BRI Horizon Scan:
Issues related to groundwater pumping and the expansion of Traditional Chinese Medicine

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Issue: Groundwater Pumping Threatening the Viability of Freshwater Ecosystems

Pictures: Jane Thomas, IAN library (https://ian.umces.edu/imagelibrary/)
Damming has been identified as a threat to freshwater ecosystems worldwide, but relatively little attention has been paid to threats from groundwater pumping.

**Recent paper:**

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It also provides water for construction (e.g. cement production), mining and many other activities linked to infrastructure development.

Pictures: Dieter Tracey, Diana Kleine & Tracey Saxby, IAN library (https://ian.umces.edu/imagelibrary/)
Issue: Groundwater Pumping Threatening the Viability of Freshwater Ecosystems

Where extraction is higher than recharge from rainfall or rivers, groundwater levels can drop.

Serious impacts on ‘baseflow’, which brings fresh, oxygenated water into rivers, streams, lakes and wetlands.

Two key impacts:

• **Reduction of baseflow**
  • Aquatic ecosystems dry out or are no longer viable

• **Reversal of flow**
  • Surface water flows into groundwater, bringing with it pesticides, heavy metals etc.

Pictures: Jane Thomas IAN library (https://ian.umces.edu/imagelibrary/)
This not a new issue, or one caused by the BRI.

“Our results show that environmental flow limits caused by groundwater pumping have already been reached for a substantial number of watersheds (currently estimated as approximately 15%, 17% and 21% for the wettest, average and driest climate projections, respectively) and are likely to be reached for more than half of the watersheds before the end of 2050 (approximately 42%, 58% and 79%).”

de Graaf et al. 2019 https://www.nature.com/articles/s41586-019-1594-4

Pictures: Jane Thomas, IAN library (https://ian.umces.edu/imagelibrary/)
But, increased infrastructure development, especially in arid regions (e.g. Central Asia), could exacerbate these threats.

**Priorities for mitigation**

- Identify at-risk areas where groundwater may already be under pressure from pumping
- Avoid these areas, or develop alternative practices for use in these areas that require less water

Pictures: Jane Thomas, IAN library (https://ian.umces.edu/imagelibrary/)
Building sustainability into the Belt and Road Initiative’s Traditional Chinese Medicine trade

Amy Hinsley, E. J. Milner-Gulland, Rosie Cooney, Anastasiya Timoshyna, Xiangdong Ruan and Tien Ming Lee
“Traditional Chinese medicine resources [were] once the important part of the ancient "Silk Road" ... the political connections was strengthened... trade was developed, and Chinese medicine culture was spread. Before Qing Dynasty, people took out the "silk" and brought back "herbs" on the "Silk Road", which enriched China's medicinal resources.”

Zhang et al. (2018) Discussion on exploitation of foreign traditional Chinese medicine resources based on "the Belt and Road". Zhongguo Zhong Yao Za Zhi. 43 (7).
Issue: Expansion of Traditional Chinese Medicine Changing Wildlife Trade Markets

Facilities connectivity

Policy coordination

Unimpeded trade

Financial integration

People-to-people exchange

Pictures: Dieter Tracey, Jane Thomas & Tracey Saxby, IAN library (https://ian.umces.edu/imagelibrary/)
Demand for TCM ingredients will likely increase from all over the world, and there will be better access to supplies of wildlife used as medicinal ingredients.
Issue: Expansion of Traditional Chinese Medicine Changing Wildlife Trade Markets

Increasing TCM demand is not, in itself, a problem. Legal ‘patent’ products are well-regulated, and exports would be subject to international wildlife trade regulations.
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**Two main risks:**

- A rapid increase in harvesting of legally traded species could put pressure on wild populations if sustainability is not considered
Issue: Expansion of Traditional Chinese Medicine Changing Wildlife Trade Markets

Increasing TCM demand is not, in itself, a problem. Legal ‘patent’ products are well-regulated, and exports would be subject to international wildlife trade regulations.

Two main risks:

• A rapid increase in harvesting of legally traded species could put pressure on wild populations if sustainability is not considered.

• Demand could also increase for informal, illegal products outside of official TCM, and improved infrastructure along illegal wildlife trade routes could facilitate trafficking.

However, sustainable wild-harvest of many popular medicinal species used in the legal trade is possible, and increasing TCM demand could be used to develop sustainable supply-chains that support livelihoods and protect habitats.
Issue: Expansion of Traditional Chinese Medicine Changing Wildlife Trade Markets

Step 1: Understand the threats
- Work with TCM stakeholders and local conservationists to find out which ingredient could threaten biodiversity.
- Identify hotspots of risk and opportunity on BRI.

Step 2: Develop sustainability strategies
- Work with TCM companies to develop responsible sourcing guidelines in supply-chains.
- Invest in training practitioners to avoid unsustainable products.
- Develop standards for emerging BRI markets.

Step 3: Monitor and enforce
- Implement proactive monitoring of TCM markets and supply-chains.
- Work with key stakeholders in BRI countries to develop effective management of wild resources, including enforcement of regulations and application of sustainability standards.

Step 4: Implement sustainable use
- Seek funding to develop sustainable-use projects or support existing community-based sustainable wild harvesting/farming initiatives.
- Focus on areas that benefit both conservation and poverty-alleviation.