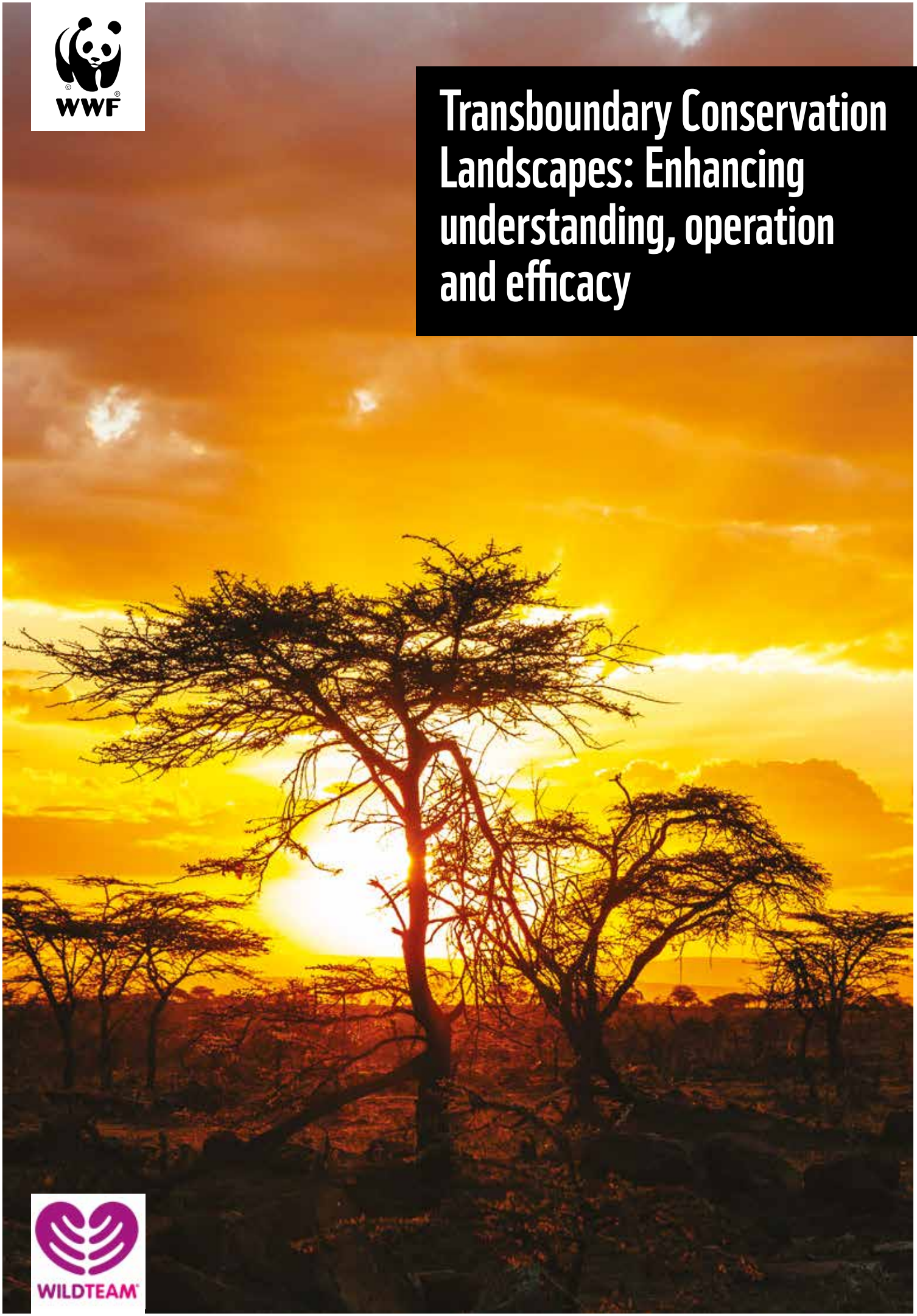
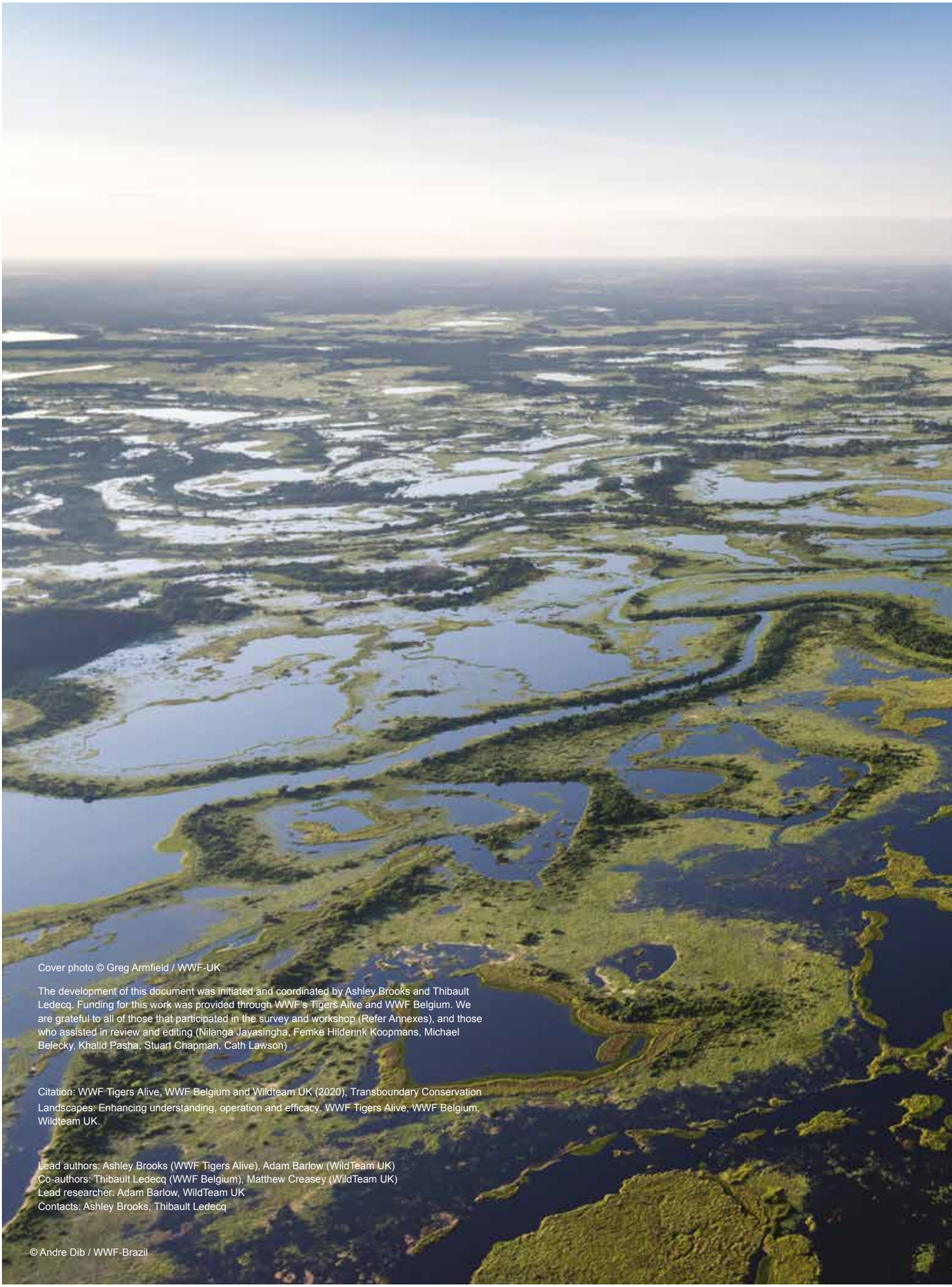
Transboundary Conservation Landscapes: Enhancing understanding, operation and efficacy





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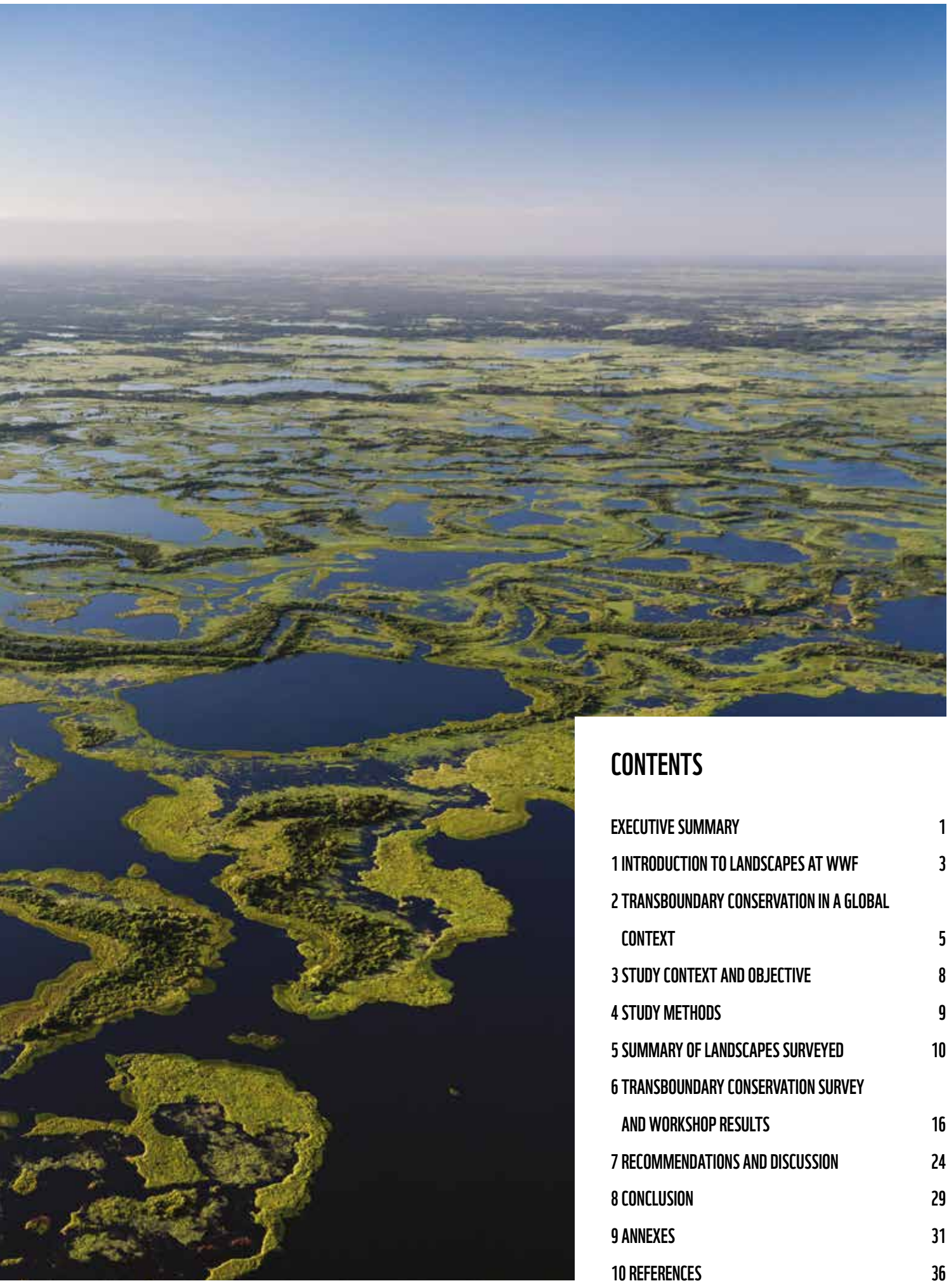

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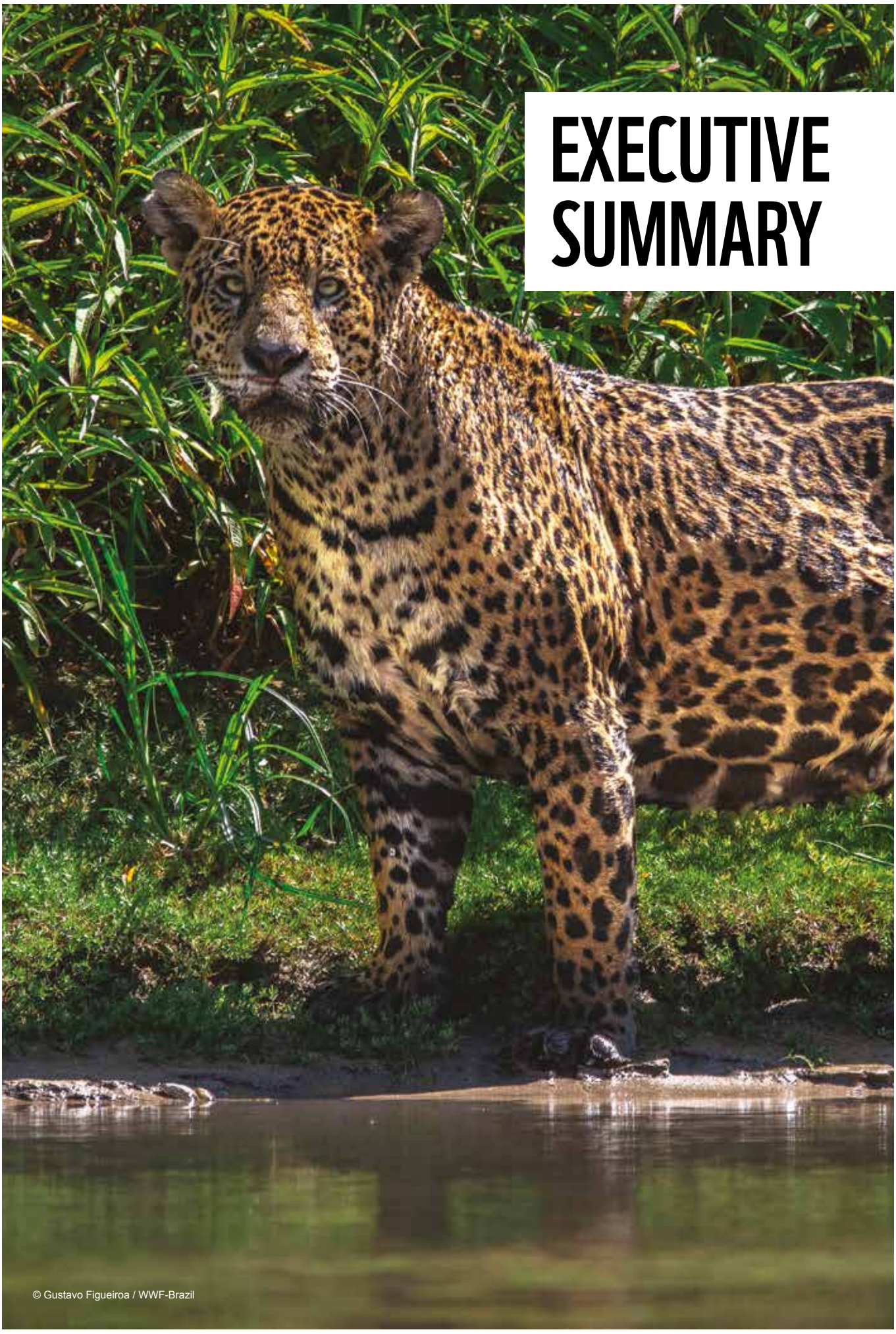
EXECUTIVE SUMMARY



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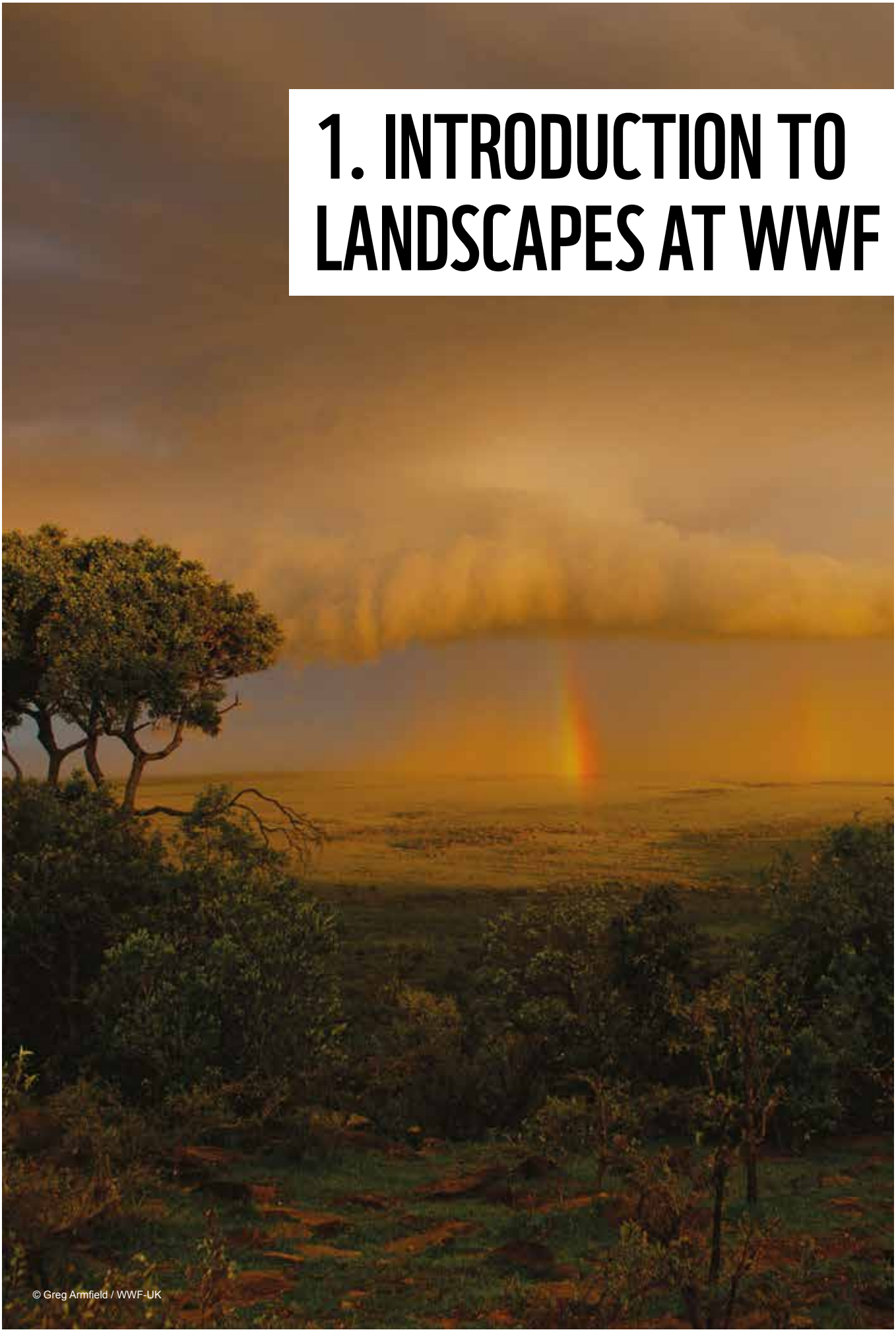
WWF's global site-based conservation programs cover vast areas of countries and continents and, via its landscape approach, invariably has large programs that transcend national boundaries be it for species conservation, forest and habitat protection, or to maintain environmental flows and sustainable use. Past global studies have looked at guidelines and criteria for successful transboundary conservation programs, but a review of practical lessons from the field is lacking. This report reflects on the strengths and challenges of transboundary conservation programs, illustrated by a compilation of lessons from over two decades of work on the ground, and builds on previous knowledge, fills some knowledge gaps, and draws on firsthand practitioners' experiences from 16 of WWF's transboundary landscapes across Europe, Africa, Central America and Asia.

The report highlights the importance of transboundary conservation (TC) and the potential for its impact, and the multiple achievements of various landscapes. All landscape programs older than one year, have made significant progress toward developing transboundary partnerships and have created shared strategies or synchronized actions Formal recognition has been given to the transboundary landscape by national governments or international bodies (in some case formal recognition was achieved sooner than ten years) for nearly all programs that have existed for more than ten years. Beyond the first decade of implementation, some landscapes have achieved significant success in joint recovery of a transboundary species or in reducing a joint threat.

The report also clearly demonstrates the common challenges and barriers to success of transboundary conservation efforts in all locations, and that the challenges have increasing levels of complexity over time. Transboundary efforts begin with a relatively simple catalyst and the need to share information across a border, sometimes between individuals. Over time, the collaboration takes on increasingly complex functions and form, encompasses multiple layers of stakeholder group, and must manage higher level, somewhat policy-centric challenges as the program develops. Ultimately the challenge for NGOs becomes how to continue to fund / support the large institutional framework they have built, as well as the complicated form and functions of the landscape if the participating governments do not take up that role. To address these challenges, project design must first account for and factor in an exit strategy in the long term, and second, that design must account for and be realistic about what can be achieved during the different phases of the program. Program design must take a phased approach starting from relatively simple and informal actions and goals and developed over the longer term (for a minimum of ten years) as more formal processes that reflect higher levels of transboundary socio-political complexity.

Many of the lessons and challenges are common to single country conservation efforts. However transboundary conservation includes added dimensions of complexity arising from the multi-national, multi-state, multi-cultural aspects of a TC situation. And on a day-to-day basis, immediate and ongoing challenges are likely to be cross border issues relating to the degree of border infrastructure, border disputes, military zones, and political differences between neighboring governments.

1. INTRODUCTION TO LANDSCAPES AT WWF



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INTRODUCTION BY ASHLEY BROOKS AND THIBAULT LEDECQ

WWF takes a 'landscape approach' to much of its programmatic work on the ground globally. But what does this actually mean and how does this challenge or enable WWF to reach its goals? WWF's site-based work on the ground recognizes the wider ecological and social contexts within which that site exists.

Transboundary landscapes exist simply because a political line happens to dissect an ecological landscape. Neighboring countries are therefore linked via environmental processes but may not in fact be jointly planning or managing for such transboundary processes. Transboundary conservation (TC) programs exist globally as they are seen to bring the neighbors together to develop processes for maintaining and enhancing environmental flows between them, as well as supporting sustainable development and cooperation in the same space. In many contexts however, the neighbors may be at very different stages of development; not be the best of friends; or have very different national policy agendas. There are two overarching reasons for focusing work at a landscape scale – ecological and socio-cultural.

Ecological: First, the scale of the conservation solution must match that of the problem or threats to the conservation target. Many of WWF's key biodiversity areas, priority species (especially those with large home ranges or migration routes) and habitats, cover large areas that mean they invariably link, or converge, with human dominated areas. These large areas, or land and seascapes, can often be defined clearly by mapping their extent, migration routes (e.g. elephant, wildebeest, whales), or by doing genetic analysis of metapopulations (e.g. jaguar, tiger, rhino), or can more easily be defined by natural barriers (e.g. ecotone, desert, watershed, coast, mountain range). Once the ecological boundaries are determined / estimated, we then tailor our programs at a scale that matches those ecological parameters because all the forces within and on that landscape are those that are contributing to the conservation challenges.

Terrestrial species landscapes are typically a mosaic of natural habitat with no human settlements (e.g. protected areas, tiger reserves, or inaccessible areas), natural habitat with resident communities, and vast areas that include villages, towns and cities, as well as agriculture, industry and transport infrastructure. The human parts of landscapes rely on the services provided by environmental provisions and processes afforded by all the natural parts. And the ecological parts of the landscape rely on the human parts for safe passage and transfer (e.g. of genetic material or nutrient cycling), and the maintenance of the wider mosaic for biodiversity protection. We know, however, that this balance is being severely tested.

Socio-cultural: Second, the human needs must be recognized and considered at the same scale of the conservation challenge, because it is the human side putting pressure on natural systems globally. If we can work to mitigate this impact, plus shift toward sustainable practices, we can, in turn, take pressure off those environmental provisions and services we are trying to sustain across the landscape.

Overall, the approach is considered strategic, holistic and multi-disciplinary as it requires us to find solutions in each of the ecological, social and political spheres. Nested within the large landscapes are the site-based efforts (camera trapping, monitoring, patrolling, species protection, community partnerships) and priority sites (national parks, wetlands, natural forests, endangered species habitat) that underpin, or are the cornerstone of why WWF has a conservation program there. Those sites and efforts within the wider landscape are typically at the highest levels of purpose or vision for the WWF office in that country. Landscape programs in WWF, therefore, seek broad outcomes around maintenance of biodiversity, environmental provisions and services, sustainable economic development and production, and improved protected area management (WWF-International 2019).

Some organizations (and in some contexts, WWF as well) use only site-based, as opposed to, landscape approaches. This means they are focusing their effort largely on key biodiversity areas and not on the entire range or landscape of a given species or environmental service. The justification and scope of their site-based work becomes the site itself, and not the wider ecological context within which that site exists. The

reason for this could include: budget limitations; historical adoption of that site by the organization; strategic selection based on the mission of that organization; or just personal preference / selection. Various organizations believe that supporting the sustenance of separate breeding populations of particular species will be sufficient to maintain them in the long run.

While the landscape approach forces organizations to address increased ecological and socio-political complexity in design, it does offer up multiple challenges and opportunities:

- It firmly links the success of conservation programs with the social processes in the same landscape. While this is similar for conservation at any scale, transboundary conservation increases the level of complexity;
- It challenges what we consider or define as the landscape boundaries. i.e. boundaries could be based on environmental, cultural, or political lines. Regardless of the final mapped product, consensus is key but often takes many years to achieve;
- The need to work with many stakeholders, some of which are not traditional allies of the conservation sector. For instance, multi-stakeholder platforms may need to be established that include extractive industries, high value commodities, or those that are incompatible with our goals. Additionally resources must be devoted to maintaining these platforms;
- The need to try find balance between competing interests. For example, how to balance the need to protect forests for conservation, forests for use and then support the intensification of productive land around them? Examples of viable and scalable projects with strong conservation elements have been difficult to achieve;
- The need to work beyond accepted ecological boundaries. This means a lot of time taken up with work and processes outside where the focal wildlife or forests are;
- Accepting trade-offs and developments, that may not align strongly with the conservation goals, in order to get 'wins' in other parts of the landscape. For example, not opposing a road upgrade across a border, to ensure a nearby by river dam does not proceed by order of the same ministry;
- Supporting development or intensification to ensure food security and productive systems to offset or mitigate pressure on natural habitats;
- Achieving multi-stakeholder consensus / shared understanding on key issues, challenges and opportunities in the landscape;
- Influencing government policy, markets and financial environments that may be negatively impacting the landscape and the conservation goal; and
- Needing to consider all the above but in a transboundary landscape context.

BOX 1: A SNAPSHOT OF TRANSBOUNDARY TIGER LANDSCAPES THAT WWF SUPPORTS

Of the 12 tiger range countries WWF is active in, eight tiger landscapes are transboundary. They are considered to be transboundary in the sense that tigers do, can, or could move across the international border due to current / historical connectivity or dispersal patterns, and that the same levels of protection and management must be afforded to them on both sides of the border.

1. Terai Arc – India, Nepal

2. Transboundary Manas Conservation Area – India, Bhutan

3. Amur Heilong – Russia, China

4. Dawna Tenasserim – Myanmar, Thailand

5. Eastern Plains – Cambodia, Viet Nam

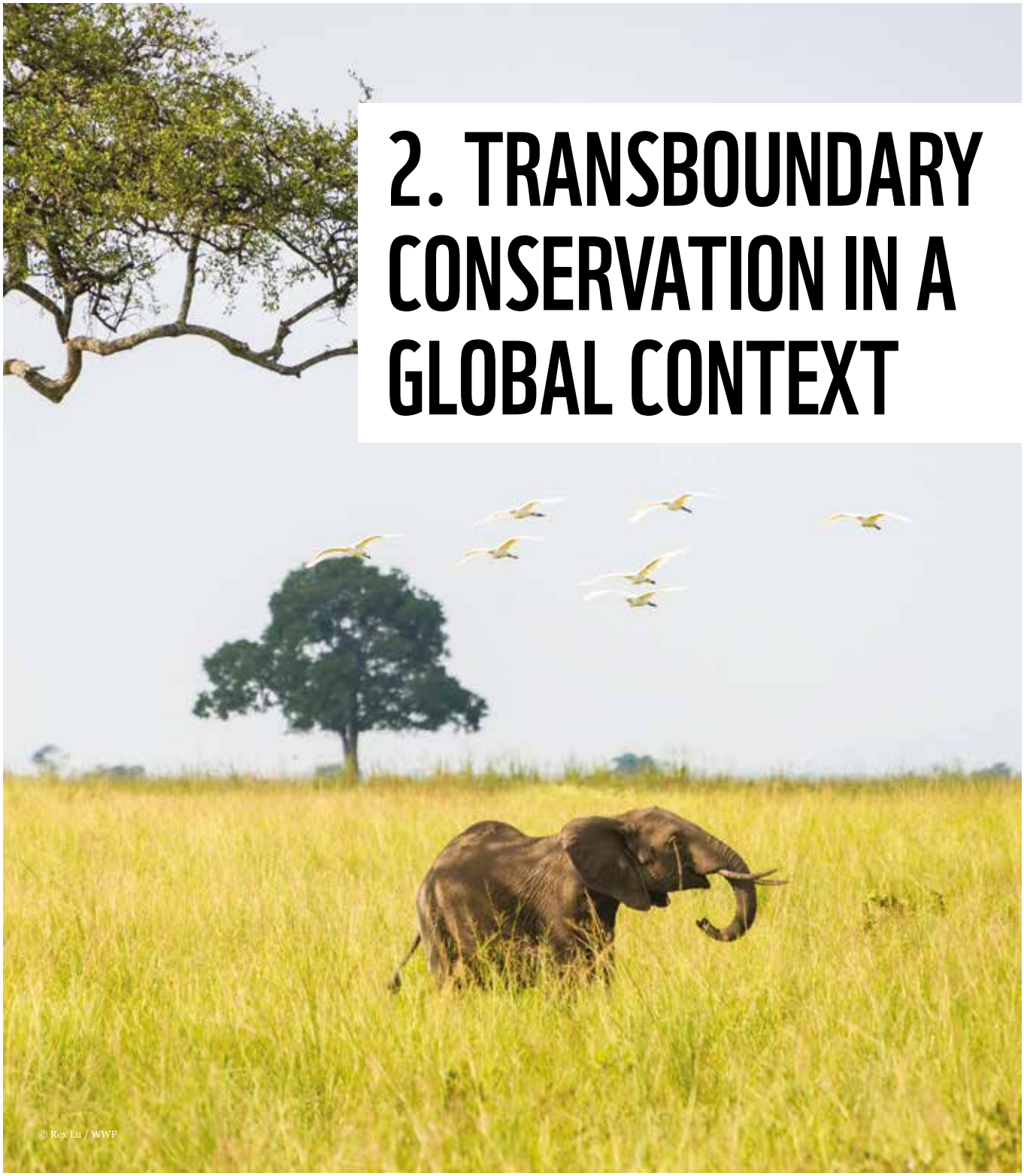
6. Banjaran Titiwangsa – Malaysia, Thailand

7. Sundarbans – India, Bangladesh

8. North West Myanmar – Myanmar, India (A non-WWF supported tiger landscape)

Each of the landscapes varies in terms of their socio-ecological and political elements and accordingly their transboundary work. Some (Terai Arc and Transboundary Manas) have extensive formal management arrangements for joint monitoring, data sharing, regular mechanisms for decisions-makers to physically meet, joint management planning, and resources devoted to transboundary activities. Others (Dawna Tenasserim, Sundarbans and Amur-Heilong) have some of these systems in place and would be considered to be on a trajectory toward more systematic joint work and planning. Some landscapes recognize their transboundary linkages but after discussions have only led to proposals to coordinate effort (Eastern Plains), while others (Banjaran Titiwangsa and North West Myanmar) at the time of writing only had incipient plans to work across the border despite the critical need for tiger recovery.

2. TRANSBOUNDARY CONSERVATION IN A GLOBAL CONTEXT



Since the first internationally recognized “transboundary conservation areas” were established in 1925, there are now an estimated 227 globally, with an acceleration in their establishment over the past three decades (Vasilijevic et al. 2015). Historically, transboundary conservation areas were not established for the purposes of biodiversity protection or ecological considerations – they were established with the desire to improve peace between countries and to increase economic partnership and prosperity (Hanks 1997).

More recently, TC has been recognized and integrated into international environmental conventions including Ramsar, the World Heritage Convention, the CBD PoWPA, and the UNESCO Man and the Biosphere Programme. TC has also been incorporated into regional programs such as the Southern Africa Development Community, EU Natura 2000 Network, and the International Centre for Integrated Mountain Development.

The international boundaries that divide the earth into countries sometimes cut through otherwise ecologically connected areas (Lopez-Hoffman et al. 2010). Transboundary conservation is an approach to help better manage the biodiversity of such areas through cross-border programs and actions.

The major benefit of carrying out TC is that it can help protect shared biodiversity or achieve conservation targets, by managing the area as a whole, rather than as independent component areas (Busch 2008, Dallimer and Strange 2015). Joining forces around an ambitious conservation target that requires multi-stakeholder solutions through a transboundary conservation approach also stimulates or enhances conservation efforts across large areas. TC has the potential to help secure the future of species that need to be able to move between areas separated by an international border to survive and reproduce. Such species may either be impeded in their movement by a physical barrier, or face threats that are most effectively addressed by a TC approach (Kark et al. 2015). For example, TC is needed to help protect African elephants and mountain gorillas from the threat of poaching linked to civil war across the Greater Virunga Landscape of Uganda, Rwanda, and Democratic Republic of Congo (Plumptre et al. 2007).

Transboundary efforts at landscape scale may also yield multiple socio-economic benefits as well:

- Enhanced ecosystem services through securing biodiversity and shared ecological processes (de Groot et al. 2002, Worm et al. 2006), and providing a mechanism for upstream / downstream issues to be addressed. For instance, allowing downstream countries to engage on issues that affect them (e.g. hydro power, roads, forests, clearing);
- Improved peace and security through building trust and cooperation between governments and other stakeholders (Barquet et al. 2014);
- Increased cultural exchange that enriches ties between stakeholders who would otherwise not have the opportunity to interact due to the restrictions in movement imposed by the international border (Erg et al. 2012, Mackelworth 2012, Vasilijevic et al. 2015);
- Improved livelihoods potential and economic opportunity from increased tourism, trade, and access to markets, jobs and training (Lim 2016a); and
- Intactness of habitat and connectivity help to mitigate effects of long-term stressors like climate change (Thornton et al. 2020).

Those involved in carrying out the TC work may also benefit from:

- Reduced costs from sharing resources (e.g. staff, equipment, infrastructure) with other TC partners (Kark et al. 2015, Vasilijevic et al. 2015);
- Increased funds from larger-scale projects developed with TC partners and wider stakeholder groups (Lim 2016a);
- Improved planning and decision-making supported by sharing of knowledge and skills between TC partners (Sick 2002, Erg et al. 2012);
- Improved efficiency due to the application of standardized approaches (Sick 2002);
- Increased political capital that can be used to positively influence policy for the improved protection of biodiversity on either side of the border;
- Improved transparency of conservation efforts, by raising the associated communications and oversight from a national to an international level;
- Enhanced governance and equity among the sites an opportunity to jointly amplify the efforts (Lim 2016b);
- Preservation of traditional knowledge, cross pollination of ideas and sharing exemplar practices (Rodrigues and Fischborn 2016); and
- Integration of natural resource management largely when the transboundary countries rely on common shared natural resource/s (Strosser et al. 2017).

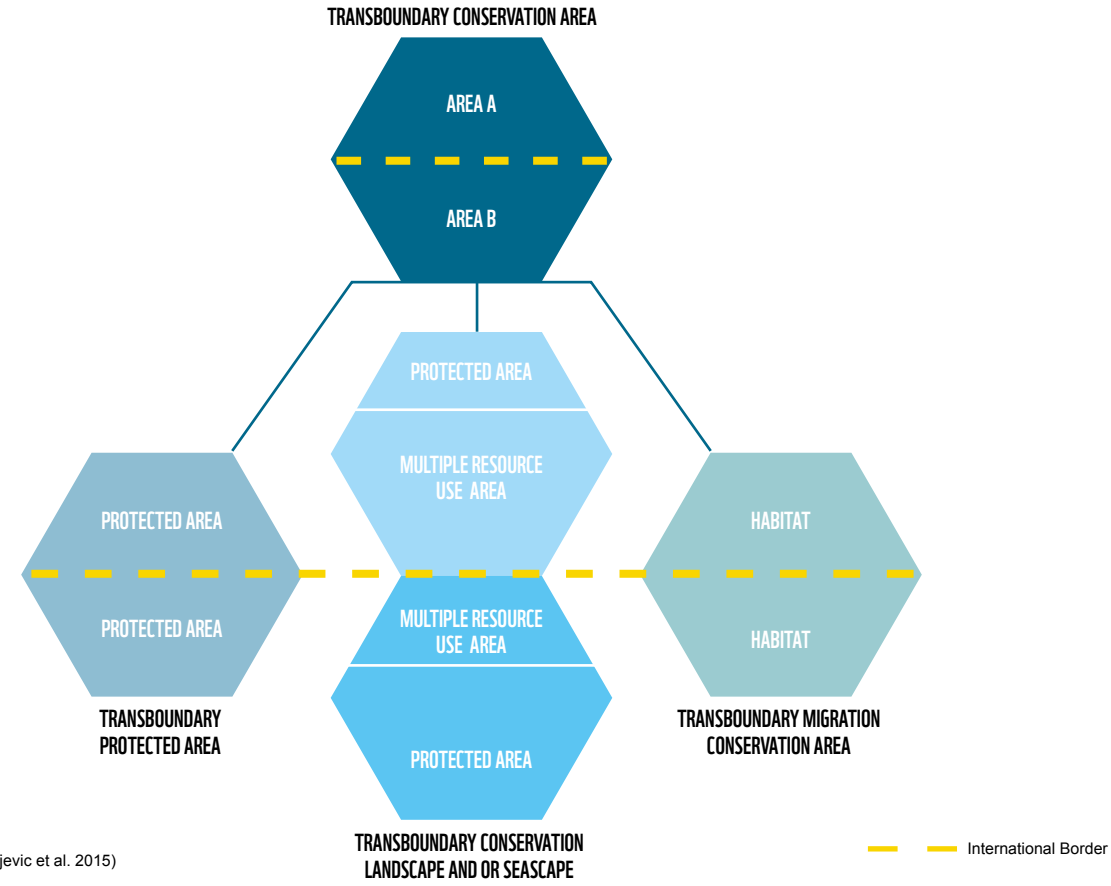
2.1 THE TYPOLOGY OF TRANSBOUNDARY CONSERVATION LANDSCAPES

A transboundary conservation landscape can be defined as an area that is divided by international boundaries and covers large-scale, interconnected – terrestrial and marine – ecosystems (Mayoral-Phillips 2002). There are three recognized types of transboundary conservation landscape as defined by (Vasilijevic et al. 2015) (Figure 1) (NOTE: While (Vasilijevic et al. 2015) uses the terminology “area”, for consistency of language, we use “landscape” throughout the report):

Type 1: Transboundary protected area: An officially defined set of protected areas that are ecologically connected across one or more international boundaries, e.g. the Si-A-Paz area of Costa Rica and Nicaragua;

Type 2: Transboundary conservation area: An ecologically connected area that includes both protected areas and multiple resource use areas across one or more international boundaries, e.g. the Terai Arc of Nepal and India; and

Type 3: Transboundary migration conservation area: An area connected across two or more countries that are necessary to sustain populations of migratory species e.g. the Serengeti-Mara ecosystem of Tanzania and Kenya.



Source: Adapted from (Vasilijevic et al. 2015)

FIGURE 1: TRANSBOUNDARY CONSERVATION AREA TYPES.

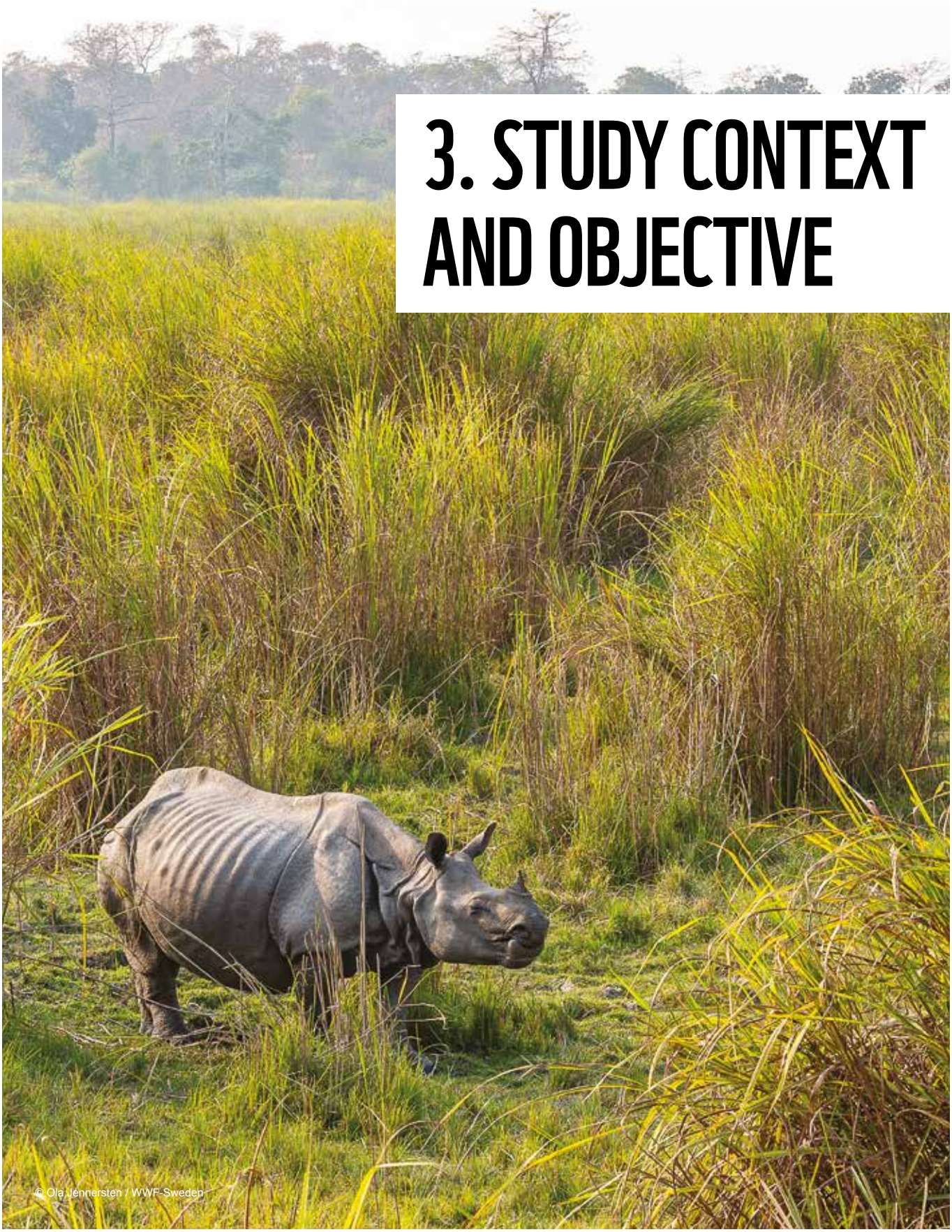
2.2 GLOBAL LESSONS FROM TRANSBOUNDARY CONSERVATION

As a TC approach is being applied to an increasing number of sites globally, a significant body of knowledge is emerging that can help guide TC effectiveness and inform future efforts. Lessons learned and challenges have been used to develop a set of common principles (Phillips 1988), IUCN best practice guidelines (Vasilijevic et al. 2015), and criteria for initiating a TC effort (Erg et al. 2012).

Transboundary conservation invariably throws up some key challenges given the scale and the cross-border limitations to decision-making. TC efforts have also been found to be hampered by cross-border differences in capacity, economic development, language, wildlife and immigration laws, and culture (Hamilton et al. 1996). While TC can help improve relations between states, it can also increase / re-awaken conflict by providing a platform that one state can use to try gain legitimacy over transboundary areas / resources that have been part of long running militarized disputes between the neighboring countries (Barquet et al. 2014, Barquet 2015). Also, the prospect of including partners from other countries in decision-making processes that effect areas of a particular country may dissuade government partners from participating in or supporting TC efforts if they perceive such an initiative as leading to an infringement on their sovereignty (Lim 2016a). TC can also lead to a centralization of power that disenfranchizes groups such as local communities from the management of and access to the natural resources upon which they survive (Duffy 2006). Acquiring long-term funding is also a major challenge considering that the normal project timeframe of 1-3 years does not match with the decades needed to establish a TC approach and realize the desired results of that work (Lim 2016a).

The complexities of seeking conservation goals across neighboring international borders invariably means that transboundary conservation initiatives are delivered through various forms. Depending on the context, transboundary landscapes could be governed by governments, private landowners, NGOs, local communities and or indigenous people, or a combination of all these with some level of shared governance (Mckinney 2015). Effective TC is, therefore, achieved through anything from very formal cooperation and treaties between states (Mackelworth 2012), to very informal, grass-roots initiatives that are catalyzed and convened by local people (Mckinney 2015) or neighboring park managers (Vasilijevic et al. 2015). The lesson emerging from the literature is that TC landscapes can evolve from being informal to more formal as greater certainty develops on issues of shared governance, local support, and feasibility of the program (Zunckel 2014). The structure of TC landscape governance at any given time, while determined by local context, is critically dictated by the purpose of the TC landscape and its age in terms of implementation. For instance, the older the TC initiative, the more likely it is that it has evolved from being an informal action to one with much more formal governance structures.

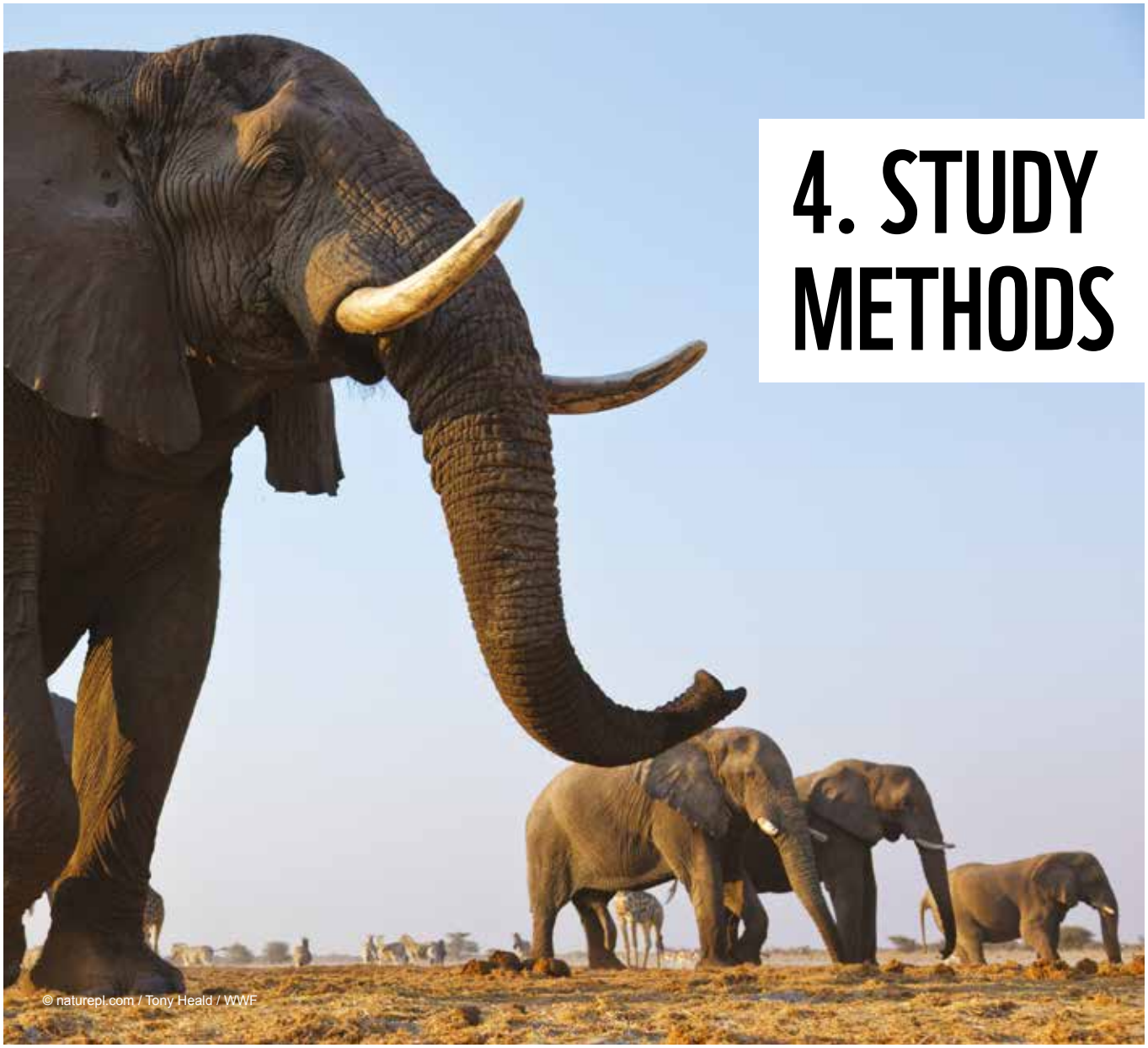
3. STUDY CONTEXT AND OBJECTIVE



Previous studies and reports have dealt with general principles, challenges, and solutions of transboundary conservation (Braack et al. 2006, Busch 2008, Erg et al. 2012, Schoon 2013, Barquet et al. 2014, Zunckel 2014, Kark et al. 2015, Mckinney 2015, Vasilijevic et al. 2015, Mattsson et al. 2019). Additional studies have illustrated plans for and progress of TC case studies (Refisch and Jenson 2016, Authier et al. 2017, Sloan et al. 2019).

The objective of this study is to add to this body of knowledge by capturing additional insights from transboundary conservation practitioners and increase the effectiveness of TC work in the future.

4. STUDY METHODS

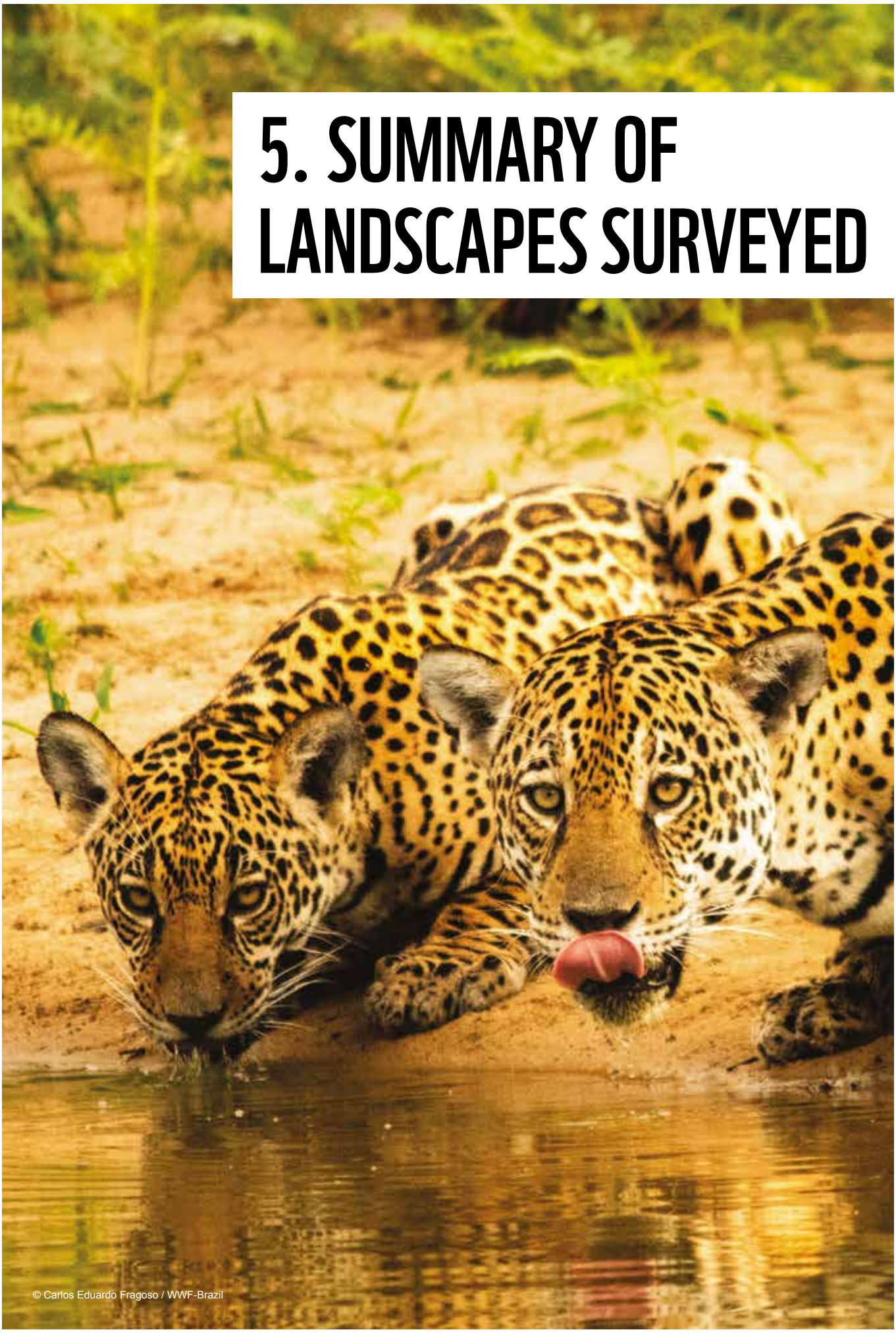


The methods for this study comprised of:

- Literature review: A literature review was used to capture as much information from sites globally to develop a solid understanding of current and historical discourse on transboundary landscapes. The review sought to explore global transboundary initiatives to look at the challenges and lessons learned from all aspects of transboundary landscapes, including governance, evolution, monitoring, sharing of data, legal and policy issues, impact, and measures of success;
- Practitioner survey: A total of 23 transboundary conservation practitioners were surveyed through an online survey and remote interview, to gain insights from their experiences. The practitioners were all from WWF (22 staff) and WildTeam (1), but had experience working with a wide range of stakeholder types through their work. The practitioners represented a total of 16 transboundary landscapes across Asia, Europe, Africa and South America (Table 1);
- Practitioner workshop: A workshop to gain further TC insights from conservation practitioners was held over two days in Hua Hin, Thailand. The workshop was attended by 19 conservation practitioners (Annex 7.2), with all but one having completed the practitioner survey. The workshop was based on a 'deep dive' design of problem solving from information gathered from the literature review and practitioner survey. Sessions were made up of group exercises designed to help participants use their experience to identify and generate shared insights and solutions; and
- Final report: The study findings from the literature review, practitioner survey and workshop were combined to develop this report and the set of key lessons learned and challenges to inform future TC design and efforts.

The source of the information for the content of the results presented below is indicated as coming from the survey (S) or workshop (W). Otherwise, citations are provided where the survey or workshop results are in line with a previous finding in the literature. Any information or guidance provided where the source is not indicated has been added by the authors based on their overview of the information base, combined with their own conservation experiences.

5. SUMMARY OF LANDSCAPES SURVEYED



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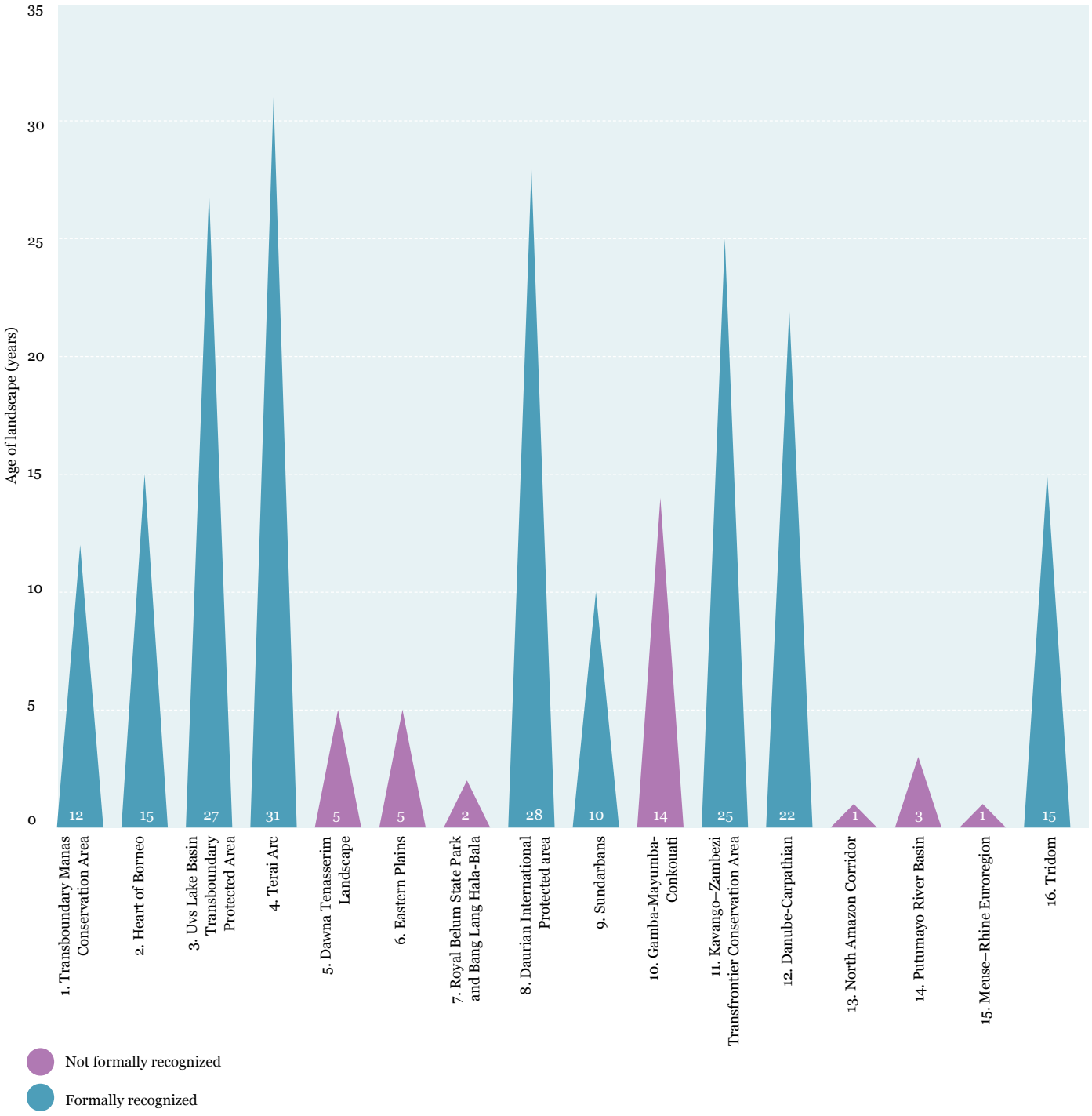
The 23 practitioners who responded to the survey had a combined total of 167 years' experience working on transboundary conservation issues across 16 transboundary landscapes (Table 1) (For detailed case studies refer Section 9.4). Of the 16 transboundary landscapes surveyed, nine were in Asia, three in Africa, two in Europe and two in Central America. The time period in which those transboundary landscape have been in effect ranged from one to 31 years and all the landscapes were either Type 1 or Type 2, with no Type 3 landscapes surveyed (refer Section 2.1).

Nine of the landscapes surveyed had been fully and formally recognized by the participating governments, and seven landscapes were only recognized by the implementing NGO (Figure 2). There was a clear distinction between the timespan of transboundary conservation work and the formal recognition of the landscape by participating governments – all but one landscape older than 10 years had achieved formal government recognition.

TABLE 1: TRANSBOUNDARY CONSERVATION AREA CASE STUDIES REVIEWED FOR THIS STUDY.

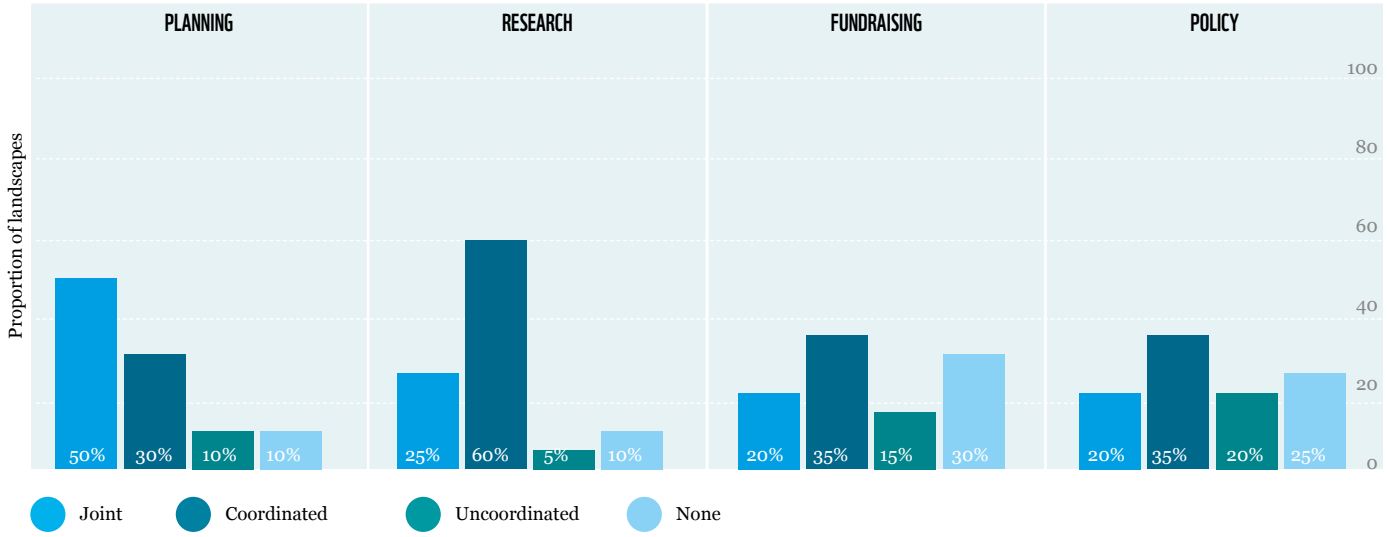
#	LANDSCAPE	COUNTRIES	AREA (KM2)	CATALYST FOR COLLABORATION	TC COMMENCED	TC TYPE	RECOGNITION
1	Transboundary Manas Conservation Area	Bhutan, India	6,764	Tiger, Indian one horned rhinoceros, elephant, golden langur, wild buffalo	2008	2	Not officially declared in India at the federal level. A formal agreement between Bhutan and India still in progress.
2	Heart of Borneo	Brunei, Indonesia, Malaysia	220,000	Bornean elephant, clouded leopard, Bornean orangutan	2005	2	Formally recognized through a declaration signed by all three governments in 2007.
3	Uvs Lake Basin Transboundary Protected Area	Mongolia, Russia	12,169	Snow leopard, Argali sheep, migratory bird species	1993	1	Formally recognized by both governments in 2011.
4	Terai Arc	India, Nepal	51,002	Tiger, Indian one horned rhinoceros, elephant	1989	2	NGO collaboration started in 2006. Formally recognized by both governments in 2012.
5	Dawna Tenasserim Landscape	Myanmar, Thailand	178,000	Tiger, elephant, gaur, banteng, clouded leopard, Malayan tapir, wild dog, Siamese crocodile	2015	2	Not formally recognized by the governments but is recognized by NGOs.
6	Eastern Plains	Cambodia, Viet Nam	16,000	Elephant, leopard, gaur, banteng, ibis and water birds, tiger preys, sarus crane, langur	2015	1	Not formally recognized by the governments but is recognized by NGOs.
7	Royal Belum State Park and Bang Lang Hala-Bala	Malaysia, Thailand	1,175	Tiger, elephant, gaur, dhole, leopard, clouded leopard, sun bear, tiger prey, hornbills	2018	1	No official recognition.
8	Daurian International Protected area	China, Mongolia, Russia	5,740	Daurian steppe, wetlands and biodiversity (migratory birds and ungulate)	1992	1	Formally recognized by three countries' governments in 1994.
9	Sundarbans	Bangladesh, India	10,000	Tiger, Gangetic river dolphin, mangrove forest	1995	2	No official recognition.
10	Gamba-Mayumba-Conkouati	Gabon, Republic of the Congo	7,530	Nile crocodile, leatherback turtle, western gorilla, forest elephant	2006	1	Not formally recognized by the governments but is recognized by NGOs.
11	Kavango–Zambezi Transfrontier Conservation Area	Angola, Namibia, Botswana, Zimbabwe, and Zambia	519,912	African elephants, black rhinoceros, African lions	1995	2	Formally recognized by Treaty by all governments in 2011.
12	Danube-Carpathian	Ukraine, Poland, Czech Republic, Montenegro, Moldova, Switzerland, Austria, Hungary, Romania, Bulgaria, Slovakia, Serbia, Bosnia and Herzegovina, Croatia.	190,000	Bison, wolf, brown bear, wetlands, and freshwater species	1998	2	Some proportion of this landscape is recognized under the Carpathian Convention signed by seven countries. The wider landscape has not been officially recognized.
13	North Amazon Corridor	Ecuador, Colombia and Peru		Jaguar	2019	2	No formal recognition.
14	Putumayo River Basin	Ecuador, Colombia and Peru	16,479	Shared threats-based program	2017	2	No formal recognition.
15	Meuse–Rhine Euroregion	Belgium, Germany, Netherlands	11,000	Wildcat, otter and wolf	2019	2	Formally recognized by all governments.
16	Tridom	Cameroon, the Republic of Congo, Gabon	178,000	Forest elephants, lowland gorilla, chimpanzee	2005	2	Formally recognized by all governments.



Note: Age of landscape: number of years since transboundary conservation work commenced by the NGO; Full landscape case study details in Table 1.

FIGURE 2: FORMAL GOVERNMENT RECOGNITION OF TRANSBOUNDARY LANDSCAPES VERSUS AGE.

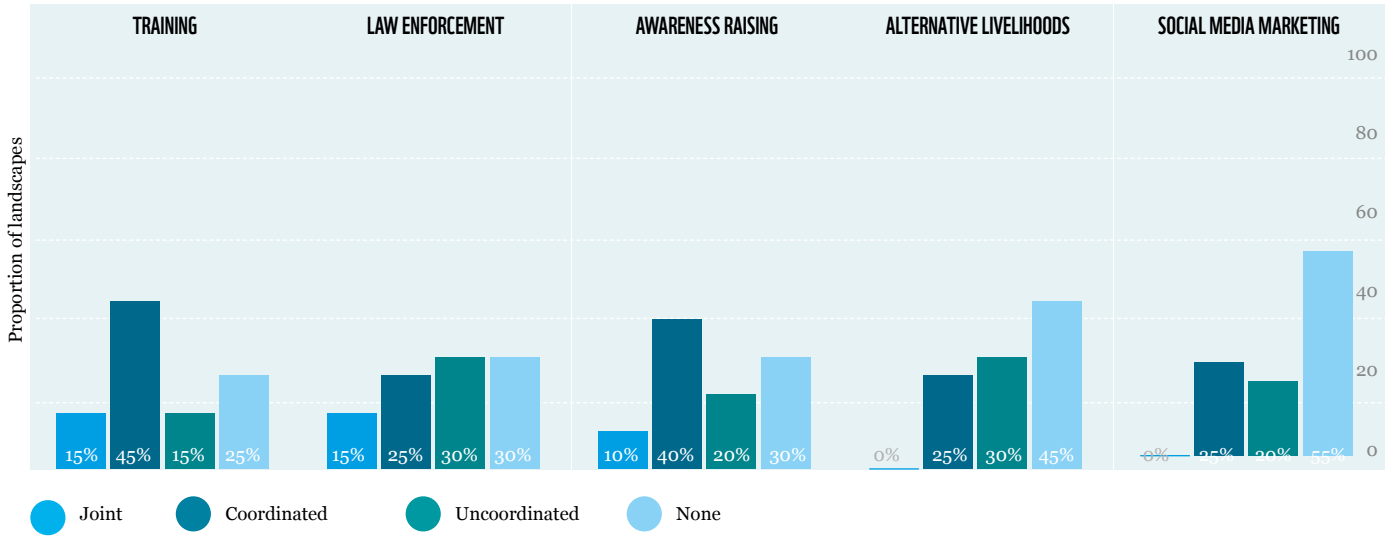
The overarching management components implemented across the landscapes were management planning, research, fundraising, and policy support (Figure 3). Significantly, half of the landscapes conducted joint planning across the borders, and a quarter did joint research. Where planning and research were not jointly implemented, there was coordination of effort and outputs with 30% of landscapes coordinating their planning, and 60% coordinating research effort.



Note: Joint activity: carried out by cross border partners at the same time, using shared resources and the same approach; Coordinated activity: carried out independently (at different times and / or using different resources and approaches); Uncoordinated activity: carried out to help achieve TC objectives, but that has not been agreed to with the transboundary partner; None: an activity not carried out for TC purposes.

FIGURE 3: STRATEGIC COMPONENTS IMPLEMENTED ACROSS ALL TRANSBOUNDARY LANDSCAPES SURVEYED.

The main thematic areas of activity included training, law enforcement, awareness raising, alternative livelihoods programs and social marketing (Figure 4). While joint training and law enforcement actions were only held in 15% of landscapes, there were coordinated training efforts across almost half of all landscapes and coordinated community awareness raising across 40% of the landscapes surveyed.



Note: Joint activity: carried out by cross border partners at the same time, using shared resources and the same approach; Coordinated activity: carried out independently (at different times and / or using different resources and approaches); Uncoordinated activity: carried out to help achieve TC objectives, but that has not been agreed to with the transboundary partner; None: an activity not carried out for TC purposes; Social marketing: behavior change and communications campaigns.

FIGURE 4: OVERARCHING ACTIVITIES IMPLEMENTED ACROSS TRANSBOUNDARY LANDSCAPES SURVEYED.

Overwhelmingly the survey respondents indicated that the transboundary approach was beneficial for enhancing knowledge (92% of respondents), as well as increasing conservation impact toward the landscape's goal (83%).

Furthermore, the approach was considered beneficial for increasing funding support, but half of the respondents recognized the approach did not reduce overall costs of their transboundary program (Figure 5).

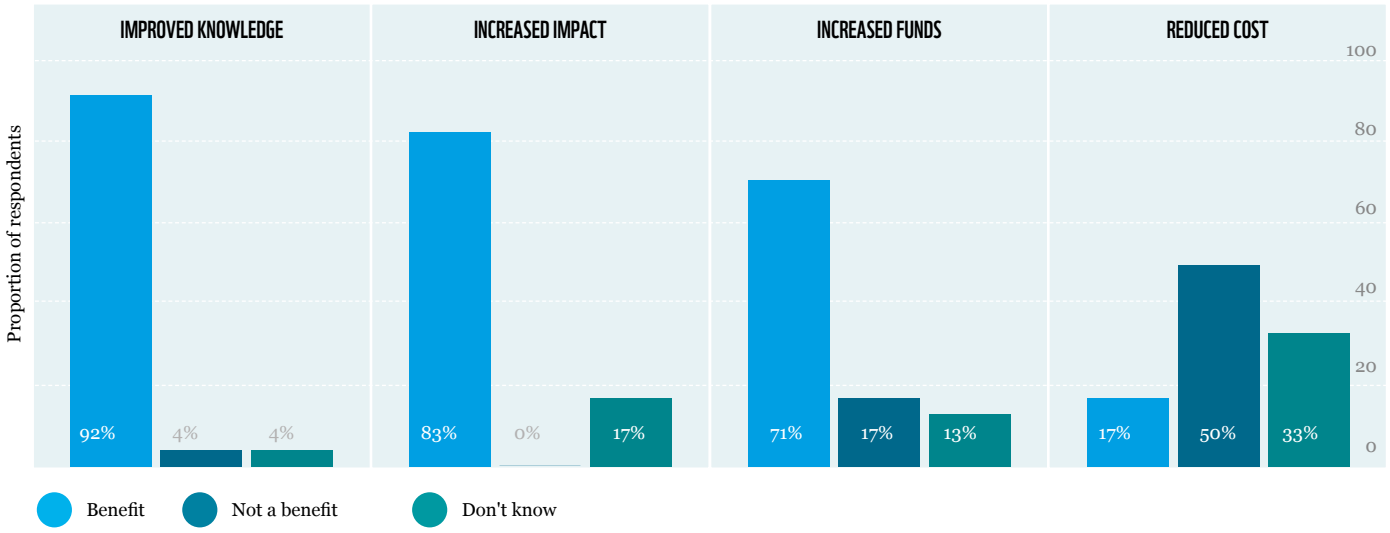


FIGURE 5: BENEFITS OF THE TRANSBOUNDARY CONSERVATION APPROACH ACROSS LANDSCAPES SURVEYED.

The most common organizational barriers to TC landscape effectiveness and impact were funding constraints, legal impediments, resource imbalances (where resources and work effort contributions from each transboundary partner were unequal), and institutional support by NGO (Figure 6). The majority of respondents (71%) considered funding constraints to be the biggest barrier. While 63% identified the legal complexities of working across borders to be a significant constraint. Resource imbalances and institutional support were generally equally regarded as barriers and not barriers by respondents.

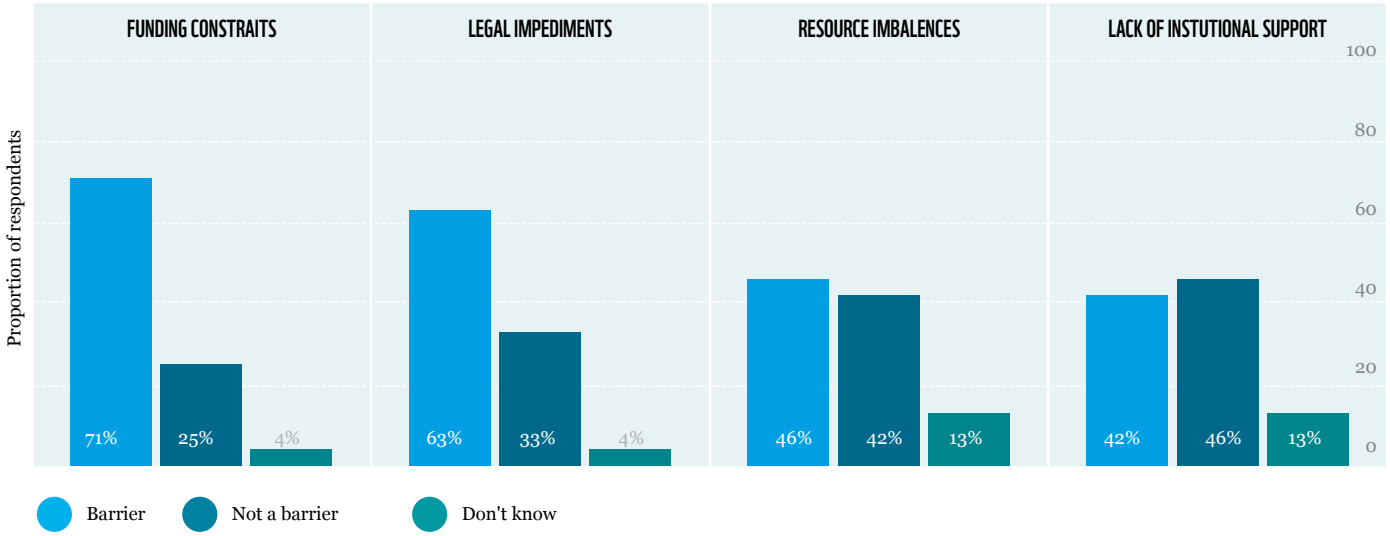


FIGURE 6: COMMON ORGANIZATIONAL BARRIERS TO TRANSBOUNDARY CONSERVATION EFFECTIVENESS.

In terms of the human resource barriers, respondents identified time, tools, trust between the transboundary partners, skills, and cultural differences to be the most common (Figure 7). However, other than cultural differences, none of these clearly stood out either as a barrier or not to the TC work. Cultural differences were suggested by 71% of respondents to be largely irrelevant as a barrier to TC work. This may reflect the cultural similarities of neighboring countries or may be more simply that landscapes by nature are culturally complex anyway, whether they are transboundary or not.

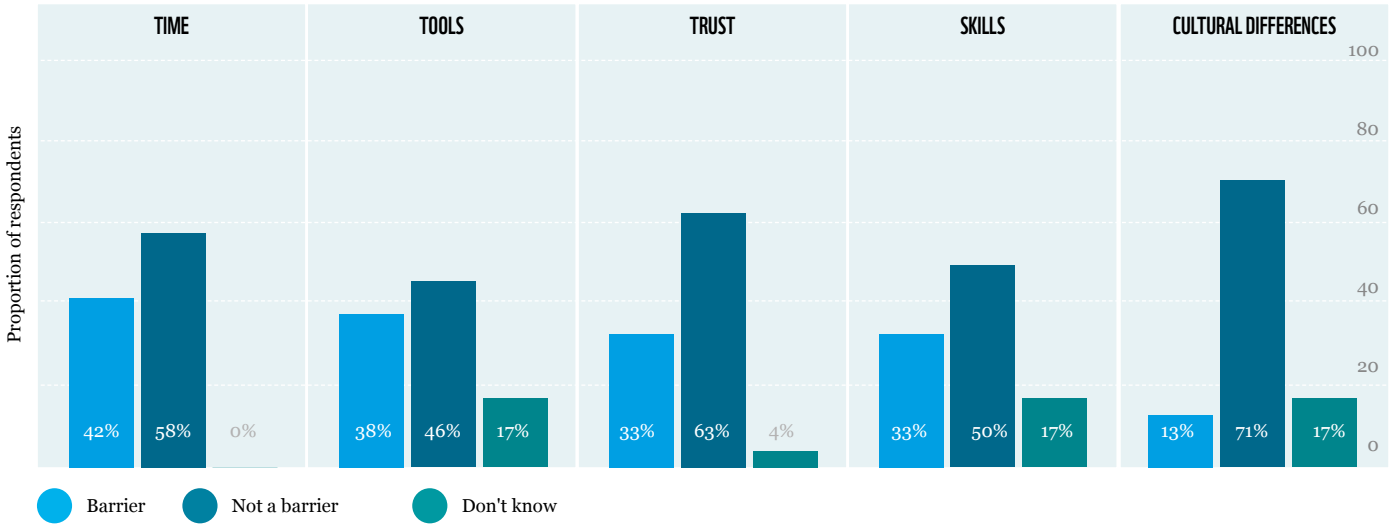
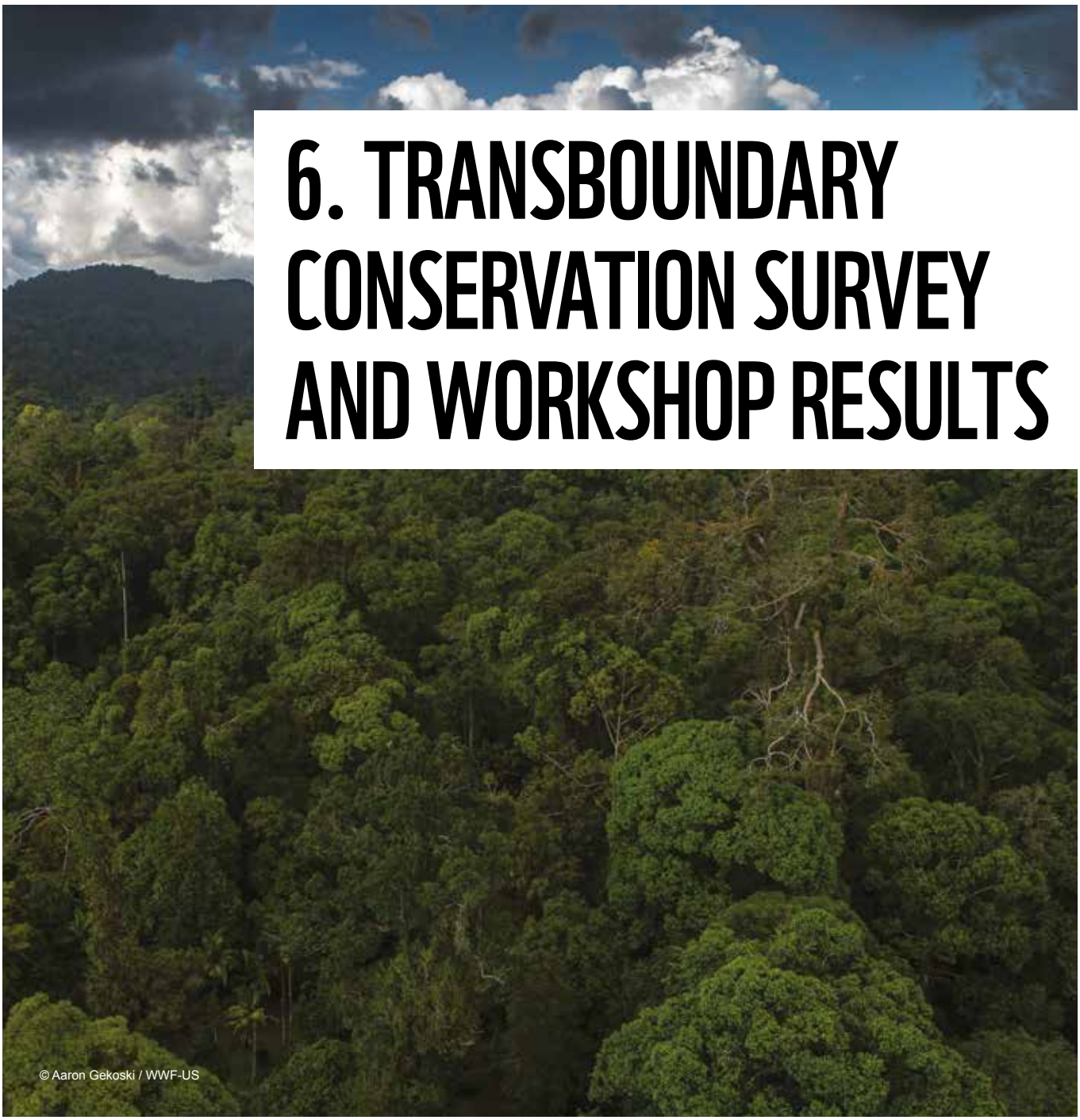


FIGURE 7: COMMON HUMAN RESOURCE BARRIERS TO TRANSBOUNDARY CONSERVATION EFFECTIVENESS.

6. TRANSBOUNDARY CONSERVATION SURVEY AND WORKSHOP RESULTS



For all the landscapes surveyed, the shared reason for collaboration was clear – either large ranging or migratory species, or a shared key biodiversity area (Table 1). This 'catalyst', or shared objective, must always be in place in order to begin the process of partnering with a neighbor to enable its joint protection or management.

Beyond this catalyst, however, the specific needs for establishing a transboundary conservation landscape or partnership are less clear and invariably will be site / context specific. Some of the key principles needed to initiate transboundary conservation have been previously developed and detailed (Box 2) (Erg et al. 2012). In each of the landscapes surveyed, the establishment of the transboundary conservation work typically began through initial discussions with the field staff who had identified a shared problem / objective, then led to joint meetings and government participation, and in most cases ultimately led to government endorsement (Table 2).

Results discussed herein are sourced from either: the workshop discussion and cited with "W"; the survey of practitioners and cited with "S"; or from the literature and cited accordingly.

BOX 2: TEN PRINCIPLES FOR INITIATING A TRANSBOUNDARY CONSERVATION APPROACH.

1. Catalyst: The need to create partnerships that accelerate and enable the work;
2. Leadership: Capacity for providing direction, collaborating, integrity, management under conditions of uncertainty and change;
3. Representation: Inclusion of all stakeholders necessary for achieving the desired results;
4. Regional fit: Definition of the TC landscape can be flexible and its definition must engage the emotions and intellect of the stakeholders involved;
5. Governance: Stakeholders need to put in place the necessary processes to manage the work;
6. Knowledge and experience sharing: Stakeholders need to develop a shared understanding of the situation and a joint approach to improving that understanding over time;
7. Strategy: A shared plan is needed to provide a common direction for all stakeholders;
8. Implementation: The benefits of TC need to be demonstrated to government and other decision makers;
9. Outcomes: Achievements relating to TC management and conservation impact should be monitored; and
10. Adaptation: The strategy should be updated in response to changing understanding and conditions.

Source: Erg et al. 2012.

Beyond the principles of Erg et al (2012), the present research identified five process lessons for establishing transboundary conservation programs, as well as captured overarching achievements and common challenges of TC work:

1. Reach out to build trust
2. Collaborate to accelerate
3. Assign resources for transboundary actions
4. Involve donors from the start
5. Be clear on the role of the NGOs
6. Achievements
7. Common challenges to transboundary conservation

6.1 REACH OUT TO BUILD TRUST

In order to create and foster transboundary conservation, it is necessary to build trust between potential partners who may have either had no previous contact or may dislike one another due to existing grievances (W) (Erg et al. 2012, Barquet et al. 2014). Creating an atmosphere of trust can be enabled through establishing positive communication channels between potential partners (S). An easy place to start this process is for a stakeholder to share their information base with others (S). For instance, an NGO could send their preliminary data from a recent tiger population survey to an NGO on the other side of the border working on tigers in the same transboundary landscape. Initial efforts to reach out remotely can be built on by organizing face to face meetings in which common topics can be discussed and each partner can present their own knowledge base to others. These meetings can start very informally between two personal contacts and then, as trust is established, gradually develop into larger, more formal events that include multiple stakeholders (W, S). Holding an initial 'mini-conference' on-site with researchers, practitioners and government representatives working on the shared subject, is a potentially great opportunity to present and agree on all the existing information and the parameters for future transboundary work, but also for establishing those initial network contacts (W, S). Establishing these early communication channels will provide the means through which stakeholders can further develop their shared TC strategy (W, S). For example, TC efforts in the Trans Boundary Manas Conservation Area of India and Bhutan started out in 2008 through a small working group of NGO and government staff who met to share information and identify common issues. Building on that foundation additional stakeholders joined the partnership and formal processes were established between the Indian and Bhutanese governments to manage the TC work over the next ten years (S) (Table 2).

TABLE 2: SNAPSHOT OF HOW EACH TRANSBOUNDARY LANDSCAPE WAS INITIATED.

#	CASE STUDY LANDSCAPE	HOW IT WAS DEVELOPED
1.	Transboundary Manas Conservation Area	A joint meeting of park managers and community leaders facilitated by WWF India and Bhutan to identify and promote transboundary conservation, joint patrolling and enforcement.
2.	Heart of Borneo	Through an advocacy process led by WWF Indonesia and WWF Malaysia with outreach to Brunei to host the first government discussions as a stepping stone to a formal declaration three years later.
3.	Uvs Lake Basin Transboundary Protected Area	Initial establishment of a transboundary protected area followed by ministerial level meetings.
4.	Terai Arc	WWF India and WWF Nepal led the process with the government through joint meetings, with a view to developing common joint strategies to address transboundary conservation issues.
5.	Dawna Tenasserim Landscape	Originally based on a WWF ecoregion, transboundary work developed through joint discussion between WWF Thailand and WWF Myanmar.
6.	Eastern Plains	Through exchange visits by provincial delegates to either side of the border.
7.	Royal Belum State Park and Bang Lang Hala-Bala	Incipient government level discussions.
8.	Daurian International Protected area	Developed as part of the Amur Heilong Ecoregion.
9.	Sundarbans	Initially through the Sundarban Delta Vision, and then a World Bank program initiative to support operationalization of the Sundarbans agreement through enhanced bilateral and technical cooperation.
10.	Gamba – Mayumba – Conkouati	Donor driven push in accord with the ecoregional approach.
11.	Kavango – Zambezi Transfrontier Conservation Area	Government led process leading to formal agreement.
12.	Danube – Carpathian	Initially a WWF regional program, which then became a Convention under UNEP.
13.	North Amazon Corridor	Initially an EU project between Ecuador, Colombia and Peru for conservation of protected areas of the 3 countries.
14.	Putumayo River Basin	WWF led regional program.
15.	Meuse – Rhine Euroregion	Informal stakeholder meetings, which led to identification of common goals and work plans.
16.	Tridom	WWF groundwork and projects used to facilitate the decision-making process at strategic level, and then heads of state signed a joint agreement.

6.2 COLLABORATE TO ACCELERATE

In instances when a high level of formality is required, it may be necessary to persuade governments to get involved. However, even if the groups engaging in transboundary efforts are part of an international coalition, each partner will be a single, distinct organization, based in one country and with its own individual network and reputation. Each partner, therefore, will have some level of influence over the government in its own country, but will have little or no initial influence of other countries' governments. To encourage each government to engage in a TC approach, each partner should, therefore, aim to form cross-border understandings with other stakeholders to create a common knowledge base and a shared approach that can be used to jointly lobby each government for the purpose of acquiring their active participation in the TC process (S). In addition to making it more likely that each government will participate, creating such a united front may also form the basis for cross-border facilitation of the whole TC approach (Erg et al. 2012), S). For example, to enable high-level recognition of the TC work in the Terai Arc Landscape of India and Nepal, WWF India and WWF Nepal worked together to lobby for the engagement of the respective governments by arranging several coordination meetings and exposure visits to share learning and develop a shared TC strategy (S) (Table 2).

6.3 ASSIGN RESOURCES FOR TRANSBOUNDARY WORK

Even if all other factors are in place for initiating a TC approach, the speed at which the work progresses will be largely dependent on what staff time, along with expertise, each partner can dedicate to it (W, S). The amount of staff time each partner will need to assign for TC work will increase over time as the partnership develops and the TC work increases in complexity and scale. What starts out as a part-time assignment for one member of staff may, therefore, develop into a full-time assignment for one or more staff members (S). For example, WWF have assigned a staff member to work full time to support the TC of the Dawna Tenasserim Landscape of Thailand and Myanmar (S). Whatever staff time each partner needs to allocate for the TC work, each partner should assign a main point of contact for driving forward the TC work on their behalf (S), but be mindful of ensuring that staff time is spent efficiently and effectively to achieve the goals of the TC landscape (W).

6.4 INVOLVE DONORS FROM THE START

Carrying out TC activities will incur a cost to each partner to cover the staff time and logistics they expend (Erg et al. 2012). TC work is also likely to require decades to put in place a partnership that can go on to achieve meaningful conservation results. Shortfalls in funding for any partner will delay their ability to participate in and contribute to the TC work. It is, therefore, important to include at least one donor at the start of the TC process when stakeholders are working together to establish a common cause and to develop an initial strategy to guide their combined efforts (S). Inclusion of a donor at this early stage will enable the donor to: a) better understand the potential of the TC approach to achieve conservation results; b) assess the motivation and needs of potential partners; and c) contribute their own expertise and knowledge to support the process. The donor may then be more likely to feel a sense of ownership, confidence, and control over the TC process and, therefore, be more likely to provide funds that support the TC approach over the long-term (W, S). In some cases, the donor can even pro-actively instigate a TC approach where none was present before (S). For example, a donor agency initiated a TC approach by funding the delineation of the Gamba – Mayumba – Conkouati area of Gabon and the Republic of the Congo, and then provided funding to partners from the different countries to work together on a TC level (S). In some cases, up front donor support may be difficult to attract or secure. This might be due to the conceptual nature of the TC program, its level of ambition or complexity, or government buy-in. In the case of the Heart of Borneo program, external donors were reluctant to support until the governments committed to or endorsed the program. As a result the initial three year inception phase was fully funded internally by WWF (in this case WWF Netherlands) (W).

6.5 BE CLEAR ON THE ROLE OF THE NGOS

NGOs can carry out crucial support work to enable TC. Practitioners emphasized the need to carry out and balance a mixture of informal and formal support, while also providing support to monitor the impact of the TC program overall (W).

Informal support: NGOs can help, through facilitation, to create a respectful environment in which stakeholders can interact, resolve conflicts, and develop shared perceptions, agreements, strategies and processes (W). Through lobbying, NGOs can also meet with key decision-makers to present them information and potential benefits that may persuade them to support the TC work (W, S). NGOs can also help stakeholders to develop or update key documents used to formally recognize the TC partnership or to enable the TC partnership to function. For example, NGOs may support government stakeholders to update regulations and procedures that enable their departments to communicate and work together with other TC stakeholders. Lastly, NGOs can play an important support role in enabling the fast transfer of TC information through informal channels to help build up a shared knowledge base (W, S).

Formal support: NGOs can provide formal support for TC efforts by providing technical expertise and implementing a wide range of conservation activities on behalf of the TC partnership. Common formal support activities include providing funding and other resources to support the initiation of the TC partnership and then to support the implementation of activities (W, S). This type of TC support may be especially needed by government stakeholders who have restricted budgets that can only be changed through lengthy bureaucratic processes. Lastly, NGOs can also train other stakeholders in key conservation skills such as law enforcement and providing alternative incomes (W, S).

Informal process are usually the quickest and most agile – especially when urgency is needed and are, therefore, extensively used during the early stages of most TC landscape programs (Table 3). Informal processes are relied on for advocacy and building support with local communities and between offices on all sides of the border and they are used via convening power and knowledge sharing but depend on good science and clear targets (W). Formal processes, on the

other hand are usually kick-in longer term but need to be factored into TC design early. Most of the older TC landscapes surveyed had solid formal processes underway (Table 3), and these were designed to: harmonize transboundary agreements, policies and plans; support mainstreaming of the TC work into government processes; or to create the basic structures for TC collaboration.

TABLE 3: SNAPSHOT OF TRANSBOUNDARY LANDSCAPES AND HOW THEY ARE MAINTAINED AND SUPPORTED.

#	CASE STUDY LANDSCAPE (YEARS SINCE START OF TC WORK))	HOW IT WAS DEVELOPED
1.	Transboundary Manas Conservation Area (12)	Informal: maintaining relationships between the NGO partners and government agencies on each side of the border leading to easy coordination with all stakeholders. Formal: create structures and mechanisms for: annual joint tiger monitoring; synchronized patrols annual TraMCA meetings where Bhutan and India host the meeting in alternate years.
2.	Heart of Borneo (15)	Informal: frequent and routine communication and meetings between sides; and dedicated staff member for the transboundary work. Formal: seek high level decision-making buy-in; and through government annual trilateral meetings.
3.	Uvs Lake Basin Transboundary Protected Area (27)	Informal: facilitate and deliver actions under the protected area transboundary work; maintain mutual trust and cooperation between both sides through regular communication. Formal: support annual workplans developed for the PAs; annual meeting at Ministry level to monitor and approve the joint work plan; annual joint scientific conference organized.
4.	Terai Arc (31)	Informal: through regular information sharing, timely follow-up, regular meetings and transparent and open communication. Formal: support government with information sharing, exposure visits, and capacity building programs; and aiding in emergency situations (e.g. conflict and rescue).
5.	Dawna Tenasserim Landscape (5)	Informal: have full time person dedicated to the landscape; regular communications and meetings for information sharing; support to operational planning and proposal development.
6.	Eastern Plains (5)	Formal: support for exchange visit by provincial representatives.
7.	Royal Belum State Park and Bang Lang Hala-Bala (2)	Formal: an exchange visit by Malaysian and Thai government counterparts with WWF as a participant.
8.	Daurian International Protected area (28)	Informal: annual meetings, joint planning and strategy development.
9.	Sundarbans (10)	Informal: through joint projects and objectives identified for a single ecological unit. Formal: through facilitation of joint tiger surveys and exchange of data along with Wildlife Institute of India; joint visit by elected representatives for shared vision; joint meeting of media for collaborative media efforts; and support to Sundarban Region Cooperation Initiative holding a side event at the UNFCCC Paris-COP 2015.
10.	Gamba-Mayumba-Conkouati (14)	Informal: good personal relationships and people working together in close proximity. Formal: twice yearly meetings; USFWS led workshop to develop a regional marine turtle strategy.
11.	Kavango –Zambezi Transfrontier Conservation Area (25)	Formal: support dialogue and engagement at Secretariat level; WWF invited to lead in delivery of the biodiversity components.
12.	Danube-Carpathian (22)	Informal: constant communication (not only when reporting) in order to build common trust.
13.	North Amazon Corridor (1)	Informal: through technical and financial support; joint workplans, and regular internal and stakeholder meetings.
14.	Putumayo River Basin (3)	Informal: through commitment and motivation between staff to work together with a single goal.
15.	Meuse–Rhine Euroregion (1)	Informal: through regular updates and exchanges of “services” (DNA analyses, monitoring data); common conservation goals; joint field trips.
16.	Tridom (15)	Informal: through joint commitment and energy toward the common goal to combat heavy poaching of emblematic species. Formal: through maintaining the transboundary landscape work with the highest level of political support and will in each country.

6.6 ACHIEVEMENTS

Transboundary conservation achievements predictably begin small and discrete as the TC work begins and develop into more complex and national efforts with enduring impacts over time (Table 4). The landscapes surveyed portray this growing sophistication well, whereby younger landscapes demonstrating that they see success through better joint understanding of the topic (for example through mapping, or joint monitoring of a species), or gaining interest through community / stakeholder participation. Over time, however, any achievements are increasingly hard won, yet enduring. In various landscapes, international recognition was achieved through World Heritage Site, Biosphere Reserve or Ramsar Site listings (in the case of the Russian-Mongolian-Chinese transboundary landscapes), or major policy breakthroughs for sustainable timber management and FSC certification across the Danube-Carpathian landscape. In other landscapes, the conservation impact becomes clear due to the monitoring frameworks that were set up and used for many years, now yielding valuable time series data such as in the case of Transboundary Manas or the Terai Arc landscapes where impact indicators like human wildlife conflict incidents, and tiger population numbers showed significant improvement (S) (Table 4).

TABLE 4: NOTABLE TRANSBOUNDARY LANDSCAPE ACHIEVEMENTS ACCORDING TO AGE.

ACHIEVEMENTS	0-10 YEARS	10-20 YEARS	20-30 YEARS
Incipient policy / leadership advocacy & dialogue (5, 15)	■		
Awareness raising for TC (14)	■		
Dialogue between park staff (6)	■		
Joint government declaration (2)	■		
Joint species (or threat) monitoring (1, 4, 9, 13)	■	■	■
Connected PA established (10, 12, 13)	■	■	■
Ecological mapping (11, 15)	■	■	■
Ramsar Site listing (3, 8, 13)	■	■	■
Establishment of joint management board (9)		■	
Joint media plan (9)		■	
Official protection of biological corridors (1)		■	
Joint law enforcement (1, 16)		■	
Official recognition of transboundary landscape (12)		■	■
Halt to transboundary threat (2, 12)		■	■
FSC certification (12)			■
Biosphere Reserve listing (3, 8)			■
World Heritage Site listing (3, 8)			■
Synchronized landscape planning (4)			■

Note: Case study surveyed in parentheses; where an achievement covers more than one age bracket, this means that the achievement was identified as occurring in each of those brackets.

Source: survey.

6.7 COMMON CHALLENGES TO TRANSBOUNDARY CONSERVATION

The overarching challenges specific to TC related to the peculiarities of the cross-border nature of the conservation work and included data management, border infrastructure, and political context (Table 5).

TABLE 5: TRANSBOUNDARY CHALLENGES AND THEIR EFFECTS.

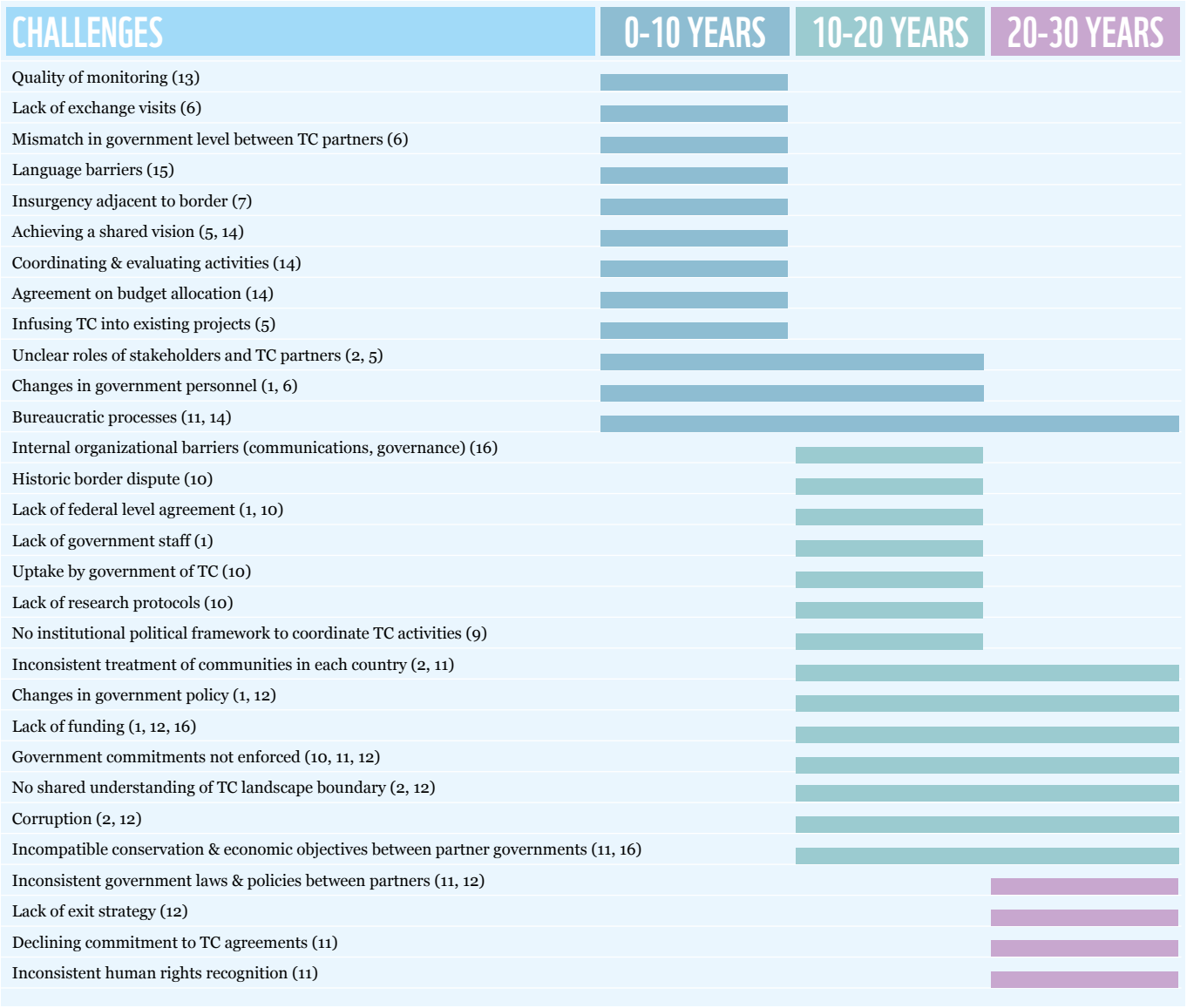
DATA MANAGEMENT	NEGATIVE EFFECT
Differences in data collection and analysis protocols between partners (W, S).	• Difficult or impossible for partners to share and collate data into TC landscpae level reports that show progress towards achieving joint objectives (W).
Differences in partner capacity to collect and analyze data (W).	• There may be temporal or spatial gaps in data that make it difficult to assess threats and monitor progress at a TC landscape level (W).
Country-specific laws in place that restrict how data can be shared and where it can be stored (W).	• Difficult for partners to coordinate TC activities such as law enforcement, which will hinder efforts to combat threats such as poaching and illegal timber harvesting (S).
Differences in data security measures between partners (W).	• Data may be vulnerable to being accessed by groups that can use that data to (i) avoid being detected by patrols, (ii) threaten the safety of patrol personnel, and (iii) locate high value biodiversity (W).
Sharing data may be politically sensitive (W) e.g. when a population of a high-profile species declines, leading to criticism of the government or senior government personnel.	• Government partners may feel reluctant to allow the collection and reporting of such data.

BORDER INFRASTRUCTURE (E.G. FENCES, CHECK POSTS, ROADS, WATCH TOWERS, MINES)	NEGATIVE EFFECT
Heavy border infrastructure can restrict movement of wildlife within the TC landscape (W, (Braack et al. 2006).	• Populations of wildlife with restrictive movement will be more vulnerable to extirpation because (i) individuals from source population will not be able to replenish sink populations (Hanski and Simberloff 1997) and (ii) restrictions in gene flow between groups will make species more vulnerable to inbreeding depression, disease, and changes in habitat (Hedrick and Kalinowski 2000).
Heavy border infrastructure can restrict movement of people within the TC landscape (W).	• Local communities may be unable to access areas which they have traditionally visited for cultural events or for the collection of natural resources.
Light or non-existent border infrastructure can enable movement of wildlife within the TC landscape (W).	• Wildlife disease will be able to spread more easily across the TC landscape (Braack et al. 2006). • Human wildlife interaction may increase as dispersing animals cross the border and come into proximity with human settlements and farmland where the may not have been present for long periods (W).
Light or non-existent infrastructure can enable movement of people within the TC landscape (Braack et al. 2006).	• Refugees can cross the border to occupy and degrade parts of the TC landscape in another country (Braack et al. 2006) • Groups such as poachers, loggers, fishermen, and wildlife traders will be able to operate on both sides of the border, be better able to avoid law enforcement agencies, and more easily transport wildlife products between countries (Braack et al. 2006).

POLITICAL CONTEXT	NEGATIVE EFFECT
Disputes over location of border between countries (S).	• TC discussions may highlight border disputes that lead to a weakening of relationships between government stakeholders that then reduces their motivation for participation and support (S).
Historical and current conflict between countries (W) (Erg et al. 2012).	• Conflicts will greatly impede the creation of a partnership to plan and implement a TC approach (W, (Barquet et al. 2014). • The threat of armed conflict or cross-border extraction of natural resources may result in governments deploying military units to secure border areas. These military units may restrict access to other groups and so impede TC activities and may threaten the safety of those entering the area to conduct TC work (W).
Inter-governmental differences in priorities between conservation and development goals (W).	• Development objectives such as building dams, roads, houses and commercial infrastructure may threaten the ecological integrity of the TC landscape.
Introducing an additional TC level of governance can disenfranchize local communities from their rights to manage and use areas within the TC landscape (Kark et al. 2015).	• This may reduce the support and active participation of local communities in the TC approach.
Change of political leadership as a result of elections or military interventions (W).	• Re-assignment of high-level government posts to staff more closely aligned to new political leadership will set back the relationships previously developed between partner representatives (S). • Changes in government priorities and policies may reduce support for TC work (W).
Corruption at a local or national level may influence decisions on fund distribution and activities in a way that benefits personal, rather than conservation, interests (S).	• A waste of resources intended to support TC objectives. • A reduction in motivation of conservation-focused partners and donors (S). • An increase in mistrust and animosity between TC partners. • Increased support for illegal practices that threaten the TC landscape and its biodiversity.

When we overlay identified challenges with the age of the transboundary conservation work, the picture of how the challenges evolve from simple consensus to more complex, government and policy-centric issues becomes clear (Table 6). In a few case studies, the challenges identified in the early stages of TC work were also felt in landscapes that had been operating for over 20 years (e.g. bureaucratic processes, changing governments, and unclear roles of partners). By and large however, the challenges in the early stages of TC work relate to achieving common understanding and consensus, adapting to a new TC approach, getting governments on board, and more mechanistic issues around resourcing and budgets across the border. Once TC landscapes have passed this initial period of development, the challenges with the differing government processes, laws, and policies, their commitment to TC, issues of corruption, and funding for the TC work begin to kick in – in some cases persisting for years. In the landscapes that had operated for over 20 years, the challenges are almost entirely of a government policy nature, but most noteworthy is that a malaise and declining interest in the TC work appears to creep in on the part of government, as does the parallel challenge of the lack of an exit strategy on the part of the NGO. Related to the lack of funding issue, the NGO is now compelled to raise funds for the complex transboundary entities and processes that it has developed over many years.

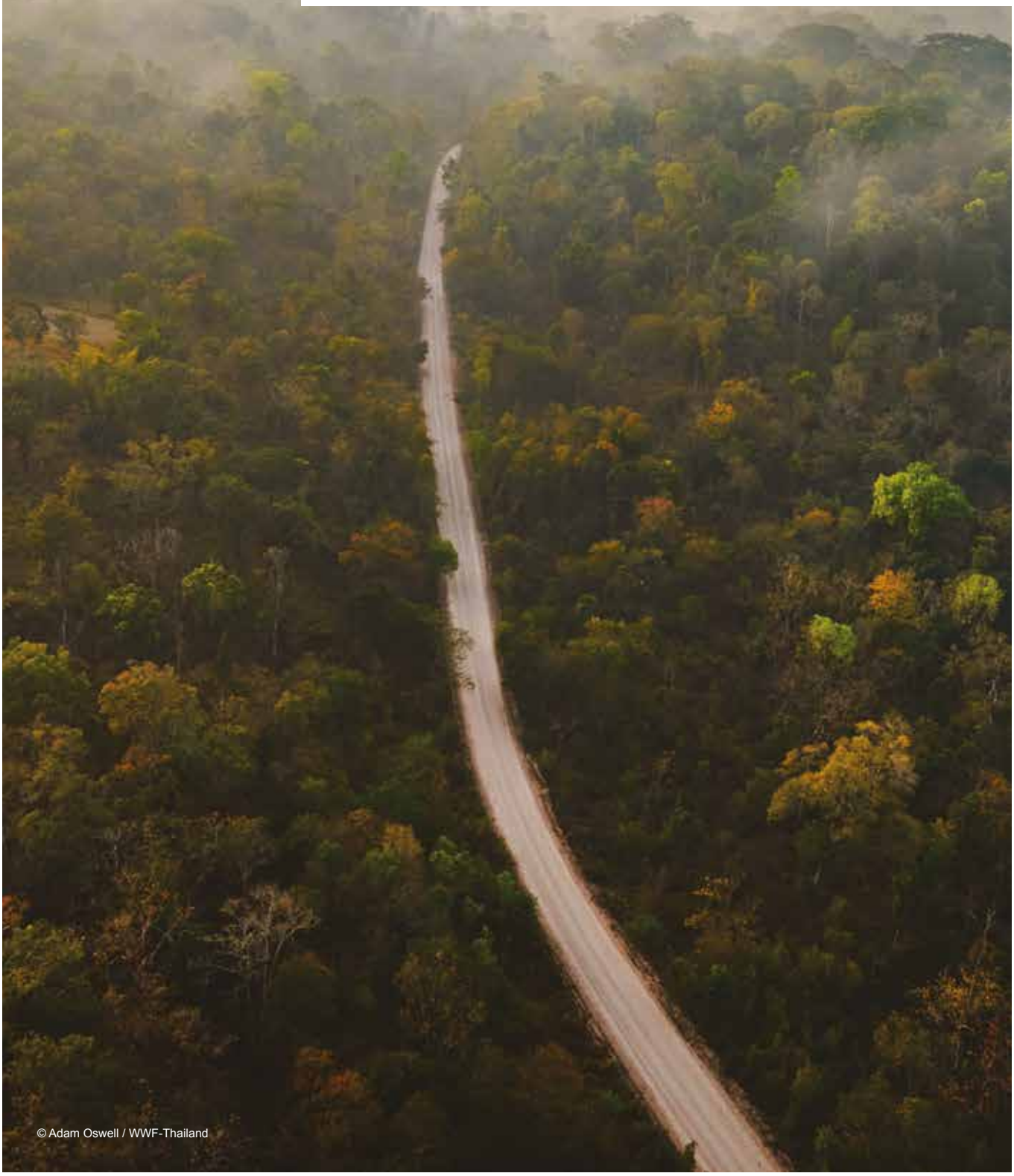
TABLE 6: RECOGNIZED TRANSBOUNDARY LANDSCAPE CHALLENGES ACCORDING TO AGE.



Note: Case study surveyed in parentheses.

Source: Survey.

7. RECOMMENDATIONS AND DISCUSSION



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7.1 IDENTIFY AND BE CLEAR ABOUT THE COMMON OBJECTIVE

There must be a catalyst to collaborate and a shared objective to justify the effort and investment in transboundary work. Is there a conservation target that can only be achieved with the collaboration of the stakeholders across the border? If yes, then this is your catalyst to begin dialogue with the neighbors for a transboundary program. If no, then you should proceed to implement your landscape plan without instigating transboundary work even if your landscape is adjacent to a border. The catalyst for joint transboundary work is the genesis of the program but should also remain the focus of the program long term.

Expanding any existing program to include transboundary components, will require new funds and effort to manage the additional, and complicated, work (Kark et al. 2015). It is, therefore, important that all such stakeholders are bound together by a common objective that provides each of them with the motivation for participation in the TC work (W, S) (Vasilijevic et al. 2015). It is also essential that, whatever the common objective is, it must be something that can only be addressed on a transboundary level. Otherwise, any common objective that is best addressed at a national or local level will take more time and costs to address if managed through the added layer of governance that a TC approach would impose (S). The common objective could be identified by any combination of expert opinion, analyses of threats, or local indigenous or accepted knowledge. Once the objective is known then initial dialogue, meetings and workshops can take place (W). By coming together, stakeholders, have the opportunity to share existing knowledge, determine and agree on the spatial limits of the common objective (e.g. delineate the TC landscape, map and delineate the contiguous shared forests between countries) (W), and discuss immediate steps and actions. In the early stages, while partners are still getting used to working with each other, it may be beneficial to keep any initial strategy as simple as possible (S) based on the shared objective. This could be, for example, an agreement to share observation data and imagery of elephants or tigers in the border area; to jointly analyze a shared threat such as habitat loss across large adjoining landscapes; or to share information on illegal trade or seizures relating to the shared objective e.g. tiger skin or illegal timber seizures.

7.2 LET FUNCTION DICTATE FORM

The agreed function of the transboundary program – to achieve the shared objective – should dictate the structure, or form, by which it is delivered. So, if the TC program aims to protect a transboundary population of tigers, through enhanced monitoring, protection and management, then the 'form' of the TC program should be built around: standardized monitoring, sharing of data, joint / synchronized patrolling, and common management actions. If the TC program aims to better understand behavior and movement of an elephant population, then the form of the program should be built around standardized monitoring and data sharing only. In both cases, there is no need in the early stages of the TC program to start to develop complicated management facilities with multiple new staff, seek high level ministerial backing for World Heritage Site listing for instance, or change national laws on the movement of people. Let the agreed function of the TC program dictate how it is delivered.

As the landscape program is delivered over a longer period, then increasing complexity is incorporated into the landscape actions, as demonstrated above, and the 'form' of the program will also increase in complexity. Here, multi-faceted components are gradually included, such as: community livelihoods and rights, policy reform, international recognition, impact investment, sustainable development and commodities supply chain management, visa-free borders, and carbon / biodiversity offset schemes. They can seem increasingly distant from the shared objective of tiger population recovery agreed at inception, for instance, but over time, they became vital toward that same goal, with the form of the more complex program still being dictated by the function.

7.3 SUPPORT THE MECHANISMS FOR COLLABORATION

"Connect the phones and support communication, don't construct the building". In the early stages of a TC program, focus on establishing and supporting (capacity and time) the mechanisms for collaboration, information sharing, and dialogue. Often, the only reason why a transboundary program has not been in place up to that point is because there was no way to connect or make contact nor resources to support it. It is these mechanisms that need to be put in place and they can include: remote connectivity via phone calls, representative bodies and a schedule to meet, agreed methods to exchange data and information, translated information, seed funding for site and exchange visits, and provision of expertise and training. Setting up transboundary facilities or management structures come with large price tags to establish and maintain. In many cases it will be much more efficient and cost effective to use existing structures and to just support their cross-border connectivity through funding an exchange visit, for instance, or funding an annual joint meeting to analyze data. Some transboundary landscapes can be fully operational just by fostering these mechanisms for joint learning that can ultimately turn into join programs.

7.4 LET THE LANDSCAPE PARTNERSHIP START SMALL AND INFORMAL, THEN GROW TO FORMAL

By its very nature, TC is carried out on a larger scale than conservation, which is carried out for the individual areas that make up a transboundary conservation area. It may, therefore, be tempting to start out by setting ambitious objectives for what the program will aim to achieve. In doing so, however, there is a big risk that those ambitious objectives will not be realized because the TC partnership, as a new, international, multi-stakeholder organization, will initially be limited to what it can achieve due to the many governance and implementation challenges it will have to overcome (S). Not realizing the initial TC partnership objectives may lead to a reduction in motivation and engagement of the partners could perpetuate further reductions in impact (S). Instead, staff should encourage the TC partnership to start off with easily achievable objectives that can be realized in a comfortable timeframe (S). Setting less-ambitious objectives will enable the TC partnership the opportunity to work through its governance and implementation challenges and learn how to collaborate better in the process. Achieving those initial objectives will help build the confidence and ability of the TC partnership, creating a strong platform for the TC partnership to then go on and achieve more ambitious objectives in the future (S). For example, instead of trying to reduce pangolin collection by 50% across a TC landscape in the first three years, it may be better in that timeframe to try and establish a common approach to monitoring pangolin populations and pangolin collection levels.

This is because achieving a high level of formality (e.g. achieving government recognition) may take many years and substantial cost (Erg et al. 2012, Kark et al. 2015) (S, W). It is important that increasing levels of formality are not sought after unless essential for the effective functioning of the TC partnership (W). For example, having government partners formally ratify a TC plan or recognize a landscape is impressive, but if that level of formality was not needed to achieve the desired conservation results, then the funds and time staff spent reaching that level of formality will have been wasted (W). Likewise, international agreements between different state actors are notoriously difficult to enforce due to the sovereign nature of each state, so these agreements end up representing guidelines rather than enforceable rules that ensure the protection of a shared landscape (Karkkainen 2004). A high-level of formality may also impede, rather than enable realization of TC impact in instances where the stakeholder(s) that lead the work (e.g. government agencies) do not have the capacity to manage it effectively, the motivation to make it a success, or the resources to support the TC activities (Karkkainen 2004). For example, it has taken decades and substantial cost for the Bangladesh and India governments to sign an agreement outlining joint TC activities for the Sundarbans forest, but those activities have yet to be implemented (S). This means that, although government agencies will always be an important consideration with respect to achieving TC work, their leadership and heavy involvement may not always be needed for other stakeholders to achieve meaningful results (Karkkainen 2004, Busch 2008).

In some cases, however, it may be essential to seek such high levels of formality, such as the degree to which a partnership or TC landscape are formally recognized by governments may enable a stakeholder's ability to implement TC activities and realize the desired conservation results (S, W). Likewise, without a formal memorandum of understanding with the government, it may not be possible for a particular stakeholder to be acknowledged as an official partner, which will severely limit their ability to influence the TC approach or participate in its application (W). Likewise, official recognition of a partnership or a TC landscape may be a donor requirement for providing some of the partners with the long-term funding they need to sustain their TC efforts (S). Whatever the level of formality required as an end point, it is always important to start as informal as possible, and to then only add levels of formality when essential for enabling the TC partnership to function (Vasilijevic et al. 2015), W).

7.5 ADAPT TO AND ADDRESS CHALLENGES AS THEY EMERGE

The stakeholder survey and workshop also yielded solutions for all the challenges summarized in Table 5. Below in Table 7 are the identified solutions for each identified challenge.

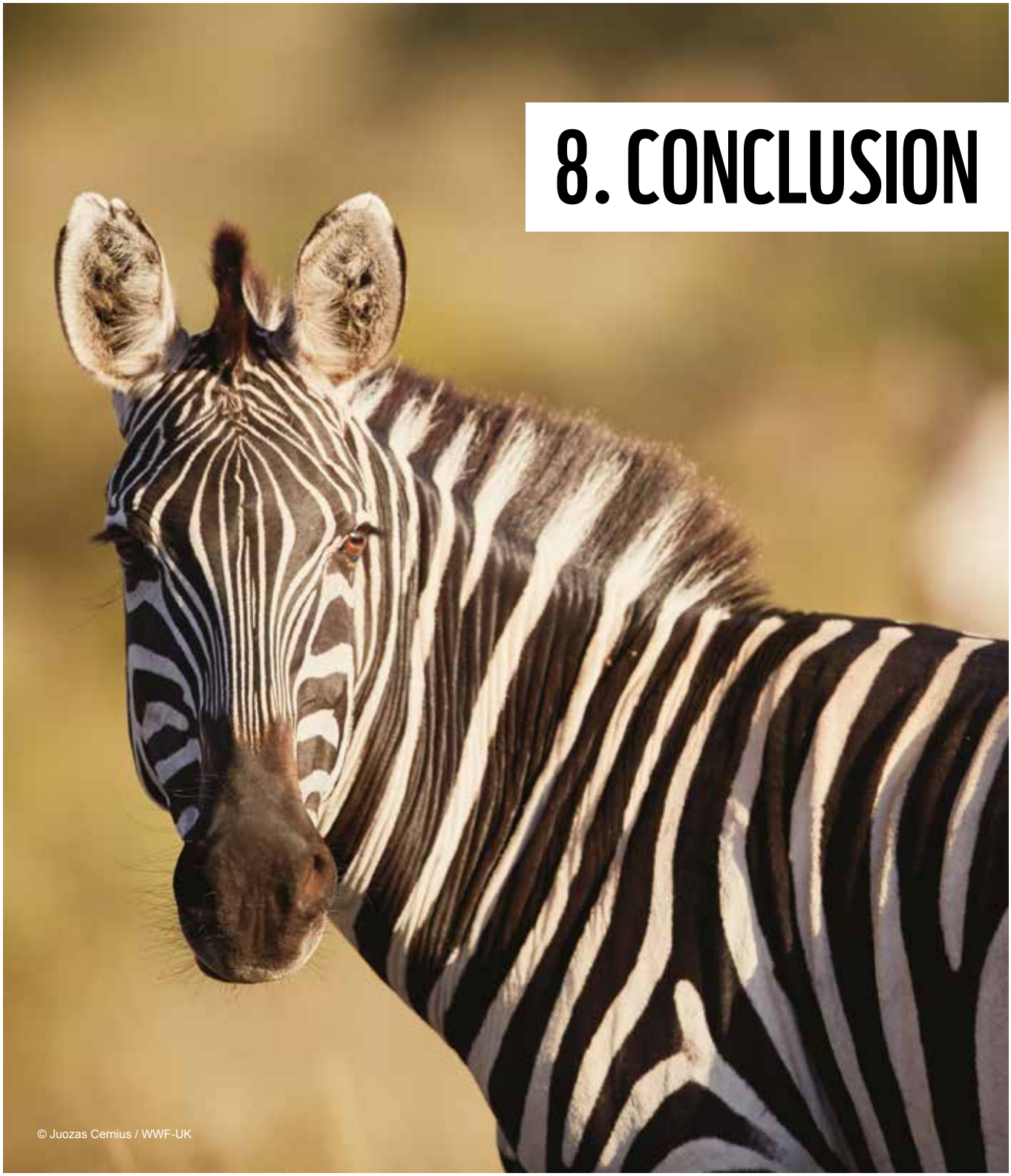
TABLE 7: TRANSBOUNDARY CHALLENGES AND THEIR SOLUTIONS.

DATA MANAGEMENT	SOLUTION
Differences in data collection and analysis protocols between partners (W, S)	• Develop standardized, joint data collection and analysis protocols (W) • Organize annual scientific meetings and workshops for partners to present, review, and learn from research findings (S)
Differences in partner capacity to collect and analyze data (W)	• Provide partners with capacity building support (e.g. funding and training) so that they have sufficient skills, knowledge, equipment, and personnel to complete their part of the data collection and analysis (W)
Country-specific laws in place that restrict how data can be shared and where it can be stored (W)	• Lobby to amend laws or develop a supplemental data sharing agreement between government agencies • Develop legal, informal channels of communication between key partner personnel from each country (W)
Differences in data security measures between partners (W)	• Encourage all partners to choose data management system with highest level of data security capability • Develop and share a standardized policy to restrict who has access to data in each partner organization • Conduct annual review of each partner's data security measures
Sharing data may be politically sensitive (W) e.g. when a population of a high-profile animal population declines, leading to criticism of the government or senior government personnel	• Establish a set of principles to guide partners on how sensitive data may be collected and reported on

BORDER INFRASTRUCTURE (E.G. FENCES, CHECK POSTS, ROADS, WATCH TOWERS, MINES)	SOLUTION
Heavy border infrastructure can restrict movement of wildlife within the TC landscape (W, (Braack et al. 2006)	• Lobby governments to establish laws that restrict border infrastructure in TC areas (W) • Support governments to remove existing infrastructure to allow movement of wildlife (W) • Build wildlife corridors to enable wildlife to by-pass existing infrastructure (W)
Heavy border infrastructure can restrict movement of people within the TC landscape (W)	• Lobby government to officially recognize local community groups as key stakeholders in the TC work (W), (Zbics 2003). • Include local community representatives in planning workshops to ensure the TC strategy will take into account the rights and aspirations of those groups (Lim 2016a) • Include local community representatives and committees into the governance structures overseeing the management of the TC landscape (Lim 2016a) • Help develop and strengthen local community governance structures (W) • Establish alternative livelihood opportunities to reduce the local communities' dependence on natural resources (W)
Light or non-existent border infrastructure can enable movement of wildlife within the TC landscape (W)	• Assess and monitor the threat of wildlife disease across the TC landscape (W) • Conduct vaccination activities for high risk species that move across border (W) • Create government and local community teams to manage human-wildlife conflict situations (W) • Develop and implement appropriate invasive species management approaches (W)
Light or non-existent infrastructure can enable movement of people within the TC landscape (Braack et al. 2006)	• Increase patrolling by rangers in border areas (W) • Utilize remote sensing technology (e.g. satellites, camera traps and drones) to improve the detection of illegal activities in areas that are difficult and costly to access through patrols (Kretser et al.)

POLITICAL CONTEXT	SOLUTION
Disputes over location of border between countries (S)	• Interview high-level decision makers to help predict how the governments would respond to the border location dispute within the context of TC efforts, and to identify potential actions to mitigate that response (W)
Historical and current conflict between countries (W, (Erg et al. 2012)	• Conduct a series of relationship building meetings to help develop personal relationships between partner representatives (W) • Include and recognize leaders of military units as key stakeholders in the process to develop the TC strategy (W) • Reach a formal or informal understanding with the military unit leaders to allow free movement and secure the safety of partner staff conducting TC work in militarized zones • Conduct meetings and workshops to build relationships and communication channels between military and park management staff (W) • Formally integrate military unit activities into TC protection through training, development of standard operating procedures, and secondment of military units to park management coordination (W)
Inter-governmental differences in priorities between conservation and development goals (W)	• Support the government to create or adopt sustainable green infrastructure regulations that guide the design and placement of new infrastructure (W)
Introducing an additional TC-level of governance can disenfranchise local communities from their rights to manage and use areas within the TC landscape (Kark et al. 2015)	• Conduct a stakeholder mapping process to identity and engage all relevant parties (W) • See above solutions about recognition of local communities as keys stakeholders and engaging these groups as respected active participants and partners in the TC planning and implementation process
Change of political leadership as a result of elections or military interventions (W)	• Reduce the dependency on government agencies to implement TC work by supporting and building the capacity of local community and NGO partners to conduct TC work (W) • Repeat previous meeting and workshop activities to develop TC strategy and partnership with representatives of the new political leadership
Corruption at a local or national level may influence decisions on fund distribution and activities in a way that benefits personal, rather than conservation, interests (S)	• Develop process to raise suspected incidents of corruption within the TC partnership (Linell et al. 2017) • Design sanctions (e.g. withholding conservation funds or other support) for partners found to be conducting corrupt practices (Linell et al. 2017) • Encourage the use of and provide training in transparent, effective budget mechanisms for donors and partners to account for all funds intended to support TC work

8. CONCLUSION



This study has built on previous work to highlight from a practical – non-theoretical – perspective, the nature of transboundary conservation programs. Invariably, transboundary effort begins with a relatively simple catalyst and the need to share information across a border, sometimes between individuals. Over time the collaboration takes on increasingly complex functions and form, encompasses multiple layers of stakeholder, and must manage higher level, somewhat policy-centric, challenges.

Ultimately, the challenge for NGOs becomes how to continue to fund / support the large institutional framework they have built, and the complicated form and functions of the landscape if the participating governments do not take up that role. A critical design feature for the transboundary landscape is, therefore, an exit strategy.

The report shines a clear light on the importance of transboundary conservation and the potential for its impact and the multiple achievements, but also the increasing level of complexity of transboundary conservation programs over time. Efforts in all the case studies older than one year, managed to progress relationships between transboundary partners. In all case studies, TC programs older than a year led to the creation of shared strategies or synchronized actions, and in every case, except one, formal recognition was afforded to the transboundary landscape after ten years (in some cases the formal recognition was achieved sooner than ten years). Beyond the ten-year life span, some landscapes achieve significant success in joint recovery of a transboundary species, or in the reduction of a joint threat. A key learning from the report is, therefore, the guidance on the need to design transboundary conservation with a clear understanding of what is achievable during what phase (Table 8).

TABLE 8: INDICATIVE LIST OF WHAT COULD BE ACHIEVED IN TRANSBOUNDARY LANDSCAPES OVER TIME.

1 - 5 YEARS	5 - 10 YEARS	10 + YEARS
Consensus on TC shared objective	Formal recognition of the TC	Global recognition (e.g. World Heritage or Ramsar listing)
Consensus on TC design	Sustainable financing plan	Mainstreaming into government budget and processes
Common monitoring framework	Joint / synchronized monitoring and patrolling	Harmonized landscape conservation and development policies and laws
Exchange visits and data sharing	Joint management plan / strategy	Exit strategy*
Mechanisms to connect, collaborate and share are operational	Tangible impact achievement (e.g. decrease in poaching; species recovery; decrease in timber or wildlife trade; joint synchronized patrolling and research)	Mechanism to deal with emerging threats such as impacts of climate change, and more acute and severe events such as fire
Aspirational (could be achieved within the timeframe if enabling conditions are right)		
Formal recognition	Global recognition (e.g. World Heritage or Ramsar listing)	
Sustainable financing plan	Mainstreaming into government budget and processes	
Joint / synchronized monitoring and patrolling	Harmonized landscape conservation and development policies	

Note: * refers to the NGO making steps to move away from day-to-day management and government policy related issues, and focusing more on scientific evidence-based reporting, capacity building, threat monitoring, and holding leaders to account.

Many of the key lessons are things that a practitioner may have come across to some degree through normal conservation work in a national-level protected area, but all of the lessons learned address the added dimension of complexity arising from the multi-national, multi-state, multi-cultural aspects of a TC situation. Nearly all the day-to-day challenges documented, however, are very TC-specific, such as relating to the degree of border infrastructure, military zones, border disputes and political differences between neighboring governments.

Although the survey and workshop components of this study only included participants from the WWF network, the collective knowledge of participants was far reaching in experience of TC in different parts of the world and in very different socio-political contexts. Nonetheless, future studies that aim to gain further insight into TC on a global level could be improved by incorporating participants that represent a wider range of organizations, e.g. through the 200 registered experts in transboundary conservation that make up The Global Transboundary Conservation Network and the development of a TC community of practice.

9. ANNEXES

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9.1 SURVEY QUESTIONS

1) How many years experience do you have of working on transboundary conservation?
2) Where is your organization's head office?

3) What is the name of the TCL you are working on?

4) What is the area (km2) of the TCL?

5) What is the designation of the TCL?

a) No designation
b) Government designation
c) NGO designation
d) Other

6) What is the status of the TCL strategic plan:

a) Not started
b) In progress
c) In place

7) If the strategic plan is in place, which of the following have been agreed upon for the TCL

a) Biodiversity targets
b) Threats
c) Objectives
d) Activities
e) Roles
f) Budget

8) Please describe anything else you want to add with respect to TCL or the answers you gave in this section.

9) Who is the main partner organization (located on the other side of the TBL international border) who your organization works with?

10) What is the current status of that partnership?
a) Formal (ratified by a jointly signed document)
b) Informal (Agreed verbally or un-signed written confirmation)
c) Other

11) How was the partnership first developed?

12) How has the partnership relationship change over time?

13) How is the partnership maintained?

14) How have you dealt with differences in opinion between you and your TCP?

15) What do you think went well with respect to developing and maintaining your relationship with the TCP? I.e. What were the key moments that catalyzed or strengthened your relationship with the TCP?

16) What do you think could have gone better with respect to developing and maintaining your relationship with the TCP? I.e. What were the key moments or issues that have slowed down or impeded your relationship with the TCP?

17) Please describe anything else you want to add with respect to TCP or the answers you gave in this section.

18) For the management components listed below, describe how they are implemented using one of the following options :
- Joint activity (An agreed activity carried out with the TCP at the same time, using shared resources, and using the same approach)
- Coordinated activity (An agreed activity carried out independently (at different times and/or using different resources and approaches) by a partner)

- Uncoordinated activity (An activity carried out to help achieve TC objectives, but that has not been agreed to with the TBP)
- No activity (The activity is not carried out for TC purposes)

b) Planning
c) Research
d) Fundraising
e) Policy support

19) For the thematic components listed below, describe how they are implemented using one of the following options :

- Joint activity (An agreed activity carried out with the TCP at the same time, using shared resources, and using the same approach)
- Coordinated activity (An agreed activity carried out independently (at different times and/or using different resources and approaches) by a partner)
- Uncoordinated activity (An activity carried out to help achieve TC objectives, but that has not been agreed to with the TBP)
- No activity (The activity is not carried out for TC purposes)

b) Law enforcement support
c) Training
d) Social marketing
e) Awareness raising/education
f) Providing alternatives
g) Other

20) How do you monitor and report on the progress of your TC work and impact?

21) What tools do you use to help you design, implement, monitor, and report your TC work?

22) What methodologies do you use to help you design, implement, monitor, and report your TC work?

23) What do you consider to be the major successes have you achieved so far through TC?

24) For the potential TC benefits below, describe if they have been achieved in your landscape based on: benefit, not a benefit, or don't know.

a) Increased impact
b) Increased funds
c) Reduced costs
d) Improved knowledge
e) Other

25) For the potential TC barriers below, describe if they have acted as barriers based on either: barrier, not a barrier or don't know.

a) Lack of trust
b) Imbalance of work/resource contribution of each partner
c) Legal impediments
d) Lack of institutional support
e) Lack of time
f) Lack of dedicated funds
g) Lack of skills
h) Lack of tools
i) Lack of best practice guidelines
j) Other

26) Please describe anything else you want to add with respect to TC or the answers you gave in this section

9.2 WORKSHOP AGENDA

TABLE 7: TRANSBOUNDARY WORKSHOP AGENDA.

DAY 1
1. Introduction to workshop 1.1 Review of TC approach in historical context 1.2 Lessons learned from TC so far
2. Discussion session 2.1 Question: What are we trying to achieve? 2.2 Question: What is the role of NGOs? 2.3 Question: Are we trying to do too much or too little? 2.4 Question: Can we come up with solutions that are future proof?
3. TC landscape group exercises 3.1 Setting scope, targets and threats
4. Day 1 wrap up
DAY 2
5. Discussion session 5.1 Question: How do we measure the success of TC?
6. TC landscape group exercises 6.1 Setting conservation results, milestones, and activities
4. Day 2 and workshop wrap up

9.3 STUDY PARTICIPANTS

TABLE 8: STUDY PARTICIPANTS.

NAME	PARTICIPATION	
	SURVEY	WORKSHOP
Alexey Kostyria	+	+
Amit Sharma	+	+
Anil Singh		
Bas Huijbregts	+	
Bas Verhage	+	
Bharat Gotame	+	+
Corentin Rousseau	+	+
Gaurav Gupta	+	+
Gilles Etoga	+	
Ionut Banciu	+	+
Iwan Wibsiono	+	+
Jorge Rivas	+	+
Joaquín Carrizosa	+	+
Kuenley Tenzin	+	+
Louise Carlsson		+
Mark Darmaraj	+	+
Munkhchuluun Basan	+	+
Peiqi Liu	+	+
Phurba Lhendup	+	+
Ratul Saha	+	+
Regan Pairojmahakij	+	+
Robert Steinmetz	+	
Seif Hamisi	+	
Stuart Chapman	+	+
Van Ngoc Nguyen	+	+

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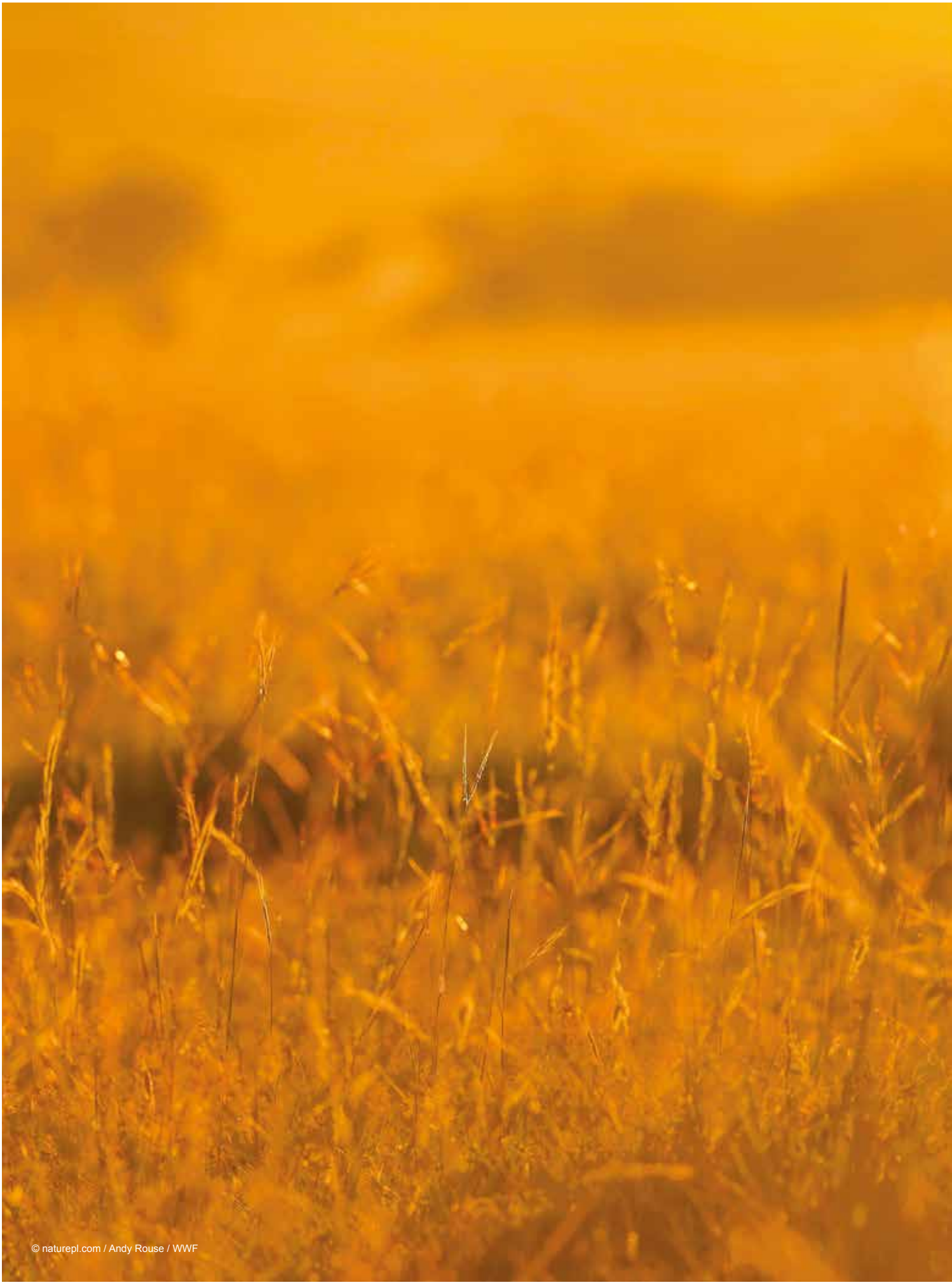
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