

A Conservation Framework to Save the World's Most Threatened Primate

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Introduction

Gibbons are one of the most threatened primates in the world. Four species are listed as critically endangered, another 13 as endangered, and 1 as threatened (Gibbons Species Survival Plan, n.d.). The most critically endangered species, the Hainan Gibbon, is estimated to have a population of only 45 individuals (Zoological Society of London, n.d.). Through analysis of the threats gibbons face and conservation efforts for gibbons, I have created conservation strategies to reduce gibbon population decline going forward. My framework is split into two tiers: short-term and long-term strategies. My short-term strategies focus on protecting, managing, and establishing protected areas targeting gibbon populations. My long-term strategies center on increasing gibbon population self-sustainability through wildlife corridors, demand redirection campaigns, community livelihood projects, and gibbon repatriation policies.

Gibbons, also known as lesser apes, are apes belonging to the family Hylobatidae. This family consists of 4 genus' of gibbons: Hylobates, Nomascus, Hoolock, and Symphalangus. Gibbons are distinct from great apes because they are

smaller, have low sexual dimorphism, and do not make nests (International Fund for Animal Welfare, n.d.). Gibbons make loud, whooping vocalizations to mark and defend territory. Gibbons are arboreal, or tree dwelling, and are frugivores, meaning their diet consists mostly of fruits (International Fund for Animal Welfare, n.d.). Gibbons move through the trees using brachiation, or swinging from branch to branch using their arms, which make them the fastest non-flying arboreal mammal. Their diet and locomotion make them one of the most efficient seed dispersers in Asia (McConkey, 2000). This role is why their protection is so important.

Seed dispersers are species that spread the seeds of the fruit they eat, commonly through their excrement. Gibbons are such effective seed dispersers because of their diet, home range, and mobility. Gibbons spend a majority of their day moving through the forest finding and eating different fruits, meaning they can disperse high amounts of diverse seeds throughout the day (McConkey and Chivers, 2007). Gibbons have a large home range, which is the area that they claim as their territory and move around in throughout the year. Their home range can be

anywhere from 16 to 60 hectares, depending on species and environmental factors, and they cover this entire range throughout a year (Ahsan, 2001; Bartlett, 1999; Chivers, 1984, 1974; McConkey and Chivers, 2007). Because of gibbons' large home ranges and diet, they can consume a large amount of seeds throughout the day, and deposit them far from their parent trees. This is very important for forest health. Studies have found that it is advantageous for plant species' seeds to be spread away from the parent tree. This is because seedlings grow better in less plant dense areas, seedlings can form new colonies if they're spread, and greater seed distribution helps seedlings avoid buildup of harmful funguses under parent trees (Howe and Miriti, 2004). As gibbon populations decrease, the forests they inhabit will suffer from less seed distribution, meaning fewer new trees will grow and the forests will shrink. I now want to pivot to why gibbon populations are shrinking.

Gibbon Threats

The two largest threats to gibbon populations are habitat loss and hunting (Gibbons Species Survival Plan, n.d.). Asia and Southeast Asia have the highest level of tropical deforestation in the world. A large contributor of this deforestation is palm oil farming (Gibbons Species Survival Plan, n.d. Palm oil is the world's cheapest and highest yielding oil crop, which makes it one of the most profitable crops in the world (Pimm and Vijay, 2016). The two biggest producers of palm oil are Indonesia and

Malaysia, with 70,000 square kilometers and 45,000 square kilometers of palm oil plantations, respectively. In Indonesia, 53.8% of this land comes from deforestation, and 39.6% in Malaysia (Pimm and Vijay 2016). Other industries like timber and rubber also contribute to deforestation in Southeast Asia (Bellantonio et al. 2016). Habitat loss is devastating to gibbon populations because of their large home range and arboreal lifestyle. This makes them vulnerable to habit fragmentation, or when large habitats are broken into smaller pockets, because they avoid going to the ground to decrease risk of predation. Habitat fragmentation can completely cut off gibbons from part of their home range by roads and construction. A reduced home range creates challenges for gibbons and the forest such as interspecies competition and less efficient seed dispersal. Gibbon habitats can also shrink because of nearby human populations. In a study in Wuliangshan National Nature Reserve in China, researchers found that gibbons prefer higher-elevation areas when lower-elevation areas have a higher density of human population and activity (Zhang et al. 2026). This is despite the fact that these high-elevation areas are colder and have less resources. This is a response to human activity such as livestock grazing and understory harvesting, as well as hunting (Zhang et al. 2026). However, it has been found that many gibbon species are fairly tolerant of human activity in their habitat, so conservation

strategies don't need to emphasize total isolation of gibbon populations from humans (Nurvianto et al. 2022).

Gibbons are frequently hunted for subsistence, traditional medicine, and the pet trade (Gibbons Species Survival Plan, n.d.). The illegal pet trade is a common sight in Asia, and gibbons are often the prized possession of these markets. Tourists can pay to take pictures with baby gibbons, watch them perform, or even take them home. To capture a baby gibbon, poachers first kill the rest of their family. Poachers do this because mothers carry their babies wherever they go, and gibbon families are known to fight back when babies are taken (Gibbons Species Survival Plan, n.d.). Gibbons are not hunted only for their babies, but also for their flesh, blood, bones, and brains.

Gibbon's brains, blood, flesh, and bones are all believed to have healing properties, which is why they are used in traditional medicines. Traditional medicines are typically over-the-counter medications, or, in rural areas, people may make their own using materials from the wild. Traditional medicines are often made from different plants and animal parts, and the demand for them is a main driver of species extinction across Asia (Liu et al., 2016). Traditional medicines vary from country to country, and there is no consensus across countries or tribes on what medicines work, or what different animal parts do. In China, Traditional Chinese Medicines (TCM) account for

80% of over-the-counter pharmaceutical purchases (CFDA, 2001). However, Liu et al. (2016) discovered that consumers don't know what is really in the TCMs, instead they buy what they have heard works. When consumers were asked if they would substitute wild animal parts in TCMs, they showed willingness if the animal was known to be endangered. However, consumers also expressed feelings that wild animals are more effective and purer compared to farmed animals or other substitutes. China has placed 161 wild animal species used in TCMs on the *Key National Protected Wild Animal List* (SINO-TCM, 1955). While this makes hunting these animals illegal, it does not stop poachers from continuing to hunt them. Consumer preferences and the difficulty of stopping poachers indicate that there is an opportunity for more conservation awareness to inform consumers.

There are also more local, tribal traditional medicines throughout Asia that use endangered wild animals, including gibbons. For example, in the Assam region of India, one tribe uses Hoolock gibbon brains as an "invigorating stimulant for pregnant women" (Karmakar, 2021), while another tribe uses Hoolock brains to cure toothaches (Karmakar, 2021). In addition to use in medicine, there are other harmful traditional beliefs about gibbons and their uses. In Hainan, China, the island home to the last 26 Hainan gibbons, locals believe gibbons are unlucky to see, their arm bones give the owner good luck,

their bones can be used to test for poison, etc. (Turvey et al., 2018). Because traditional beliefs and medicines are so widespread and diverse, they pose a difficult challenge for conservationists.

Now that we've seen the threats gibbons face, it is clear that gibbon conservation is a daunting task. Gibbons need large, undisturbed tropical rainforests to survive. Today, there are not many large, protected forests left. Gibbons also face threats from poachers, which adds more pressure to their survival. If gibbons are to be saved from extinction, immediate action must be taken. So, what is being done right now?

Current Conservation Efforts

There are many gibbon/gibbon-related conservation efforts being taken right now. The ones I will focus on are community outreach, traditional medicine demand reduction, better illegal wildlife trade enforcement, and land protection. These appear to be the most effective methods.

Community Outreach

Community outreach can be aimed at local communities or large groups of people. Local community outreach usually consists of meeting with local communities that have close contact with endangered species and educating them about sustainable practices around said species. For example, The Gibbon Experience in Laos focuses on conservation of the Western Black Crested Gibbons. They do this through tourism and partnership with farmers and the state. The

Gibbon Experience offers fun, safe gibbon tourism through activities like ziplines and treehouses.

Practices like these allow tourists to get a glimpse of the gibbons in the area while still keeping gibbons at a safe distance. They also offer free or low-cost irrigation and land preparation services to local farmers to encourage them to switch from slash-and-burn agriculture techniques to confined rice-paddy farming. Prior to the COVID-19 pandemic, The Gibbon Experience created 120 jobs in tourism and helped numerous farmers become more sustainable (WWF-Asia Pacific, n.d.). Another example is Flora & Fauna International's community outreach-based conservation of the Western Hoolock Gibbons in Myanmar. Flora & Fauna identified a priority conservation site, Pauk Sa Mountain, for the Western Hoolock Gibbons and discovered that the main threat to gibbons and the forest was shifting local agriculture. To combat this, Flora & Fauna worked with 6 indigenous communities surrounding a priority conservation site for the primate to introduce new alternative agricultural practices that can support the surrounding environment and gibbons, such as planting cash crops that can support the communities (Flora & Fauna, 2023). These small-scale, local outreach programs are effective for conservation of specific populations of gibbons. There are also outreach programs focused on large-scale changes in perceptions of species.

These large-scale outreach programs can be books, video games, events, or even time periods, such as IUCN's designation of 2015 as the year of the gibbon and October 24th as "Gibbon Day" (IUCN SSC Section on Small Apes, n.d.). These outreach programs are based upon years of research and aim to educate the public on the uniqueness and importance of species or ecosystem. For example, the Borneo Nature Foundation (BNF) has published a book, *The Little Gibbon*, and a video game, *Wildverse*, in order to raise awareness about gibbons and their protection (Cheyne et al., 2024). The BNF has researched gibbons in Borneo since 2005, and through this research created their educational materials (Borneo Nature Foundation, 2025).

Cheyne et al. (2024) emphasize that local community outreach is still the key to larger-scale outreach, as the local community still has a large impact on the surrounding environment and gibbons. Interestingly, local outreach and large-scale outreach can differ greatly. Cheyne et al. (2024) point out that when working with the local communities, species-specific education is less effective because they view gibbons as a part of the forest ecosystem and are no more or less important than any other species in the forest. When planning community outreach conservation strategies, it is evident that understanding of local perceptions and practices is crucial, no matter the scale.

It has also been shown that local communities have a direct impact on the

effectiveness of a protected area. A study conducted by Chinese researchers in the Wuliangshan National Nature Reserve in China looked at this effect. The researchers found two things: protected areas are effective for gibbon conservation, and local people's knowledge of gibbons and attitude toward wildlife positively impact gibbon conservation (Zhang et al., 2026). Between 2010 and 2020, the gibbon population of Wuliangshan NNR increased from 87 gibbons to 104, so it is clear the protected area is effective (Zhang et al., 2026). Zhang et al. (2026) also found that gibbons move to higher elevation areas when they are too close to humans. These higher elevation areas are colder and have less resources therefore providing less suitable habitats.

Nevertheless, gibbons survive better in higher elevations, likely because there are less people (Zhang et al. 2026). Because of this, it may be wise to choose higher elevation areas when choosing potential protected areas for gibbons.

These findings suggests that more targeted gibbon education community outreach could be effective for gibbon conservation, since residents' gibbon knowledge was relatively surface level. Based on the success of programs like *The Gibbon Experience* and *Flora & Fauna*, local community outreach campaigns focused on education of sustainable agriculture practices and gibbon's role in the ecosystem could further

increase the effectiveness of the Wuliangshan protected area.

Traditional Medicine Demand Reduction

Traditional medicine (TM) demand reduction campaigns are another conservation method being used to combat gibbon extinction rates. Demand reduction campaigns can be defined as outreach campaigns focused on getting people to voluntarily change their consumption behavior of wild animals (Veríssimo et al., 2012; Burgess, 2016). A review of TM demand reduction campaigns by Veríssimo and Wan (2018) found 236 campaigns in peerreviewed journals and grey literature. Of these, only 9% reported any biological impacts of the campaigns, and these reports were based on anecdotal evidence or “high risk research designs” (Veríssimo and Wan, 2018).

TM demand reduction campaigns are difficult for a number of reasons. They are asking consumers to negatively change their behavior, there are no direct benefits to the consumer, and traditional medicines are a culturally sensitive topic (Liu et al., 2016; Thomas-Walters et al., 2020). A study of wildlife trade demand reduction campaigns, Thomas-Walters et al. (2020) found that these kinds of campaigns may not be as effective as some think. The researchers looked at “behavior change interventions” (Thomas-Walters et al., 2020) in the public health and international development sectors, and found that overall they are not very effective. For example, a study of anti-tobacco,

alcohol, and drugs campaigns found that out of 54 campaigns, 64% reported no change in usage after 2 years (Stead et al., 2007). Behavioral researchers have found that campaigns that promote adopting a new behavior are twice as effective as campaigns aimed at reducing a behavior (Snyder et al., 2004). This suggests that instead of focusing on reducing consumers consumption of TMs that contain wild animal parts, campaigns should focus on informing consumers of adequate substitutions (Thomas-Walters et al., 2020; Liu et al., 2016; Moorhouse et al., 2020). Moorhouse et al. (2020) call this demand redirection. They suggest this as an alternative to demand reduction, based on their findings that 89% of regular TM users surveyed said they would choose to buy an herbal TM substitution when given the chance. I can conclude based on these findings that TM demand redirection campaigns would be more effective than demand reduction campaigns, as people are more willing to substitute behaviors than fully give them up (Moorhouse et al., 2020; Snyder et al., 2007; Stead et al., 2007; ThomasWalters et al., 2020).

Besides reducing/redirecting the demand for TMs, more regulations on the use of wildlife in TMs can be put in place, specifically for traditional Chinese medicines (TCM). The problem with TCMs is that while all IUCN listed endangered Chinese animals are nationally protected and hunting is banned, only 2 species, rhinos and tigers, are fully banned from use in

TCMs (State Council of China, 1993). Now that China has become a global power, the demand for TCMs has increased greatly. China has even integrated TCMs into their Belt and Road Initiative, a global expansion project, with the “Traditional Chinese Medicine ‘Belt and Road’ development plan (2016–2020)” and “Promote the high-quality integration of Traditional Chinese Medicine into the ‘Belt and Road’ development plan (2021–2025)” (State Administration of TCM, 2021; State Administration of TCM & NDRC, 2016). The increase in demand for TCMs this will cause is sure to put more strain on endangered wildlife populations, gibbons included. China also has no regulations on disposal of seized illegal wildlife products. This creates loopholes that allow the illegal goods to re-enter the market, usually through corruption (Wang et al., 2022). In order to build a more sustainable TCM market, Wang et al. (2022) suggest China tightens its regulations on disposal of illegal material through clear protocol and more oversight, as well as better law enforcement training based on different species, types of product and certification, quantities, and other system-specific factors.

Illegal Wildlife Trade Enforcement and Policy

Weak illegal wildlife trade (IWT) enforcement is not a problem unique to China. In 2024 alone, India seized 3 gibbons being sold on the black market (Raman, 2025). While there are laws forbidding the capture and trade of gibbons, this is barely enforced. The issue lies in the

increased demand for wildlife, including gibbons, from social media, lack of regulation for what to do with seized illegal animals, and lack of legal cross-border cooperation, specifically between China and Southeast Asia (Jiao et al., 2021; Raman, 2025). Related to reducing the demand for TMs with animal parts, the demand for exotic pets must also be reduced, as social media has led to higher demand internationally (Raman, 2025).

Better regulations for what to do with a seized animal are key to reducing the harm caused by the IWT. Currently, seized gibbons are sent to local zoos or released into the wild where they were found. These practices not recommended, as these zoos often don't know how to care for gibbons and if released into the wild the gibbons will either die or destabilize the ecosystem (Raman, 2025). Instead, Susan Cheyne, vice chair of the primate specialist group section on small apes at the IUCN, suggests that wildlife should be repatriated the same way stolen cultural artifacts are, which is mandated by UNESCO's 1970 convention (Raman, 2025; UNESCO, 1970).

To combat the IWT, better cross-border regulations between China and Southeast Asia need to be put in place. China is one of the largest consumer markets in the world, which means it is also shapes the trade of wildlife, both illegal and legal (Nijman, 2010). Southeast Asia is one of the largest exporters of wildlife to China, due to its proximity, strong economic ties, and its rich

diversity of fauna. Currently, legal cooperation between China and Southeast Asian countries, as well as between Southeast Asian countries, is very weak and ineffective (Jiao et al., 2021). Law enforcement concerned with IWT is underfunded and undertrained to deal with transnational organized crime groups, regulations are vague and unclear, and there is no standard precedent for overseas prosecution (Jiao et al., 2021, Raman, 2025).

While combating IWT, specifically the illegal gibbon trade, is a very challenging and complex problem, there are successful initiatives taking place right now. One example is the Wildlife Crimes Unit in Indonesia. This was created by the Wildlife Conservation Society (WCS) in Bukit Barisan Selatan National Park in Indonesia. The Wildlife Crimes Unit is a team of law enforcement dedicated to combating poaching of endangered species, including gibbons (Fondation Segré, n.d.; IUCN Save Our Species, 2021). Fondation Segré (n.d.) reported that the Wildlife Crimes Unit was successful in reducing gibbon hunting in Bukit Barisan Selatan National Park. Due to the unit's success, WCS proposed to expand the program to other parks dealing with illegal hunting. One such park, Nam Et-Phou Louey National Protected Area in Laos, is home to Northern White-Cheeked Gibbons that are under threat from hunting by local communities.

The success of this program suggests that this kind of bottom-up, boots on the ground method of combatting poaching may be more

effective than top-down cross-border policy shifts aimed at IWT. There is no doubt that large cross-border policy change is the key to ending IWT. However, this paper is focused specifically on gibbon conservation. I believe that bottom-up, population focused efforts such as the Wildlife Crimes Unit are more suitable for this goal. This is because these kinds of efforts can achieve results quickly, and the gibbon population decline problem is an urgent one.

Land Protection

Another successful method of gibbon conservation is land protection. This means establishing protected forests in areas deemed to be key for the survival of endangered species and ecosystems. Protected areas (PA) have been shown to be very effective. A study by Graham et al. (2021) found that Southeast Asian PAs lost three times less forest coverage than similar areas that were unprotected. They also found that PAs that completed management reporting using Management Effectiveness Tracking Tool (METT) lost less forest than PAs that didn't, about 1.5% less. The METT allows PAs to measure the progress of effective management over time (Stolton et al., 2020). METT is only used by 11% of Southeast Asian PAs, so it has been suggested that widespread implementation of this tool could greatly reduce deforestation in the region (Graham et al., 2021).

Well managed PAs are very effective, but many Southeast Asian PAs are not well managed. In a study of effective Southeast Asian PA

management, Sreekar et al. (2024) found that of 80 PAs studied, 44 lost ~72,000 hectares of land, which impacted 226 threatened species of birds and mammals. The study found that this was due primarily to a lack of funding leading to poor management. The researchers suggest that an increase of 17 million USD a year would be enough properly manage these low-performing PAs. These studies indicate that proper management is the key to an effective PA.

Another key to an effective PA is understanding the needs of species in the PA. For gibbons, this means establishing one large PA, instead of several small PAs. This is because, as mentioned earlier in this paper, gibbons need large areas of unfragmented forest because of their arboreal lifestyles and large home ranges. This means that some areas are much more suitable than others for PAs focused on gibbon conservation. In a study of suitable Hoolock gibbon habitats, a genus of gibbons in India, Myanmar, Bangladesh, and China, Lwin et al. (2021) found 27 “strongholds” – areas of at least 250 square kilometers – and 199,447 square kilometers of suitable habitat that could accommodate each of the three species of Hoolock gibbons. Lwin et al. (2021) report that the most at risk gibbon populations are those in Bangladesh, so setting up protected areas in strongholds in Bangladesh and cross-boundary strongholds in between Myanmar and Bangladesh should be prioritized. Of the total suitable habitat identified, 18.9% of the habitats

are highly threatened, 26.2% show a medium threat level, and 54.8% are deemed to have a low threat level (Lwin et al., 2021). This study highlights priority conservation zones for hoolock gibbons, but these kinds of studies could be used to find priority conservation zones for all other gibbon species.

Conservation Strategies

Now that I have covered the most effective current gibbon conservation efforts, I will move on to my own. Through my research, it has become clear to me that conservation strategies should be community-oriented, transnational, and science-based and adaptive.

Conservation efforts should be community-oriented because the communities surrounding gibbon populations have been shown to have a great impact on their continued survival (Zhang et al., 2026). It is also true that gibbons are fairly tolerant of human activity in their habitats (Nurvianto et al. 2022). This means that if local people are educated on sustainable practices in and around gibbon habitats, gibbons should be able to live near human communities with little issue. However, this also means that gibbons are more at risk from human activity than more human-avoidant species. This means that community-based conservation is crucial to reducing gibbon population decline.

Conservation efforts must be transnational because gibbons can be found across 11 countries in Southeast and East Asia. A gibbon conservation strategy confined to single country

will be undermined by weak enforcement and policy by neighboring countries, even at the species level. As mentioned earlier, Hoolock Gibbons alone are spread out across four countries: India, Myanmar, China, and Bangladesh (Lwin et al., 2021). A conservation strategy that doesn't take into account cross-border challenges will inevitably be ineffective.

Finally, conservation strategies must be based in scientific research and data, and adapt to this data. The Borneo Nature Foundation explains this well:

To develop effective conservation strategies and counter these threats, we first need to understand the gibbons' behaviour, ecology, and population dynamics. If we don't know how many individuals there are, where they live or what they need to survive, how can we hope to protect them? (Borneo Nature Foundation, 2025)

In addition to building strategies based on data, these strategies must also adapt to changing populations and threats. If a strategy is developed to address the urgent population decline of the Hainan gibbon, the most critically endangered gibbon species, this strategy must be able to adapt to this same population as it changes, hopefully for the better (Wengel et al., 2024).

Short-Term Strategies

My conservation strategies can be broken into two groups: short-term and long-term. Before we can consider long-term conservation strategies, we need to address the immediate

problem of gibbon's rapid population decline. To do so, protected areas must be increased and better protected and managed. I suggest that efforts like the WCS Wildlife Crimes Unit be replicated and expanded across gibbon ranges, and more protected areas should be established in gibbon strongholds like the ones identified by Lwin et al. (2021).

The WCS Wildlife Crimes Unit was successful in reducing gibbon population decline in Bukit Barisan Selatan, Indonesia and successfully expanded to PAs in Malaysia and Laos (IUCN Save Our Species, 2021). Because this program is both successful and easily replicated, it is a perfect model for widespread PA protection. Therefore, a regional network of WCU-style protection units should be created. This could be facilitated by the ASEAN Wildlife Enforcement Network (WEN), an existing intergovernmental initiative between ASEAN countries to combat the IWT (ASEAN Wildlife Enforcement Network, 2026). This direct coordination between countries is the key to this strategy, as we have seen that cross-border policies often fail due to lack of coordination (Jiao et al., 2021).

There should also be more PAs created that specifically target gibbons. We have seen through the research of Lwin et al. (2021) that there are still many areas of forest, or strongholds, throughout Southeast Asia that are suitable Hoolock gibbon habitats. Of these areas identified, 45.1% have a high or medium threat level. These areas should quickly be designated

PAs and become part of the ASEAN WEN protection unit network I propose above. In addition to this, more gibbon strongholds for other gibbon species across SE Asia should be identified and protected quickly. Remember that gibbons are affected greatly by habitat fragmentation, so while PA designation is not a fast process, it is faster than regrowing destroyed sections of forest. Lwin et al. (2021) also note that there are scattered populations of gibbons in forest fragments throughout Bangladesh. To protect these populations, they should be translocated to strongholds.

Scattered gibbon populations can be found across SE Asia. Translocating them to identified strongholds should also be a short-term priority, as these populations are very at risk.

Finally, international funding of PAs should require use of METT reporting. It has been shown to increase the effectiveness of PAs greatly and should therefore be a staple of every PA's management (Graham et al., 2021).

These strategies are designed to quickly protect gibbons from continued population decline. Once these are implemented, SE Asian countries can start working on implementing long-term conservation strategies.

Long-Term Strategies

My long-term gibbon conservation strategies are wildlife corridors, IWT and TCM demand reduction/substitution, community livelihood development, and gibbon repatriation. These strategies are designed to achieve results over

several years and aim to make gibbon populations more self-sustainable.

Wildlife corridors are a conservation tool used to connect fragmented habitats, allowing wildlife to move freely between habitats in human dominated areas (LaPoint et al., 2013). Wildlife corridors can be built between PAs near human communities to combat negative impacts on gibbon populations caused by habitat fragmentation. It is important to note that wildlife corridors must be based on actual animal movements, not cost-based models, which are often used (LaPoint et al., 2013). Regional cooperation is important for successful cross-border wildlife corridors, as nations must work together to create and manage these corridors. A great example of wildlife corridors is the Flora & Fauna International's six village agroforestry project. By teaching villages surrounding endangered Hoolock gibbon territory sustainable agriculture at the forest's edge, the transition zones between villages became open to gibbons to move through (Flora & Fauna, 2023).

To reduce hunting pressures on gibbons, consumer demand for gibbons in TMs, specifically TCMs, and as pets must be reduced. I suggest that this is done through demand replacement instead of demand reduction. As we have seen, demand campaigns centered on getting people to stop a behavior are not very effective (Stead et al., 2007), but campaigns that aim to change or redirect behavior are (Stead et

al., 2007). As mentioned previously, it has been shown that TM users are willing to substitute when educated on the negative impacts of TMs made with endangered animal parts (Liu et al., 2016; Moorehouse et al., 2020). This is why I suggest that demand campaigns focus on redirecting consumers toward substitutions instead of reducing consumption entirely.

For local, tribal-specific TM use, targeted local outreach will be more effective. As previously discussed, tribal and local use of gibbon parts in medicine throughout SE Asia is diverse and cannot have one single solution (Turvey et al., 2018; Karmakar, 2021). Therefore, each tribe or local community should be educated based on their specific beliefs. This will certainly take a lot of time and effort, but I don't believe it has to be a priority. China is the largest market for TMs, so demand redirection campaigns targeted toward Chinese consumers will have a great impact (Liu et al., 2016).

In the case of illegal gibbon pets, demand campaigns should focus on educating consumers of the harm caused to obtain a pet gibbon and suggest legal alternative pets. Another way to reduce the harm of the IWT is to create a system of gibbon repatriation. I briefly mentioned Susan Cheyne's suggestion that wildlife should be repatriated the same way stolen cultural artifacts are, which is mandated by UNESCO's 1970 convention (Raman, 2025; UNESCO, 1970). I believe this should become a real law that requires confiscated gibbons to be returned to

their natural habitat. This is in response to current methods of dealing with confiscated gibbons, which are to release them where they were found or sent to zoos unaccustomed to gibbons (Raman, 2025). The precedent already exists for repatriation of stolen cultural artifacts, so it is feasible to extend this to living animals. The ASEAN WEN could oversee enforcement of this policy, as they already have a transnational network across SE Asia, and in my framework they already oversee implementation of wildlife protection units.

Community livelihood improvement projects should also be expanded across SE Asia. These are projects that focus on improving sustainable livelihood practices in communities living near gibbon populations. I've discussed two successful examples of this; the Gibbon Experience's agricultural transition support and Flora & Fauna International's six-village agroforestry program (Flora & Fauna, 2023; WWF-Asia Pacific, n.d.). These are successful because they give local communities alternatives to hunting and unsustainable agriculture practices. This way gibbon conservation and a local community's livelihood are not competing against each other but working together.

Measuring Success

To make sure these strategies are effective, I propose three success metrics be used: population monitoring, deforestation metrics, and enforcement outcomes.

Population monitoring is crucial for evaluating whether strategies are boosting gibbon population growth. Because gibbons make such loud, distinct vocalizations, bioacoustics surveys every 3-5 years, because of gibbons' naturally slow reproduction, are an easy way to monitor populations. Bioacoustics use the sounds of animals to track movement and population level, and have been used by the Borneo Nature Foundation to survey gibbon populations (Borneo Nature Foundation, 2023). Deforestation must also be monitored to assess how effective PA-centered strategies have been. PAs can use satellite-based forest cover tracking tools like Global Forest Watch (GFW) in tandem with METT to accurately assess PA effectiveness (Global Forest Watch, n.d.). Enforcement metrics can be used to evaluate the success of wildlife enforcement strategies. These are metrics like number of arrests, prosecutions, and convictions for the IWT across countries. These should be tracked annually to monitor change.

Conclusion

Gibbons are the most threatened primate family in the world. Their protection is vital to

the health of forests across SE Asia, as they are Asia's best seed dispersers (McConkey, 2000). In this paper, I discussed current conservation efforts and posited my own conservation strategies to bring this key primate back from the brink of extinction. These strategies are broken into short and long-term. Urgent short-term strategies are the establishment, protection, and management of protected areas targeting gibbons. My long-term strategies to improve gibbon population self-sustainability are wildlife corridors, community livelihood development, demand redirection campaigns, and gibbon repatriation. Of these strategies, the most important is the establishment, protection, and management of protected areas in gibbon strongholds. Without large, safe areas for gibbons to live, they are sure to vanish from our planet. My hope for this paper is to emphasize the urgent need for gibbon conservation strategies to widespread and effective so that we can save these creatures that we have almost exterminated.

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