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Emerging illegal wildlife trade issues: a global horizon scan

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Abstract:

Illegal wildlife trade is gaining prominence as a threat to biodiversity, but addressing it remains challenging. To help inform proactive policy responses in the face of uncertainty, in 2018 we conducted a horizon scan of significant emerging issues. We built upon existing iterative horizon scanning methods, using an open and global participatory approach to evaluate and rank issues from a diverse range of sources. Prioritised issues related to three themes: developments in biological, information and financial technologies; changing trends in demand and information; and socio-economic and geopolitical shifts and influences. The issues covered areas ranging from changing demographic and economic factors to innovations in technology and communications that affect IWT markets globally; the top three issues related to China, illustrating its vital role in tackling emerging threats. This analysis can support national governments, international bodies, researchers and non-governmental organisations as they develop strategies for addressing the illegal wildlife trade.

Introduction:

Thousands of species are subject to illegal wildlife trade (IWT), defined here as the unlawful buying or selling of harvested wild species (or derivatives; 't Sas Rolfes et al. 2019). Due to its complexity and typically covert nature, the absolute scale and value of IWT is challenging to assess, but estimates place it in the top five illegal transnational trades, alongside arms and drugs. (UNODC, 2016; van Uhm, 2016). Impacts extend beyond biodiversity, as criminal involvement may destabilize governments and economies (Felbab-Brown, 2017) and damage livelihoods and security for those living with wildlife (Riskas et al., 2018). However, IWT also provides income to individuals with limited alternatives (Harrison et al., 2015) and valued goods, such as bushmeat, to consumers (Boratto & Gore, 2018).

Whilst predicting and responding to IWT is challenging, there are growing opportunities to influence global and national policies. For example, in 2015, the UN General Assembly adopted its first wildlife trafficking resolutions (UNGA, 2015). In 2014-18, the UK government led a series of four international conferences and one regional event, specifically aimed at addressing the topic. At the Convention on Biological Diversity's thirteenth Conference of the Parties, a decision was made to provide technical guidance towards a more sustainable bushmeat sector. The direct exploitation of organisms, including illegal extraction to meet local and global markets, was ranked second of five key drivers of harmful ecosystem change in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services' first global assessment (IPBES 2019).

Global IWT policy-making involves a range of stakeholders, operating within and between systems of varying compatibility. Currently, member state compliance with international agreements, such as CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora), provides the dominant means for governing wildlife trade to ensure it does not threaten species ('t Sas-Rolfes et al, 2019). Increasing attention has recently focused on transnational organised crime and related security dimensions, broadening the scope of IWT policy and action to involve bodies such as the UN Security Council, Interpol, and the United Nations Office on Drugs and Crime (UNODC). Regional and global policy initiatives focus on enforcement, technical assistance, and capacity building, yet effective counter-IWT measures hinge on the political will of nation states. Such a multifaceted policy-making environment requires proactive approaches informed by interdisciplinary input, leveraging relevant innovations in technology, governance and information systems.

IWT is often unpredictable, involving fluid markets and clandestine crime. In this complex landscape, appropriate policy responses should be informed by empirical evidence. While some trends in the *legal* wildlife trade are relatively well-documented (Harfoot et al., 2018), little has been done to analyse IWT trends and patterns systematically. Proxy measures of IWT, such as seizure data (Rosen & Smith, 2010), provide some indication of trade routes and scale, but contain detection and reporting biases (Underwood et al., 2013). Seizures tend to be biased towards charismatic

130 megafauna (e.g., elephant ivory) and may constitute less than 10% of all illegal trade
131 (van Uhm, 2016). Information linked to underlying drivers and trends shaping IWT is
132 even more difficult to obtain. In the face of such uncertainty, poorly informed public
133 responses may drive politically popular, but ultimately counterproductive, policy
134 measures.
135
136 This first global horizon scan of IWT aims to inform proactive policy responses by
137 governments, international conventions and NGOs to prioritise key IWT issues,
138 underpinned by emerging empirical evidence. Horizon scanning is particularly useful for
139 gathering, organising and prioritising new and existing evidence about emerging issues
140 in a timely, structured and transparent way (Wintle et al, In press). It can be used for
141 policy and decision-making alongside other strategic foresight tools, such as scenario
142 planning (Cook et al., 2014).
143
144 Horizon scanning systematically searches diverse information streams (Amanatidou et
145 al., 2012), and identifies emerging threats and opportunities (Sutherland & Woodroof,
146 2009). By helping understand system dynamics and anticipate the future, horizon
147 scanning can support better coordination of resources, responsive policy or on-the-
148 ground action to address issues before full impacts are realised (Konnola et al., 2012).
149 The policy impact of horizon scanning exercises is challenging to gauge, because
150 decisions typically reflect a blend of inputs (Wintle et al., In press). Nonetheless, other
151 horizon scans have set a precedent of informing policy and decisions. For example,

priorities identified in an Antarctic Science Horizon Scan (Kennicutt et al., 2014) were used to invoke financial support for joint science programmes on ice sheet research (National Science Foundation, 2016), and issues identified in annual global conservation scans (e.g. Sutherland et al., 2018) have informed the U.K.'s Natural Environment Research Council's 'Forward Look' strategic planning.

Scans for global conservation issues have been conducted for ten years (e.g., Sutherland et al., 2018) and topics thus identified have had widespread salience. Illustrating this, in 2009, only 23% of respondents had heard of microplastic pollution, 46% of synthetic meat, and 69% of mobile sensing technology; today, these are mainstream issues (Sutherland et al., 2019). Our horizon scan provides insights into how complex economic, socio-political, financial, and ecological systems relate to IWT. Building on existing structured methods, but using an open and inclusive approach to participation, it highlights a diverse range of emerging topics to consider when formulating policy and coordinating resources.

Methods:

We adapted the Delphi-like method used in other horizon scans (Mukherjee et al., 2015; Sutherland et al., 2018). Through anonymity, iteration, facilitated discussion, structured elicitation, and aggregation of individual judgments, the method is designed to democratically incorporate a range of perspectives, and mitigate psychological biases that typically befall individuals and groups (Burgman, 2016).

Many scans solicit direct input from an invited expert group and require participants to meet in person. There is always a risk that particular topics may be more likely to be suggested when they closely align with the person's own research interests, and that more senior people, seen as "experts", may have particular worldviews and experiences, that limit their perspectives. To help mitigate this potential source of bias, we cast a wide net to solicit the first round of ideas from as many different contributors as possible, to capture diverse interests from around the world. To do so, we used an open online platform, which accommodated 29 languages and remotely engaged contributors who might not otherwise be able to participate (Hemming et al., 2017; McBride et al., 2012). An online call for participation was disseminated via targeted individuals and approximately 45 networks, groups and organisations, encompassing a range of relevant disciplines and institution types. The call reached a minimum of 5,000 people. Supplementary Material 1 provides specific methodological details.

The study followed a stepwise procedure, with all stages remotely facilitated, to identify and prioritise emerging issues with the potential to have substantial positive and/or negative impacts on IWT over the next 5-10 years (Figure 1). Ultimately the usefulness of Horizon Scanning can only be judged retrospectively based on whether the issues have come to pass within the specified time-frame and how the scan has informed proactive responses (Sutherland et al. 2019).

196 ***<Figure 1>***

197

198 Up to five issues were elicited from each contributor (**Stage 1**), who were asked to think
199 widely, consult their networks, and conduct their own research. Thirty-nine nationalities
200 and wide expertise (including biomedical engineering, conservation, criminology, earth
201 sciences, ecology, economics, geography, law, political science and sociology) were
202 represented in the initial contributor group (139 individuals). Eighty-seven percent of
203 contributors were affiliated with institutions. Of those, sixty-five percent were affiliated
204 with academia, 50% NGOs, 17% consultancy, 13% government, 10% multilateral
205 organisations, and 7% private sector. Contributors worked in multiple regions: 55%
206 Africa, 50% Asia-Pacific, 26% Europe, 17% North America, 11% Latin America.

207

208 The initial list was thematically organised and anonymised by the facilitators (NE, BW).
209 Unsuitable material (which conveyed a perceived need, knowledge gap, opinion or
210 promotion) was removed. A consolidated list was circulated to 'assessors', a subset of
211 contributors who had submitted well-researched contributions accompanied by links to
212 evidence (i.e. papers, reports etc.), chosen to balance background, expertise and
213 geographical diversity (the remaining authors). Six of 139 people submitted issues in a
214 language other than English; among the 25 authors there was fluency in at least 10
215 languages, allowing evidence from a range of sources to be assessed.

216

In **Stage 2,** the assessors independently and anonymously scored (on a scale of 0-1000) each issue based on novelty, plausibility, and potential future impact on IWT. Raw scores were converted to z-scores, ranked (Wintle et al., 2017), and the top 45 were shortlisted. Assessors reported whether they had previously heard of each issue; the least known reflecting some of the most novel issues. Before **Stage 3**, the opportunity was given to 'save' any of the originally assessed 128 issues not shortlisted through scoring, if substantiated with well-justified reasoning. Eight additional issues were saved, meaning 53 issues moved to **Stage 3.** Here, each assessor was randomly assigned 4-5 issues to investigate, ensuring that each issue was closely examined by 2-3 people and equally considered before discussion. This helped mitigate potential biases from people focussing solely on their own 'pet' topics, or eye-catching topics. In **Stage 4,** authors discussed insights into each issue from their investigations and experiences via an online forum. This culminated with a second scoring round to produce a final ranked list of 20. Again, scoring was independently completed by each assessor with scores aggregated, so decisions on the final list were not dominated by the loudest voice. The facilitators then reworked final issue descriptions and grouped them into overarching themes. We cross-validated these groupings and links between themes by conducting topic modelling, based on the descriptive text, using Latent Dirichlet Allocation (Blei et al., 2003; Supplementary Material 4). To clarify the policy relevance of issues and refine their descriptions, we drew upon issue-specific expertise from an additional 12 external reviewers (Stage 5).

Results:

The top 20 issues fell under three overarching themes: (i) *Geographic (political, demographic and socio-economic) shifts and influences;* (ii) *Scientific and technological innovation,* and (iii) *Changing trends in demand and information* (Fig. 2). Topics identified through the Latent Dirichlet Allocation analysis largely complemented our qualitative analysis of overarching themes; results are presented in Supplementary Material 4. In Supplementary Material 2, we provide details of the top 20 issues, with brief descriptions of the following 40. Policy directions are mapped out for all top issues in Supplementary Material 3, intended as a platform for further discussion and decision-making.

<Figure 2>

Issues under the first theme, '*Geographic shifts and influences*' include changing geopolitical processes and the rising global influence of East Asia. Authors noted political, demographic and economical changes, which could facilitate greater access to wildlife, and stimulate growing demand (but also sustainable opportunities) for IWT products. These issues were the top three ranked: **Issue 1**- the political support and cultural revival of Traditional Chinese Medicine (Zheng, 2016; Table 1); **Issue 2**- the increasing role of China in developing countries, through international aid, investment, and diaspora; and **Issue 3**- the rapid expansion of new international trade routes,

261 particularly in the context of the Belt and Road Initiative (Chinese State Information
262 Centre, 2019).
263
264 ***<Table 1>***
265
266 In key wildlife source countries, especially in Africa and Latin America, recent
267 developments create conditions that may exacerbate IWT. This includes freer trade and
268 migration policies, with aspirations for rapid economic growth and prosperity across
269 Africa (African Union, 2018; **Issue 7**). Rapid human population growth, alongside
270 continued agricultural land conversion and natural habitat encroachment, also affects
271 sub-Saharan Africa (**Issue 8**), leading to increased human-wildlife conflict, resource
272 pressure, and wildlife crime (Kideghesho, 2016). Indicated by expanding Asian-
273 influenced demand for its range of commodities and species, Latin America was also
274 considered increasingly prominent in IWT activities, with trade often passing undetected
275 through established smuggling routes (Issue 20). Political and socio-economic instability
276 in the region was highlighted, with the current crisis in Venezuela identified as a
277 significant potential catalyst for IWT, facilitating both extraction and transit (Sánchez-
278 Mercado, 2017) and impacting neighbouring countries (Issue 9).
279
280 Issues under the second theme, *'Scientific and technological innovation'*, fell into two
281 broad categories: 1) biotechnology and 2) information technology (IT), including
282 financial technology. The most highly-ranked biotechnology issue was **Issue 4**: genetic

technological advancements (e.g. Parker et al., 2018), enabling rapid, cost-effective assessments and traceability of product identity and source at the species and individual levels. Such advances can provide critical evidence to penalise and deter wildlife traffickers. Increased availability of portable devices also offers the potential to increase legal trade monitoring.

Three recent IT developments were deemed significant. **Issue 17** concerns the shift of IWT operations and transactions onto and between digital platforms, such as closed social media groups (Xiao et al., 2017), with trade aided by the convergence of online and mobile payment systems, and cryptocurrencies (**Issue 12**). Both reflect the increasing exploitation of digital platforms for advertising and IWT-related transactions, by sellers and buyers. Closely related is **Issue 13**: the role of social media as a marketplace and forum that can either stimulate or deter IWT (e.g. Nekaris et al., 2013). Relatedly, **Issue 16** highlights the emerging use of financial analysis and investigation tools to help track and disrupt IWT-related transactions (Haenlein & Keatinge, 2017), enabling law enforcement to incorporate this into their broader IWT responses.

Our third theme, *'Changing trends in demand and information'*, encompasses a range of issues around specific products and markets. Markets for certain taxa and wildlife-derived products are growing, with threats underappreciated. These include demand for *Haiwei*, dried seafood (**Issue 10**), medicinal plants (**Issue 19**) and cave beetles in Eastern Europe's karst landscapes (**Issue 18**) which are at risk of extinction before being

scientifically described. **Issue 14** highlights the general concern that newly discovered species (desired by collectors for their novelty) may quickly become targets due to easier-to-access locational information (Lindenmayer & Scheele, 2017).

Linked to themes two and three, public-private collaborations help identify and disrupt illicit financial flows by using financial institutions' anti-money laundering technology and infrastructure, and information exchange to facilitate investigations and prosecutions (**Issue 15**, APG & UNODC, 2017). Another cross-thematic issue is that, in the modern age of networked communication, misinformation (from market participants, intergovernmental bodies, NGOs, policymakers and/or the media) can rapidly influence policy and practice (**Issue 5**). This can be difficult to correct and can undermine conservation efforts by skewing policy responses and potentially misdirecting scarce resources.

Finally, and linking back to our first theme, two additional cross-thematic issues were identified. **Issue 6** highlights how urbanisation (across Africa and Asia) may change the dynamics of wild meat markets (Boratto & Gore, 2018). As supplies diminish and restrictions on harvesting certain species intensify, substitutes for wildlife products (such as tiger parts, timber, orchids) are increasingly sought, with globalisation facilitating this shift towards analogue species (**Issue 11**).

Discussion:

Through an inclusive and democratic horizon scanning strategy, we prioritised 20 issues, from which three interlinked themes emerged. Many are double-edged; for instance, a more networked world allows both illegal traders and conservationists to form new alliances and influence public opinion and behaviour. Rapidly emerging technologies are changing the speed and ways people react to newly opened markets and information sources. In particular, the growing reach of mobile technology and physical access into new areas (including remote rural and marine locations) presents opportunities for both IWT perpetrators and conservationists. This dynamic IWT environment presents a challenge as mitigation efforts are inherently reactive to trafficking activities and thwarted by jurisdictional boundaries.

Many issues relate to changing social, economic, political and governance regimes, with the potential to both enable and limit IWT. Major initiatives, such as China's Belt and Road Initiative and African economic growth strategies, may bring prosperity but also biodiversity loss. A number of issues (relating to agricultural conversion, urbanisation, TCM promotion, East Asia's influencing role, African growth strategies, skewed African demographics towards younger people and a rising Asian middle-class) circle back to underlying topics of human population growth and overconsumption; major and contentious causes of current and future conservation challenges.

Given a key aim of addressing IWT is to conserve biodiversity (IPBES, 2019), a broader perspective is needed, requiring integrated responses across sectors. Policy and funding currently tend to focus on large, charismatic species, predominantly traded from Africa to Asia, with wider ecological values sometimes overlooked. Additionally, it can be difficult to predict which species and areas will become the next targets, especially if they are lesser known. Of the taxonomically-focused issues captured, we prioritised those we believed to be most neglected in IWT discourse (i.e. cave invertebrates, medicinal plants, *Haiwei*, seabirds), while acknowledging prioritising one taxon over another is a value judgment. We also recognise that the issues identified were informed by the expertise of scan participants, who were predominantly sourced through the Oxford Martin Programme on the Illegal Wildlife Trade mailing list. A different group of people might have identified and prioritised different specific issues. Similarly, limiting participants to those with more horizon scanning experience might have yielded a different balance between issues that are truly novel and those that are already well-evidenced. However, this would have reduced contributor diversity, thereby potentially also limiting the range of issues considered. This doesn't negate the issues selected, but highlights the need for regular scans and wide consultation. Future scans should incorporate all relevant voices even more actively, ensuring local community perspectives are heard as well as those sourced through international-level processes.

IWT dialogues are often perceived as 'western'-led. But as local and national voices seek more authority over natural patrimony, sovereignty and self-determination, this is

changing. Notably, our scan identifies greater commitment to tackling IWT from African political leaders, particularly through peer-to-peer dialogues (**Issue 34**) and initiatives that support recognition of and engagement with local communities (**Issue 38**). Furthermore, the pivotal role of China in tackling IWT is highlighted. However, expanding demand for wildlife products due to rising prosperity is not unique to China and its neighbours. Future agendas for tackling IWT would benefit from coordinated efforts linking major centres of supply, demand and trade across the world.

Many issues cut across several policy arenas and stakeholders. Conducting in-depth stakeholder and policy-gap analyses for each issue can highlight those in need of cross-sectoral input and help inform appropriate action, by identifying other relevant individuals, groups, policies or legislation, considering their relationships, and prioritising their involvement in the decision-making process (see Supplementary Material 3 as a starting point). It would also be useful to further 'roadmap' the path to a *particular* policy impact by carrying out feasibility assessments of different options, informed by filling necessary knowledge gaps. Techniques to support evidence-based decision-making in uncertain conditions (e.g. scenario planning) can also assist in assessing the most relevant possible futures and policies.

Our findings underpin policy briefing documents, presented at the 2018 London IWT Conference and the 18th CITES Conference of the Parties in August 2019 (Esmail et al., 2019). This scan might be similarly useful to large-scale funders (such as governments and

391 international NGOs) as a guide for prioritising strategic funding programmes, and for
392 highlighting issues to raise during inter-governmental discussions on strategic
393 approaches to tackling IWT. We recommend regular systematic IWT horizon scanning,
394 both nationally and globally, as a pro-active management tool to detect issues before
395 they become urgent, ubiquitous, and thus unmanageable. This could be integrated into
396 strategic planning by donors, regulatory bodies and international partnerships
397 addressing transnational crime, to better coordinate resources and interventions, pre-
398 emptively addressing challenges while solutions are achievable. We hope that future-
399 orientated exercises such as this may help conservation shift its focus from responding
400 to crises to preparing for what is to come.
401
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573 *Figure 1: Methodological stages illustrating the number of people involved and treatment of issues*
574 *at each stage*. Assessors and facilitators are the paper's authors.
575
576 *Figure 2: The top 20 issues with linkages drawn between them*. Numbering represents the rank
577 order of the issues. Those outlined in black are cross-thematic issues. See Supplementary
578 Material 2 for descriptions of all issues.
579
580 Table 1: *Policy relevance of issue 1, as an example of how the issues can be related to policy*. Other
581 issues are discussed in Supplementary Material 3.
582

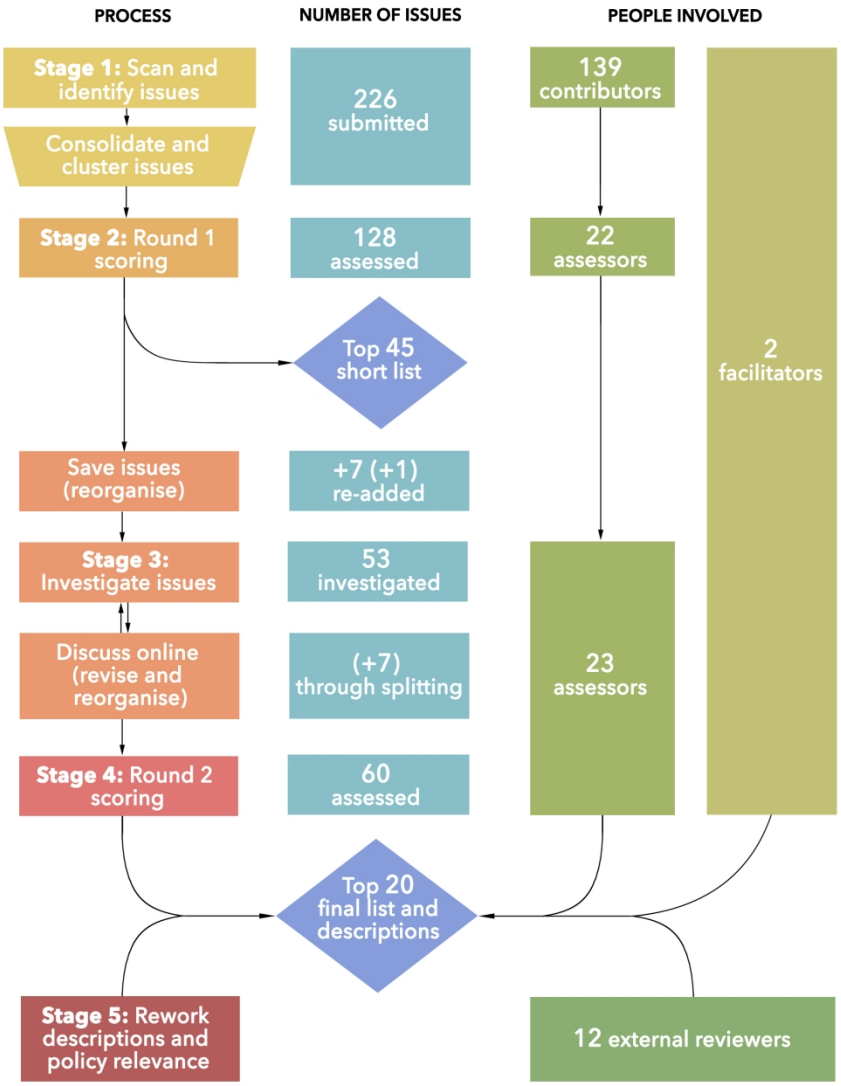

Figure 1: Methodological stages illustrating the number of people involved and treatment of issues at each stage. Assessors and facilitators are the paper's authors.

196x250mm (300 x 300 DPI)

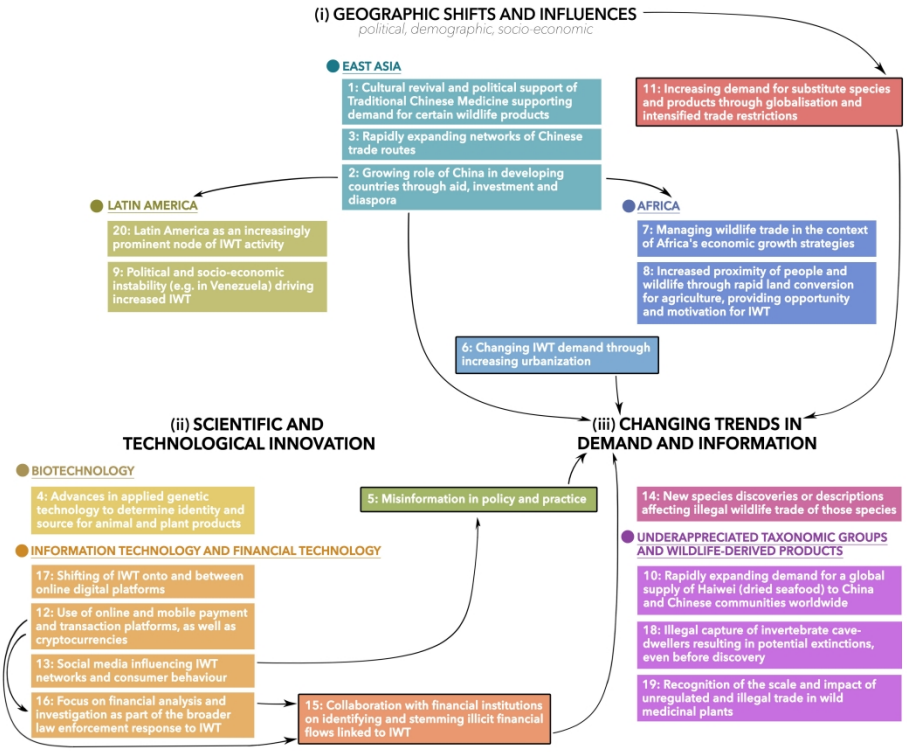

Figure 2: The top 20 issues with linkages drawn between them. Numbering represents the rank order of the issues. Those outlined in black are cross-thematic issues. See Supplementary Material 2 for descriptions of all issues.

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Table 1: Policy perspective of the top ranked horizon scan issue. This table is not exhaustive, (e.g. it largely omits local and national processes and stakeholders) but represents a starting point to inform policy and management and guide strategic responses. See Supplementary Material 3 for Acronym List and perspectives for other issues.

1: Cultural revival and political support of Traditional Chinese Medicine supporting demand for certain wildlife products			
Current policy context	**Relevant actors and institutions: stakeholders to consider**	**Knowledge gaps**	**Potential policy and management approaches: ideas for discussion**
Section 4.2 of Traditional Chinese Medicine Could Make 'Health for One' True, states: "In order to ensure sustainable supplies of natural produce, planting and farming endangered species of wildlife are encouraged by the government, community, and the international organization."[1] Strategic objective 1 of WHO Traditional Medicine Strategy, states: "Member States should strengthen their own knowledge generation, collaboration and sustainable use of T&CM resources. It is important that Member States and stakeholders are mindful	TCM associations (e.g. China's National Administration of TCM), regional hospitals and local medicinal marketplaces. Pharmaceutical industries and TCM education sectors. National and regional pharmaceutical market and labeling regulators (e.g. State Administration for	What pharmacopoeia is being promoted? Where do the wildlife-related ingredients for the medicines in the pharmacopoeia originate? How are these ingredients currently sourced? Are these ingredients	Implement evidence-based regulation of unsustainably sourced products (alongside monitoring of medicines over a certain quantity). Raise awareness of all stakeholders of issues of biodiversity and conservation. Conduct targeted consumer / practitioner behaviour change interventions. Create an open-access online platform to integrate policy

[1] World Health Organisation Commission on Intellectual Property Rights, Innovation and Public Health. Traditional Chinese Medicine Could Make 'Health for One' True, 2007. Retrieved from: https://www.who.int/intellectualproperty/studies/Jia.pdf

of biodiversity and international treaties concerning endangered species."[2] China's National Regulation on Protection of Wild Medicinal Resources (1987), Law of the People's Republic of China on TCM (2017), Pharmaceutical Administration Law of the People's Republic of China (2015 Amendment). Existing CITES measures to regulate trade of wildlife products derived from listed species. SDG 3: Good Health and Well-being (However there is no mention of traditional medicines).	Market Regulation). National importation regulators, CITES management authorities and customs agencies. International development agencies, multilaterals and intergovernmental bodies (e.g. WB, WTO, WHO, FAO, UNDP, UNEP). General public, particularly users/consumers.	sustainable now? In the future, given predicted demand? What acceptable substitutes exist for unsustainable ingredients? Will TCM practitioners adhere to the pharmacopoeia? If not, what other species may be affected?	transparency and accountability.[3] Integrate issue into intergovernmental regulatory platforms and institutions (e.g. FAO food safety regulations; WHO pharmaceutical safety regulations). Strengthen control and screening at customs ports. Particularly because TCM may expand rapidly outside of China due to the BRI and other similar plans.

[2] World Health Organisation. WHO Traditional Medicine Strategy: 2014-2023, 2013. Retrieved from: https://apps.who.int/iris/handle/10665/92455

[3] See the Institute for Policy Integrity Government Transparency and Accountability project, as an example: https://policyintegrity.org/projects/transparency-and-accountability