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Building relationships: how zoos and other partners can contribute to the conservation of wild orangutans *Pongo* spp

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With three species of orangutan now listed as Critically Endangered by the International Union for Conservation of Nature, orangutan conservation needs some critical rethinking. Habitat loss, degradation and fragmentation, and hunting are continuing to push orangutan populations towards further decline. Conservation efforts focusing on rehabilitation and habitat protection are in place but are insufficient unless we move towards a landscape approach that will aim at protecting and connecting areas rather than retaining isolated patches of forest. Conservationists need to engage with communities and industry to protect the species at a truly landscape level. This paper explores the current efforts in orangutan conservation on the ground and from the zoo community, and describes new areas emerging to contribute to these new approaches needed to impact positively wild orangutan populations.

Key-words: behaviour change; conservation; *ex situ*; *in situ*; landscape approach; oil palm; orangutan; sustainable.

MAJOR THREATS TO THE SPECIES

The Bornean orangutan *Pongo pygmaeus*, Sumatran orangutan *Pongo abelii* and Tapanuli orangutan *Pongo tapanuliensis* are all Critically Endangered because of the loss and fragmentation of their habitat, and hunting (Ancrenaz, Gumal *et al.*, 2016; Singleton *et al.*, 2016).

Habitat destruction and degradation

Satellite data show that in Sumatra, 60% of key orangutan habitat was destroyed

between 1985 and 2007 (Wich *et al.*, 2008), while 40% was destroyed in Borneo between 1973 and 2010 (Gaveau *et al.*, 2014). On these islands, tropical forests are converted to large-scale industrial plantations (oil palm, rubber, acacia and other tree species), small-scale agriculture, mining concessions, dams and other types of land uses.

Orangutans on Borneo, more so than in Sumatra, show behavioural flexibility that allows them to, at least for the short term, survive in areas that have been affected by logging, have been fragmented or are converted to acacia and oil-palm plantations (Ancrenaz *et al.*, 2010, 2015; Meijaard *et al.*, 2010; Campbell-Smith *et al.*, 2011; Spehar & Rayadin, 2017). However, extractive activities and other types of human disturbances might displace animals temporarily and result in the influx of newcomers from nearby home ranges (which is called the 'compaction' effect) with unknown long-term social impacts on the resident populations.

Habitat fragmentation

Habitat fragmentation is an ever-increasing threat given the current land conversion occurring in Borneo and Sumatra. New

roads, bridges, dams or railways split populations into smaller subpopulations and give access to poachers, settlers and other human encroachers, putting new pressures on remote populations. In these newly created man-made landscapes, orangutans often seek refuge in whatever forest patches are left. Although orangutans are mainly arboreal, they can walk several kilometres on the ground (Ancrenaz *et al.*, 2014), which could facilitate their movements between forest fragments. Fragmentation leads to smaller populations that show reduced long-term survival (Marshall *et al.*, 2009). In addition, more fragmentation results in a higher proportion of the orangutan habitat being bordered by non-forest, which carries new survival risks, such as potentially dangerous encounters with people or dogs, infrastructures (e.g. electrical lines) and exposure to diseases from humans and domestic animals. The latter particularly needs specific attention because of the almost total lack of knowledge about risk management.

Ultimately, poor land-use practices that do not consider biodiversity and ecosystem services, and lack of collaboration and communication between the different groups of land users are responsible for the increased degradation and loss of tropical natural habitats.

Illegal hunting

On both islands, people have hunted orangutans for a long time and, at the time of writing, orangutans are still killed to mitigate conflicts or for meat consumption (Wich *et al.*, 2012; Davis *et al.*, 2013). Across Borneo, interview surveys revealed that between 2000 and 3000 individuals were killed annually on average (Meijaard, Buchori *et al.*, 2011). In many areas, the overall mortality rate as a result of hunting exceeds the natural breeding rate, driving most populations to extinction (Marshall *et al.*, 2009).

Inadequate knowledge about the protected status of orangutan, weak enforcement of existing laws and poor prosecution

of people responsible for the illegal trade or poaching of orangutans are major obstacles to improving the situation on the ground (Meijaard, Wich *et al.*, 2011).

CURRENT CONSERVATION EFFORTS

Despite decades of efforts and a significant amount of financial and human resources dedicated to orangutan conservation, all three orangutan species are Critically Endangered, and their numbers continue to decline. Overall, conservation has failed the species (Meijaard, Wich, *et al.*, 2011; Voigt *et al.*, 2018). Two major strategies are used to conserve orangutans: rehabilitation/reintroduction and habitat protection (Wilson *et al.*, 2014).

Orangutan rehabilitation and translocation

At the time of writing, the media often presents orangutan rehabilitation and reintroduction as the frontline of conservation efforts for this great ape. However, the emotive nature of ape reintroduction can be counterproductive for long-term *in situ* conservation of wild populations and their habitat. Rehabilitation targets one area facing orangutan conservation, and it often becomes an animal-welfare discussion, which indirectly competes for resources and prioritization with other strategies to protect habitat on a landscape scale (Wilson *et al.*, 2014).

The rehabilitation success rate is low, probably far below 50% (Russon, 2009), unless a very intensive and costly post-release monitoring is undertaken (Robins *et al.*, 2013). Between 1964 and 2008, the various reintroduction centres located in Indonesia and Malaysia rescued at least 3320 individuals and released *c.* 1250 animals (Russon, 2009). However, during the same time, tens of thousands of wild orangutans were lost as a result of forest destruction and poaching (Ancrenaz, Gumal *et al.*, 2016; Voigt *et al.*, 2018).

Translocation is often perceived as the silver bullet to ‘rescue’ stranded orangutans that are surviving in forest patches, and to move them somewhere else. However, this type of rescue operation can have perverse consequences, such as the destruction of the forest patches after orangutan translocation. In addition, the land users are not encouraged to develop better land-use practices within their own concession to manage the protected species they are accountable for if the animals are removed.

The strategy in itself is a reactive approach to a crisis and should be incorporated into a proactive discussion on reducing and repairing habitat loss to reduce the problem of injured wildlife or orphaned orangutans. A recent financial cost–benefit analysis showed that orangutan conservation should primarily focus on habitat conservation and management, and not rehabilitation (Wilson *et al.*, 2014).

Habitat protection

Undoubtedly, identifying and protecting key orangutan populations and their habitat should remain the cornerstone approach to ensure the long-term survival of the species.

Over the past 15 years, Sabah (Malaysian Borneo) has significantly enlarged the network of strictly protected forests from 12% to *c.* 27% of the total land mass of the State, encompassing more than 70% of its current orangutan distribution. Orangutans in Sarawak face a similar situation, where the majority of the remaining animals are all located within fully protected forests. However, in Indonesia, only about 25% of the wild orangutan distribution occurs in protected forests and many of these protected forests are still degraded by illegal activities (Wich *et al.*, 2012). In Sumatra, most orangutans are concentrated in the Leuser Ecosystem where protected and unprotected forests are still encroached and converted to other types of land uses at an alarming rate (Singleton *et al.*, 2016).

MOVING FORWARD

Rethinking orangutan conservation at the landscape level

Under the current situation, it appears that the long-term survival of most orangutan populations will rely heavily on (1) improved management of non-protected forests and (2) minimizing losses among remaining orangutan populations. This means that conservation strategies need to focus on both protected and non-protected areas, and this will require a shift of the overall conservation mindset and novel approaches to conservation. The immediate need for such a shift is highlighted by the presence of *c.* 10 000 orangutans within undeveloped plantations that had been earmarked for oil-palm conversion in Kalimantan alone (Meijaard, Morgans *et al.*, 2017).

Better land-use decisions

Land-use deciders and planners need to take into account not only the socio-economic dimension of their choices but also the long-term ecological impacts. Indeed, deforestation comes with a real cost in terms of destruction or degradation of ecosystem services and foregone benefits that political or industry leaders seldom consider in their decisions (Meijaard, Anrenaz & Wilson, 2017). Not considering externality costs is risky business. Locally, communities will be impacted in their daily lives and will have to pay the cost of these choices in terms of erosion, pollution, flooding, health issues or loss of access to natural assets.

Ecological connectivity is a key element of sustainable development in Borneo and Sumatra, requiring land-use decisions to be undertaken at multi-scale levels and not limited by the political and administrative boundaries of a company or a district or even a country (Runting *et al.*, 2015). A possible frame to achieve land-use planning over a larger landscape is given by the ‘jurisdictional approach’ that aims at

certifying a given production at the scale of a state, such as the approach decided by Sabah, the Central Kalimantan Province and the South Sumatra Province, to certify their entire oil-palm production by 2025.

Policy changes

The current orangutan protection status is inadequate in curbing population loss in the two range countries and the political framework can also hamper orangutan conservation (Cotula *et al.*, 2015). For example, it is urgent for the two range countries to revise laws and policies that are preventing landowners from retaining areas in their concessions under natural forest cover or high conservation-value forests.

Empowering local communities

In non-protected habitats, forest reduction results in a closer proximity between people and animals, which inevitably leads to conflict situations. Orangutans can consume entire fruit crops in orchards belonging to local villagers resulting in significant economic losses (Campbell-Smith *et al.*, 2011). Agro-industrial plantations also experience economic losses when apes kill acacias by stripping bark and cambium (Meijaard *et al.*, 2010), or pulling out the stems of young palms to feed on their heart (Ancrenaz *et al.*, 2015). These conflicts result in orangutan killings and create a negative perception towards wildlife, which has been a major impediment to building local support for conservation. In these newly created landscapes, it is urgent to identify and implement peaceful ways to mitigate possible conflicts with species such as orangutans, including: regular patrolling; new landscape design; drains and rope bridges; tree protection devices; awareness; insurance schemes (Campbell-Smith *et al.*, 2012). These groups also need to be encouraged to become active participants in conservation and not simply beneficiaries of what it can offer. Communities need to be better empowered to act.

Engaging with industry

Although still hotly debated by many, we need to acknowledge that well-managed plantations can provide foraging resources, and dispersal opportunities for orangutans and other species. They can also preserve important ecosystem functions.

Considering that more than half of the range of the Bornean orangutan is found within forestry or agriculture concessions (Wich *et al.*, 2012), better biodiversity-conservation outcomes need to be ensured in man-made landscapes. This requires industry players to embrace better management practices that minimize the strong negative impacts of forest exploitation and agro-industrial development (Ancrenaz, Meijaard *et al.*, 2016).

Retaining forests within an agro-industrial landscape is key in preserving ecosystem functionality, improving meta-populations and facilitating dispersal and survival of many species, such as the orangutan. Remaining forests that sustain key orangutan populations should be identified as high conservation-value forests and maintained as such. Engaging with the land users before they start their on-the-ground operations, influencing the ways in which they are going to develop their plantations or adapting current policies to the conservation needs of orangutans appears to be the only way to minimize the losses of orangutan lives.

Best-practice management guidelines are already available under several certification schemes: Roundtable on Sustainable Palm Oil (RSPO) for the oil-palm growers or Forest Stewardship Council (FSC) for the timber industry (among others). Although these guidelines must be further improved, they are a first step towards more sustainable practices. Simultaneously, we have to recognize that the industry needs significant incentives to develop and to implement these best management practices: educating consumers towards sustainable choices guaranteed by certification is one way to influence on-the-ground practices (Ancrenaz, Meijaard *et al.*, 2016).

ZOOS AND ORANGUTAN CONSERVATION

The role of zoo populations is primarily to act as ambassadors for educational purposes, to support conservation in the wild and to act as a research resource (Abelló & Stevens, 2016). Captive populations are managed to preserve maximum genetic diversity as they may be vital for future reinforcement of wild populations of certain species. Traditionally, the zoo community has mostly been a financial source of support for *in situ* conservation initiatives. In 2012, the World Association of Zoos and Aquariums (WAZA) community reported that they spent nearly US\$ 350 million on wildlife conservation, making this community one of the major financial supporters of conservation efforts globally (Gusset & Dick, 2011). The financial support provided by zoos for *in situ* conservation projects in the long term (i.e. over several years) is key to creating success stories. However, zoos have much more to offer, including conservation skills in terms of species management and conservation breeding, capacity building, technical expertise, and advocacy and outreach activities among the more than 700 million visitors to these institutions every year and with industry.

Capacity building

Zoos are increasingly working with staff from *in situ* programmes for training and exposure sessions. The Orangutan Veterinary Advisory Group, initiated through Orangutan Conservancy (Los Angeles, CA, USA) and supported by Chester Zoo (United Kingdom), brings together expertise from *in situ* field projects, zoos, industry, academia, non-governmental organizations (NGOs) and government to provide a strong cadre of professionals providing capacity building on wildlife health matters in Indonesia and Malaysia.

Community engagement is a vital part of the work of zoos, and transferring this knowledge to field projects is a key role

that can reinforce orangutan conservation. In Sabah, Chester Zoo supported and supervised the development of the 'Hutan Education Awareness Program' Master Plan with the HUTAN team, following principles of strategy development from educational professionals in the United Kingdom. This collaboration allowed a transfer of skills between the zoo and field project to produce a solid education strategy with follow-up evaluation built into the programme.

Another avenue pursued by Houston Zoo (TX, USA) and other zoos is to create scholarships to support students from range countries who will become the face of conservation of the species they are interested in. Indeed, if our collective goal is to create long-term sustainable conservation programmes, one of the critical directions of these efforts should be in building local capacity within the next generation of conservationists. This funding mechanism is critical at a time when it is difficult for those in the field to raise support for salaries and stipends, and other zoos and aquariums could also support similar efforts. At Houston Zoo, initially it was much easier to raise funds for equipment and fieldwork, which left the question of who would do the work if there was no support for the conservationists on the ground. These scholarships are covering fees to obtain high-level educational degrees (MSc and PhD) in national and international universities, funds to attend professional conferences and meetings, such as the International Union for Conservation of Nature Species Survival Groups, or are used to facilitate lateral staff exchange between *in situ* conservation projects to reinforce the skills and network of local field research assistants. Over the past decade, this programme has led to MSc- and PhD-level partners focused on Bornean elephant *Elephas maximus borneensis*, Banteng *Bos javanicus* and small carnivores with efforts on Asian hornbills Bucerotidae and pangolins Manidae under way at the time of writing. These programmes have in turn led to the development of a number of conservation management strategies in the region.

Technical expertise

Zoo staff have a wide range of currently untapped knowledge that could potentially become part of the solution in assisting *in situ* programmes build their own capacity to meet the goals of species recovery, such as grant writing, donor management, accounting principles, carpentry and construction skills, tree nursery management, studying animal behaviour and overall communication.

A practical example includes the orangutan bridge experiment in Sabah. Following a visit to National Zoo in Washington (DC, USA) where captive orangutans were using cables to move across the Zoo, the Kinabatangan Orangutan Conservation Programme decided to erect bridges that would enable orangutans to cross water bodies that had become impassable following the destruction of large trees along riverbanks. Various zoos from Japan and Europe assisted the Kinabatangan Orangutan Conservation Programme and the Sabah Wildlife Department in sourcing used fire hoses and weather-resistant webbing commonly used in captive settings, and in the design and building of these bridges. Orangutans, gibbons and many other species are now using these bridges regularly (M. Ancrenaz, pers. obs).

Outreach campaigns: awareness and lobbying

Public outreach can go far beyond interpretation boards displayed inside the zoo premises, and modern-day zoos need to use various forms of education to disseminate their message. A recent study confirmed the value of education at zoos and aquariums to engage members of the public with biodiversity-related issues and demonstrated that the aggregate impact from such experiences can be enhanced through coordinated public-engagement initiatives (Moss *et al.*, 2017).

Typically zoos are using conservation education campaigns to raise funds and awareness about the plight of the

orangutan. However, they are also increasingly promoting behaviour changes in their public; a study found that including persuasive messages requesting behaviour is often seen as a positive step, improving the visitor experience (Smith *et al.*, 2012; see also, Fiskén, 2016). The issue of unsustainable palm-oil production has offered an opportunity to have a positive impact on orangutan conservation through behaviour change and advocacy. Indeed, zoos are useful vehicles for disseminating information not only to the public but also to the industry or to the political world. They are therefore an important part of the palm-oil debate.

Acknowledging that consumers can play a key role in increasing the demand for sustainably produced palm oil, zoos are beginning to develop and deliver lobbying and behaviour-change campaigns supported by zoological associations, such as the British and Irish Association of Zoos and Aquariums (BIAZA) and the Association of Zoos and Aquariums (AZA) who are encouraging their members to support certified sustainable practices. A genuine collaboration and dialogue between zoological institutions, *in situ* groups and associations is needed to ensure that clear messages are promoted to the public. Zoos Victoria's 'Don't Palm Us Off' campaign was launched with the aim of increasing awareness about palm oil, to make palm-oil labelling compulsory in Australia and to subsequently drive a market need for certified sustainable palm oil (Pearson *et al.*, 2014). A follow-up assessment showed that 80% of visitors were willing to change their future behaviour to support orangutan conservation. This campaign was the first educational campaign of its kind in Australia and highlighted the importance of continued innovation in zoo-based conservation education and practice to maximize contributions to species conservation (Pearson *et al.*, 2014).

Campaigns in European zoos began around the 'Clear Labels Not Forests' campaign in 2011 (Mongabay.com, 2014). The campaign by NGOs, including the

European Association of Zoos and Aquaria (EAZA), called for the mandatory labelling of individual vegetable oils on food-product packaging in the European Union. A number of AZA-member institutions, including Cheyenne Mountain Zoo (Colorado Springs, CO, USA) and Philadelphia Zoo (PA, USA), have led and supported public campaigns for support of sustainable palm oil, and in 2015 Houston Zoo hosted the AZA Orangutan Species Survival Plan and Palm Oil Summit, bringing together zoos, NGOs and industry. More recently, WAZA signed a Memorandum of Understanding with RSPO to support sustainable palm oil.

FUTURE FOR ZOOS IN ORANGUTAN CONSERVATION

As conservation organizations and tourist attractions, zoos have the capacity to influence governments and industry in their own countries to encourage change. A key responsibility of zoological institutions is to work collaboratively with *in situ* projects to develop a message that is reflective of the situation on the ground. However, zoos also need to engage with unlikely partners to be successful in conservation campaigns because purely messaging to a zoo audience is unlikely to have a conservation impact. Zoos should use their influence in the community to increase the scope of their messaging (Barongi *et al.*, 2015), using new ways of thinking to reach a larger audience. With the aim of increasing demand for sustainable palm oil, Chester Zoo's Sustainable Palm Oil Challenge is working with and reaching out to new audiences and partners not necessarily linked to the zoo, including the arts and theatre interested in food sustainability, restaurants to increase sustainable palm-oil sourcing in the hospitality industry and other key organizations in the region, using influence to increase support. BIAZA has engaged with the United Kingdom government on sustainable palm oil through the United Kingdom Roundtable, acting as an environmental voice on the group. Thirteen zoos globally are members

of the RSPO, and by being members, they are contributing to the global efforts to improve the practices of the palm-oil industry.

Zoos such as Copenhagen Zoo, Denmark, have entered into partnerships alongside oil-palm companies to collaborate on enhancing biodiversity on their sites, and the Zoological Society of London (ZSL, United Kingdom) is working closely with industry through their Sustainable Palm Oil Transparency Toolkit (SPOTT), which includes scored assessment of the worlds' largest palm-oil companies. These collaborations are a way forward for collaboration between NGOs and industry.

As tourist attractions with 700 million visitors per year globally, zoos should utilize their platform to communicate more to build public pressure around conservation issues and to become a voice for wild orangutans. Consistent messaging from NGOs, zoo associations and individual zoos would encourage collaborative working and international campaigning across networks. Zoos could be perceived as neutral partners to facilitate dialogue between corporate partners, range-country conservationists and environmental organizations. They also could become one of the key partners to operate a shift in people's views to support conservation and promote sustainable development.

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