



# 中外对话

## chinadialogue

### 中国的 生态领导力

China's ecological  
leadership in focus

万众瞩目的“绿色一带一路”

'Green Belt and Road' in the spotlight

中国昆明能否挽救全球生物多样性？

China plans 'landmark' biodiversity talks

中国的高铁到底有多环保？

How green is China's high-speed rail?

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## 关于“中外对话”

“中外对话”是一个独立的非营利性组织，以伦敦、北京、德里和圣保罗为中心开展工作。

“中外对话”的主要业务是其独特的完全双语网站，它通过发表精辟、原创的中外文章、评论和分析，促进世界理解中国崛起带来的全球性生态环境影响，进而共同寻求公平可行的全球环境问题解决之道。

“中外对话”在很多机构的资助下运作，其中包括英国环境、食品和农业事物部、壳牌（中国）以及许多基金会。

## 关于“中外对话”内部交流刊物及网站

《中外对话》内部交流刊物是“中外对话”网站文章的精华。我们从网站上精心挑选了趣味盎然而极富挑战性的深度报道以及展现科技进步的新闻信息，方便与您的交流。欲阅读更多精彩的文章，请您登陆“中外对话”网站（<http://www.chinadialogue.org.cn>）。

“中外对话”网站以中国前沿环境记者撰写的文章、对国际知名人士的访谈以及对全球重大问题的深入报道为主要内容，通过网站，您可参阅每日全球环境新闻、赏析高质量的文章和参与“零语言障碍”的讨论（双语发布）。

另外，通过全球双语志愿者的帮助，您还可以在线与英文读者顺畅进行跨文化交流。在那里，您可以提出疑问、挑战专家观点、贡献您的知识和了解他人独到的见解。

加入讨论您就走出了解决问题的第一步。

## What is chinadialogue

*chinadialogue* is an independent, not-for-profit organisation based in London, Beijing, Delhi and Sao Paulo.

*chinadialogue*'s primary vehicle is our website (<http://www.chinadialogue.org.cn>), a unique bilingual platform which promotes a global understanding of the environmental impact of China's rise by publishing informed articles, commentaries and analysis by writers from inside and outside of China. We aim to inform, educate, and contribute to building a global consensus on fair and workable solutions.

*chinadialogue* is now read in 208 countries and regions and in all regions of China.

## About our journal

Produced on a bi-monthly basis, our journal brings you the best articles and reports from *chinadialogue*. If you want to contribute to the discussion you can visit our website (<http://www.chinadialogue.org.cn>) to add your comments and thoughts. Join the debate and be part of the solution.

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# 斯特恩爵士：世界实现温室气体净零排放的关键在中国

前世界银行首席经济学家谈投资环境和社会凝聚力的重要性。

□ 冯 灏

**2016**年，前世界银行首席经济学家尼古拉斯·斯特恩与其他研究人员合作发表了一篇文章，提出中国的煤炭消费已经在2014年前后达到峰值，并认为煤炭使用基本上已经和中国的经济增长“脱钩”。

但2018年煤炭消费连续第二年增长，不禁让人怀疑这些来之不易的环保成果能否持续下去，以及中国能否兑现2030年左右碳排放达峰的承诺。

在北京举行的2019年中国发展论坛上，“中外对话”有幸采访了斯特恩爵士，共同探讨了中国的排放轨迹和可持续发展的未来。

**中外对话（以下称“中”）：**2017和2018年中国煤炭消费上涨，扭转了2014年以来的下降趋势，这是否会让您重新思考2016年的研究结论？

**尼古拉斯·斯特恩（以下称“斯”）：**2015年以来，中国的碳排放基本趋于平稳，去年出现了上行“波



上海虹桥火车站顶棚的太阳能板

动”。中国的经济结构一直在转型，更多地向服务及高技能产业，电力、交通、能源和城市管理新技术倾斜。

我当然希望这只是平稳中的一些小小波动，而不是再次增长之前的平静。后一种情况对全球来说很糟，对中国也不利。2017和2018年中国碳排放增涨，煤炭使用量增加是一方面原因，而煤炭用量增加在一定程度上有中国政府的支持。通过增加煤炭用量来推动经济的增长

不是个好主意。相比（使用煤炭能源这种）19世纪的技术，中国还是投资21世纪的技术更好。

**中：**您认为经济增速放缓会影响中国控制碳排放的工作吗？

**斯：**在低增长时期，决策者必须问自己，什么样的投资可以增加经济产出。中国善于投资有未来前景的技术，这条路是对的。



例如，低碳公共交通能够减少路上的汽车。10 到 15 年前还没有管理公共交通系统的人工智能和数字技术。现在我们需要明确的政策来鼓励未来这类新的投资。我认为增速放缓就是这方面的信号。

**中：**能否解释一下什么是“有未来前景的投资”这一概念？除了技术，现在社会还应该投资什么？

**斯：**我们通常提到的资本类型有四种：人力、物力、自然和社会资本。纵观世界历史，所谓“规划”，指的都是物质资本的规划。然后我们才开始更清楚地认识到人力资本，即健康和教育的重要性。

我们现在发现，未能投资自然资本（森林、水、空气和海洋）正在给我们带来问题。据《欧洲心脏期刊》报道，空气污染每年在英国造成 6 万人死亡，全球 900 万人死亡。我们对自然资本的忽视正在杀人，且规模非常大。

在富裕国家，缺乏对社会资本的关注已经让我们失去了大量的社会凝聚力、相互信任和支持。在英格兰北部，我们看到有些城镇整个都变得很萧条。在美国，类似的地区被称为“铁锈地带”，其中大部分地方都饱受底特律综合症的困扰。

好在我们比以前更加注重自然资本和社会资本的概念了，这可以从联合国的“千年发展目标”和“可

持续发展目标”之间的差别看出来。千年发展目标是在 2000 年左右制定的，主要侧重于扶贫、健康和教育，很少提到环境。而现在的可持续发展目标，你可以看到处处都有环境因子。生态文明的概念和“向污染宣战”非常清楚地表明，中国现在将投资自然资本作为头等大事。

社会凝聚力的重要性（这一点在可持续发展目标也有提及）也在凸显出来。

**中：**您提到了英格兰北部社会凝聚力丧失的问题。中国在逐步淘汰煤炭的过程中可能会面临类似的问题，受影响的主要是低收入人群和农村居民。中国能从英国的经验中学到什么？

**斯：**管理这类变化需要在技能方面进行投资，要支持当地的企业和创业，这样人们才能去做别的事情。

在英国，北方的许多工业城镇都有好大学，可以促进社会流动。简单地让居民搬迁只会让问题复杂化，他们有房子有生活中要尽的义务，所以不是帮他们买张火车票就好了，而是要帮助他们改变生活。

社会安全网也很重要，但我更倾向于从增加机会开始，这一点需要从公共政策和行动方面加以直接积极的引导。

总体而言，英国的减排成绩不差。上世纪 90 年代以来，英国经济

增长了 60% 到 65%，碳排放减少了 40%，这主要归功于放弃使用煤炭。

我们还有很长的路要走。英国现在正在讨论如何在 2050 年之前实现温室气体净零排放，政府已经明确提出了这一目标。

**中：**您认为中国能否在 2030 年达到碳排放峰值？

**斯：**我认为目前中国的碳排放基本保持了平稳状态，能够、而且将会在“十四五”（2021-2025）规划期间下降。

如果“十四五”规划中能有一句：“中国计划在此期间达到排放峰值”，那就太好了。五年前，中国承诺在 2030 年之前达到排放峰值，此后不久中国的排放量就趋于平稳。之后发生了很多变化，技术进步很快，中国国家领导人对未来的愿景很明确，重点发展高产出、高技能型产业和生态文明。我认为趁着中国正着手制定“十四五”规划，现在应该开展更多的讨论。

我还希望在“十四五”规划中看到的是：“我们将在推动排放达到峰值的基础上走向零碳排放。”想要稳定全球气温，就必须做到净零排放。越早达成净零排放，我们能够稳定在的温度就越低。

只有中国净零排放，世界才能净零排放。中国可能不想说一个确定的时间，但认识到这是一条必然规律已经是进步。

**中：**最近中国在海外的煤炭投资引起了广泛关注，您对中国在海外的煤电发展项目有何看法？

只有中国净零排放，世界才能净零排放。中国可能不想说一个确定的时间，但认识到这是一条必然规律已经是进步。

斯：中国工业在价值链上所处的环节已经有所提升，更多是依靠熟练的劳动力，而不是简单的低成本劳动力。中国已经意识到空气污染、水污染和气候变化带来的挑战，并在积极地应对这些挑战。因此，中国已经选择了一条不同的道路。

与中国的变化相对应的是，价值链上还有其他一些环节需要填补。我们看到这些环节中有很多正从中国转移到“一带一路”国家，以及越南、孟加拉国等国。

“一带一路”国家的人均收入大约是中国的一半。因此，如果他们完全参照中国的发展模式，全球的排放将大幅增加。《巴黎协定》的气候目标也不可能实现。这些处于发展

早期阶段的国家必须选择可持续的发展道路。

但好消息是，“一带一路”沿线国家可以接触到 20 年前的中国没有的技术。这些技术让他们有极大的机会沿着一条不同的、清洁的道路发展。

中国曾表达了对“绿色一带一路”的极大兴趣。但如果你去看中国的那些投资，它们还不够绿色。（中国投资了）巴基斯坦及其他一些地方的多个煤电站。

接受投资的这些国家讨论的是如何让自己的发展变得更加绿色。中国可以在提供资金的同时，通过分享自己的经验和技術来促进这一讨论。中国可以在推动“一带一路”

沿线国家的政策变化方面发挥重要作用。

西方过去的发展模式带来的是城市拥堵和污染。那为什么不走另一条消耗资金更少、更加健康、更有吸引力的道路呢？过去我们做不到，是因为那时我们没有这样的技术，但现在其他国家有条件了。

我感觉，“一带一路”倡议背后的理念和它实际资助的项目之间还有差距。如果“一带一路”的融资能够更贴近自己的理念，贴近中国国内正在发生的巨大变化，那将很好。☺

冯灏，中外对话研究员



# Nicholas Stern: 'The world cannot go net zero unless China does'

Experience from China's own solar sector could help it deliver a sustainable transition in Belt and Road countries

□ Feng Hao

In 2016, Nicholas Stern, former chief economist of the World Bank, published a paper together with other researchers arguing that China's coal consumption had peaked around 2014 and that the use of coal and the country's economic growth had essentially "decoupled".

But in 2018 coal consumption increased for a second consecutive year, creating doubts about whether hard-won environmental gains will be preserved and if China can deliver on its commitment to peak carbon emissions by 2030.

At the 2019 China Development Forum in Beijing, chinadialogue had the opportunity to talk with Lord Stern on China's emissions trajectory and the future of sustainable development in China.

**chinadialogue (CD):** Coal consumption in China rose in 2017 and 2018, reversing a downward trend since 2014. Does this make you rethink the conclusion of your 2016 study?

"I certainly hope that this is a plateau with some bumps, rather than a quiet period before another rise."

**Nicholas Stern (NS):** China's emissions have been more or less on a plateau since 2015. Last year saw an upward "bump". The structure of China's economy has been changing towards more services and high-skilled industries, new technologies in electric power generation, transport, and managing energy and cities.

I certainly hope that this is a plateau with some bumps, rather than a quiet period before another rise. The latter scenario would be very difficult for the world and not good for China. The uptick in 2017 and 2018 is partly because of coal use, to some extent with the Chinese government's support. But accelerating growth by using coal would be a bad idea. It is much better for China to invest in twenty-first-century than nineteenth-century technologies.

**CD:** Do you think the economic slowdown will have an impact on China's emissions control efforts?

**NS:** At times of low growth, policymakers have to ask themselves what kind of investment could increase economic outputs. China is good at investing in technologies of the future and that is the way to go.

For example, low-carbon public transport is very good at keeping cars off the road. Ten to 15 years ago the artificial intelligence and digital technologies needed to manage a

public transport system did not exist. Now we need clear policies to encourage those kinds of new investments in the future. I see the falter in growth as a sign of that.

**CD:** Can you elaborate on the idea of “investment in the future”? What should societies invest in now beyond technologies?

**NS:** We usually think of four types of capital: human, physical, natural and social. If you look at the history of planning in the world, it used to be all about physical capital. And then we began to be much clearer about the importance of human capital, namely health and education.

Now we see that the inability to invest in natural capital (forests, water, air and oceans) is causing us problems. According to the European Heart Journal, air pollution kills 60,000 a year in the UK and 9 million a year around the globe. We are killing people by neglecting our natural capital, on a very large scale.

In the rich world, the lack of attention to social capital has cost us a lot of our social cohesion, our mutual trust and our mutual support. In northern England, we’ve seen whole towns and cities become depressed. In the US, the equivalent area is known as the Rust Belt, and much of it has suffered from Detroit Syndrome.

The good thing is we now appreciate the idea of natural capital and social capital much more than before. We can see the difference between the millennium development goals and the sustainable developing goals (SDGs). The millennium goals, which were created around 2000, focused mostly on poverty alleviation, health and education, but had little mention of the environment. Now with the SDGs, you see sustainability everywhere. The concept of ecological civilization and the “war against pollution” make it very clear that investing in natural capital is a priority in China.

And the importance of social cohesion, which is also mentioned in the SDGs, is also coming to the fore.

**CD:** You mentioned the loss of social cohesion in northern England. China may face similar problems when phasing out coal, which affects predominantly

“There is a split between the ideas behind the Belt and Road Initiative and what has actually been financed under it.”

low-income workers and rural residents. What can China learn from the UK’s experience?

**NS:** Managing this kind of change requires investment in skills, in financing local entrepreneurship, so that people can do something else.

In the UK, many of those northern industrial towns and cities have good universities. They can help with social mobility. Simply relocating people is complicated. They have houses and obligations. So it is not about helping them buy train tickets. It is about helping them change their lives.

Social safety nets are important too, but I prefer to begin with enhancing opportunities. That is something we have to do with direct, positive public policy and actions.

On the whole, the UK does not have a bad record on cutting emissions. Since the 1990s the British economy has expanded by 60-65%, while cutting carbon emissions by 40%. A lot of that has resulted from moving away from coal.

We still have a long way to go. We are now discussing how to get to net zero by 2050. That objective has been explicitly stated by the government.

**CD:** Do you think China is on its way to peak emissions in 2030?

**NS:** I think China is roughly on an emissions plateau and it can and will go down during the 14th Five Year Plan period (2021-2025).

It would be very nice to have one sentence in the 14th Five Year Plan that says: “China plans to peak its emissions during this period.” Five years ago, China committed to peak its emissions before 2030, and soon after that, China’s emissions plateaued. A lot has changed since then. Technological advancement has been fast



and a vision for the future has been articulated by the country's leadership with a focus on high productivity, high-skilled industries and ecological civilization. I think now is the moment for more discussions as China works on the 14th Five Year Plan.

The second nice thing to see in the plan would be: "We will peak on the way to zero carbon." If we want to stabilise global temperature, it has to be net zero. And the earlier we can do net zero, the lower the temperature at which we stabilise.

The world cannot go net zero unless China does. China may not want to say when, but to recognise

**CD: Lately China's coal-related investments overseas have drawn much attention. What's your take on the perceived disconnection between China's coal slashing efforts domestically and its support of coal power in other countries?**

**NS:** Chinese industries are already moving up the value chain, depending more on skilled than simply low-cost labour. China has recognised the challenges of air pollution, water pollution and climate change, and is facing up to the challenges very strongly. So China has already chosen a different path.

The counterpart of China's change is that there are still other parts of the value chain that need to be filled. We have seen many of those parts moving outside China to the Belt and Road countries, to Vietnam, Bangladesh and so on.

The average per capita income of Belt and Road countries is roughly half that of China, so if they grew exactly like

China it would significantly increase global emissions. That would be impossible for the climate in terms of achieving the Paris goals. It is very important for these countries in the early stages of development to choose the sustainable path.

But the positive story is that those countries along the Belt and Road now have access to technologies that China did not have 20 years ago. Here is an enormous opportunity to grow differently and cleanly.

China has said that it is very interested in a "green Belt and Road". But if you look at the investments, they are not so green yet. [China has invested in] many coal-fired power plants in Pakistan, and other places.

In those recipient countries, the discussion is about how to do things greener. China can contribute to that discussion by sharing its experiences and technologies, as it offers the financing. China could play a big part in helping with policy changes in countries along the Belt and Road.

The Western development model ended up with congested and polluted cities. Why go that road when it is cheaper, healthier and more attractive to go the other path? We couldn't do it because the technology was not there, but those countries can.

I feel that there is a split between the ideas behind the Belt and Road Initiative and what has actually been financed under the initiative. It would be good if Belt and Road financing could get closer to the idea and to the great changes that are happening inside the country. ☞

*Feng Hao is a researcher at chinadialogue.*

# 中国的高铁到底有多环保？

这个全球最大的高速铁路网能否帮助中国实现去碳化目标？

□ 白莉莉

中国国家发改委近期密集批复了一批新建轨道交通项目，规模之大让美国“绿色新政”的支持者大为羡慕。作为国内经济刺激计划的一部分，2019年，中国将在轨道交通领域投入8000亿元人民币（约合1200亿美元）。

本次投资延续了中国连续十年的铁路建设热潮。在这十年里，中国迅速建成了全球规模最大的高速铁路网。这个铁路网比全球所有其他国家高铁里程的总和都要多。

铁路是最节能的交通方式之一。所以，这些新线路有望成为推动中国去碳化进程的一大功臣。不过研

究显示，中国有些高铁线路的碳足迹水平较高，而且长期以来运能大量闲置。随着中国不停地注资打造这个不断扩大的铁路帝国，我们可以从这些项目中得到一些警示。

## 基础设施建设大爆发

十多年前，北京和上海之间坐火车要12个小时，而现在只要4个半小时。中国的“十三五”规划（2016-2020）延续了这股轨道建设热潮，计划铺设3万公里的高速铁路，将覆盖中国80%的大城市。

新近宣布的高铁项目遍布中国

各地，其中包括广西北部湾经济区、西安至延安、江苏省沿江城市群三个区域的铁路建设。

近年来，建筑业（尤其是钢铁和水泥生产）一直推动着中国能源消费的增长。2019年2月，中国政府报告显示，2018年中国煤炭消费连续第二年上涨，二氧化碳排放量也随之增加。

陕西省城市经济文化研究会会长张宝通在谈到最近这些轨道交通投资时承认，这些项目会产生很大的材料需求。修建地铁不仅能满足公共交通需求，还能吸收钢铁、水泥等行业的过剩产能，从而促进经济发展。

从减缓气候变化的角度来看，这些建筑材料的排放强度又引发了另外一个关键问题：火车出行的能效能否抵消新建数千公里轨道交通网络所产生的碳排放？

## 高铁能否实现减排？

从全球来看，高铁已经被认为是走向低碳未来的一部分。近日的一份报告显示，政府间气候变化专门委员会呼吁各国将建设高铁作为淘汰飞机出行的一种方式。



中国高铁的乘客是飞机的2倍

但是，建设高铁并不能保证大幅减排，国际能源署（IEA）在一篇题为《未来铁路》（The Future of Rail）的报告中解释了其中原因。

决定高铁线路碳足迹多寡的因素有几个。首先，最繁忙的高铁线路里程一般在 300 到 1000 公里之间。这些线路两端的城市居民相对富裕，

并且习惯于城际旅行。为了降低排放，高铁必须将潜在乘坐飞机、汽车等高排放交通的人群吸引过来，同时还不产生额外的交通需求。其次是建设效率问题，高铁的使用频率和载客率需要达到一定程度，同时采用绿色电网供电。

国际能源署（IEA）的模型显示，

在理想状态下，在类似伦敦和巴黎这样的两个大型城市之间修建高铁可以立即实现减排。而在条件相对不佳的情况下，这类项目的减排效果并不十分显著，而且需要 50 多年才能看到效益。

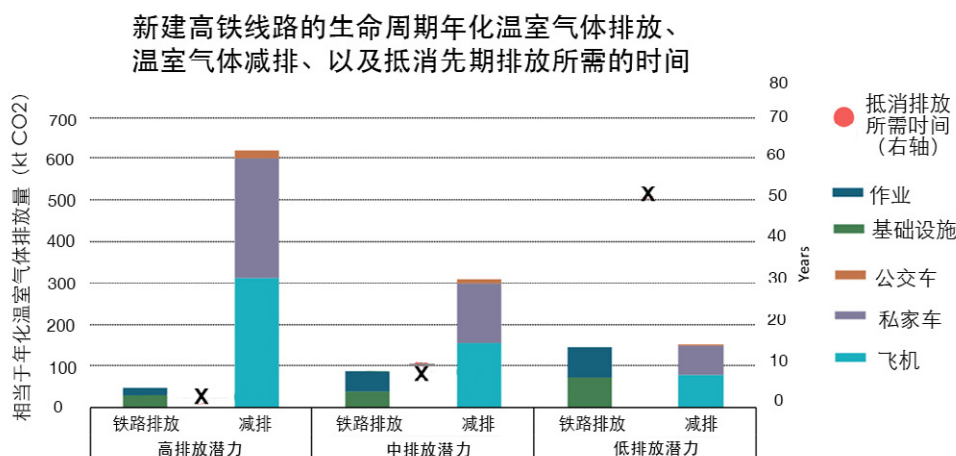
## 4.5 小时从北京直达上海

那么中国的铁路网属于哪一类呢？一项有关中国一条高铁干线生命周期温室气体排放的学术研究可以为我们提供一些线索。

京沪高铁是中国最繁忙的高铁线，来自中科院等多家机构的研究人员对此条线路进行了分析。他们发现，这条高铁线的碳足迹比其他国家的高铁线要高得多。主要原因在于，中国对煤炭火力发电的依赖度仍然很高。然而报告认为，京沪高铁极有潜力能够达到国际能源署（IEA）关于低碳高铁的标准。

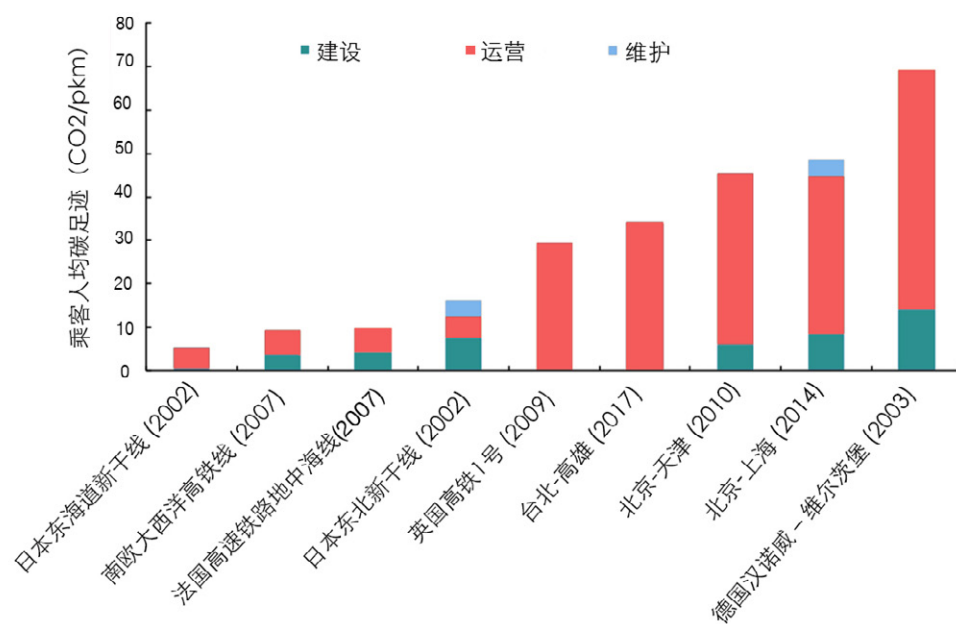
研究显示，京沪高铁的碳排放中，线路运营占 70%，而线路建设只占 20%。而运营部分的排放又主要来自火车动力的电力需求。随着中国可再生能源电力资源占比持续升高，这个问题也将有所改善。相比于燃油驱动的汽车和飞机，这应该是电气化铁路所具有的一个重要的气候优势。

研究还发现，从 2011 年线路开通到 2014 年，中国高铁乘客数量持续增加，这意味着乘客的人均碳足迹下



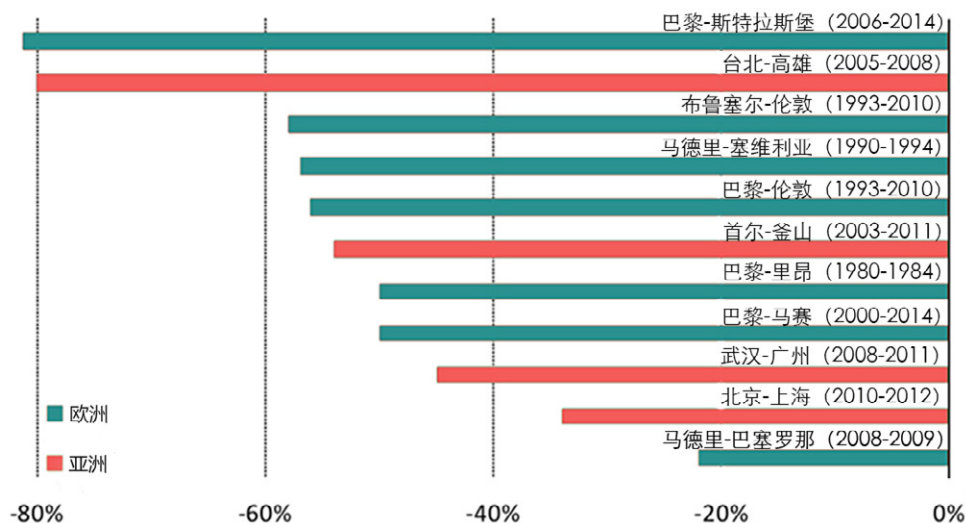
关键信息：如果能够达到理想状况，一条新的高铁线路能够减少航空和汽车的出行需求，从而几乎可以立竿见影地产生净二氧化碳效益。来源：国际能源署（IEA）

## 不同高铁线路的乘客人均碳足迹对比



来源：中国科学院、厦门大学

高铁线路开通后，既定航线上乘客活动的平均变化情况



备注：图中各线路时段各异，对比时需考虑这一因素。民航乘客里程变化-km (%)。

重要信息：高铁线路投入运营后可在短时期内使同一区间乘坐民航的人次减少高达80%。

降。国际能源署(IEA)能源政策分析师雅各布·泰特表示，这在中国可能是一种普遍现象。由于轨道交通建设速度较快，高铁实现满负荷运营可能还需要几年时间。

重要的是，国际能源署(IEA)的研究还显示，京沪高铁已经成功从航空公司手中抢得了不少客源，而这也是实现减排的一个关键因素。

## 华而不实？

相比于京沪高铁沿线人口密集的城市群，中国西部和北部人口稀少地区修建高铁并没有发挥多少减排去碳的作用，反而是带给我们不少警示和思考。

在2019年1月“财新网”的一篇专栏文章中，北京交通大学的赵坚教授表示，除京沪、京广两条高铁线路外，中国其他大部分高铁的运能都未得到充分发挥。相比之下，日本高铁的平均利用率是中国的两倍。国际能

源署(IEA)的研究也显示，中国高铁线路的运输密度只有欧洲和韩国的一半，并且低于全球平均水平。

赵坚表示，债务融资型基础设施建设导致中国出现了不少鬼城，同样也会为非理性的高铁建设产生不当的激励。

著名博主“北京塞冬”在今年1月发布了一条微博，批评了在类似黑龙江这样人口日渐流失的中俄边境大省举债修建高铁的行为。这位博主认为，资源应该优先向人口快速增长的城市倾斜。

数据显示，中国西部地区人口稀少，轨道和高速公路人均投资严重失衡。比如，中国载客率最低的高铁线就是位于西部地区的兰州-乌鲁木齐线，全程12个小时。

随着这些大型铁路项目开工建设，在那些出行需求不那么高的城市，货运铁路这个高铁的“表兄弟”却一直处于被忽视的状态。目前，铁路货运仅占中国道路运输总量的17%，而

2005年这个数字是50%。公路货运增加会加重空气污染，增加交通领域的温室气体排放。国际能源署(IEA)表示，货运铁路的排放强度大约只有货运卡车的十分之一。

中国中央政府最新出台了《打赢蓝天保卫战三年行动计划》(2018-2020)，试图通过设定更高的铁路货运目标来扭转这种投资不足的困境。

赵坚在接受“中外对话”采访时表示：“我觉得现在不应该建了吧，什么地方都不该建了。现在应该建的就是普通铁路，有很大的建设空间，但是高铁不该建了。”

## 低碳车票？

国际能源署(IEA)2050年铁路发展的最佳情境预计，中国通过不断扩大铁路建设，包括建设10万多公里的高铁线路，能够减少12%的交通排放。中国的这种模式或许可以成为其他国家交通系统去碳化的一个典范。

但是，中国到2025年高铁总里程达到3.8万公里计划让不少气候环保人士保持警觉的态度。

绿色和平组织气候污染高级分析师柳力(Lauri Myllyvirta)表示：“中国面临的主要困境在于，各类投资都是为了维持人为的GDP高速增长，以及对能源密集型产品的大量需求，而不是以实际需求为出发点。当然，这不是说所有的项目都没有合理的规划，只能说这样会大幅增加项目风险。”

白莉莉，中外对话研究员，北京能源网络(Beijing Energy Network)执行制作



# How green is China's high-speed rail?

Can the largest high-speed rail network in the world help China decarbonise?

□ Lili Pike

China's economic planning department has recently approved a flurry of new rail projects at a scale that Green New Deal advocates in the United States would envy. A total of 800 billion yuan (US\$120 billion) will be poured into rail construction in 2019 as part of a plan to stimulate the domestic economy.

These investments are the latest in a decade-long building spree that has rapidly outfitted China with the world's most extensive high-speed rail network – larger than all others combined.

Trains are among the most energy-efficient modes of transport, so new lines could be a major asset to China's decarbonisation. However, studies show that some of China's high-speed lines have relatively large carbon footprints and are chronically underutilised. As China continues to pump money into an ever-expanding rail empire, these projects tell a cautionary tale.

## Infrastructure boom

Little more than a decade ago, it took 12 hours to travel between Beijing and Shanghai by train. Now it takes four and a half. China's 13th Five-Year Plan (2016-2020) seeks to replicate that feat, setting a target to build 30,000 kilometres of high-speed rail connecting 80% of the country's major cities.

The recently announced high-speed rail projects span China. They will connect the Guangxi gulf economic zone, historical Xi'an and Yan'an, and cities along the Yangtze River in Jiangsu province.

In recent years, construction – particularly the production of steel and cement – has been driving the increase in China's energy consumption. In February, the government reported that China's coal consumption increased in 2018 for the second year in a row, with carbon dioxide emissions following suit.

Zhang Baotong, the director of a Shaanxi economic research institute, acknowledged the thirst for materials of the projects recently invested in. Zhang said building subway systems not only meets public demand but can also absorb overcapacity in steel, cement and other industries, thereby boosting the economy.

From a climate change mitigation perspective, the emissions intensity of these construction materials raises a key question. Are train trips energy efficient enough to offset emissions produced by crisscrossing the country with thousands of kilometres of new tracks?

Under optimal conditions a line between major cities can decrease emissions almost immediately.

### Does high-speed rail lower emissions?

Globally, high-speed is recognised as a part of the transition to a low-carbon future. In a recent report, the Intergovernmental Panel on Climate Change called for its construction to help phase out flights.

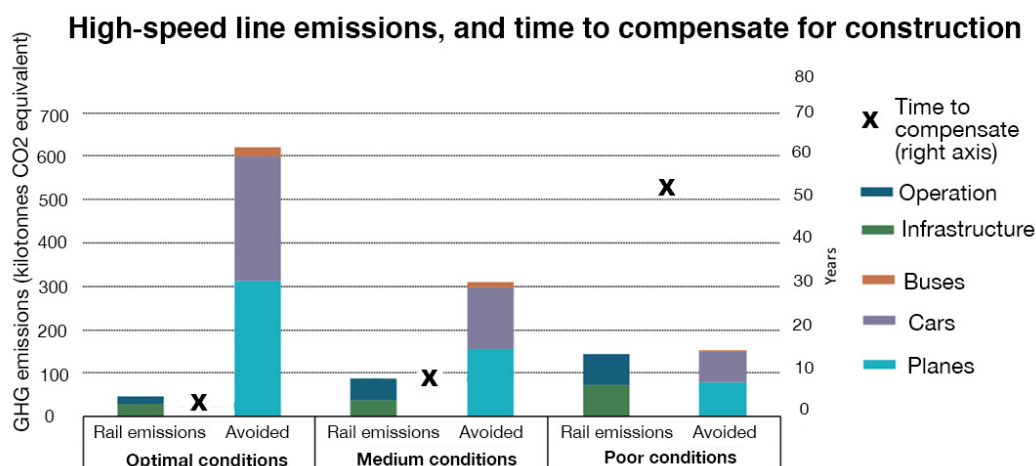
However, building a high-speed line does not guarantee significant emissions savings. The Future of Rail, a

new study from the International Energy Agency (IEA), demonstrates why.

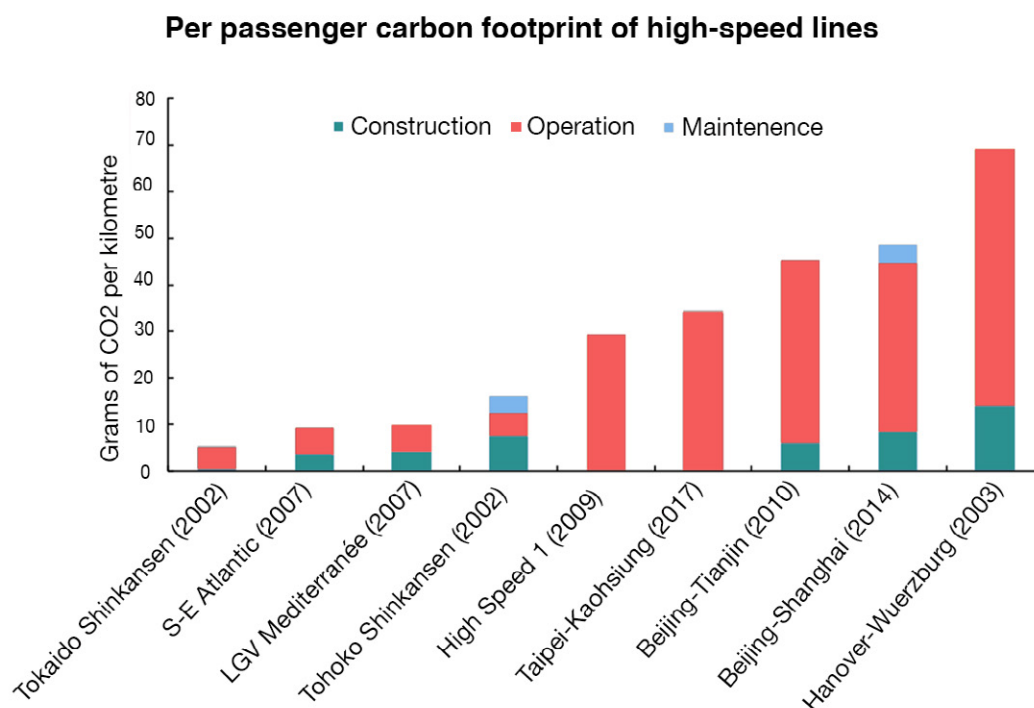
A few factors determine a high-speed line's carbon footprint. First, such lines typically flourish at distances between 300 and 1,000 kilometres, connecting cities where residents are relatively affluent and in the habit of intercity travel. In order to lower emissions, they must be efficient to construct. The trains they carry need to be

powered by a green electricity grid, to run frequently and near capacity, attract people away from other higher-emissions modes of travel, like planes and cars, and not generate too much new demand for travel.

Under optimal conditions, a line between major cities like London and Paris can decrease emissions almost immediately, IEA's model shows. However, under suboptimal conditions, the project might only slightly reduce emissions and those benefits could take over 50 years to materialise.

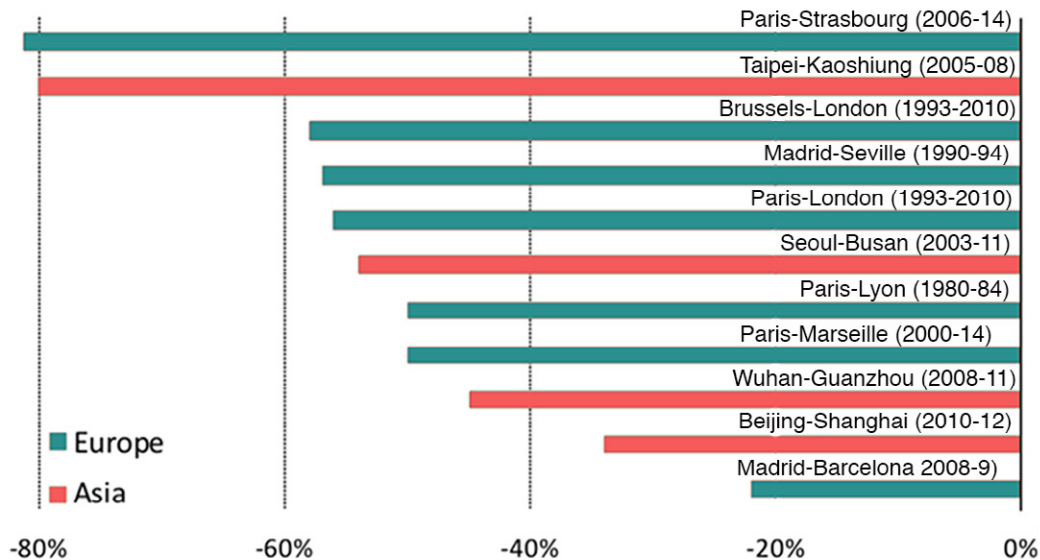


Source: IEA



Source: Chinese Academy of Science and Xiamen University

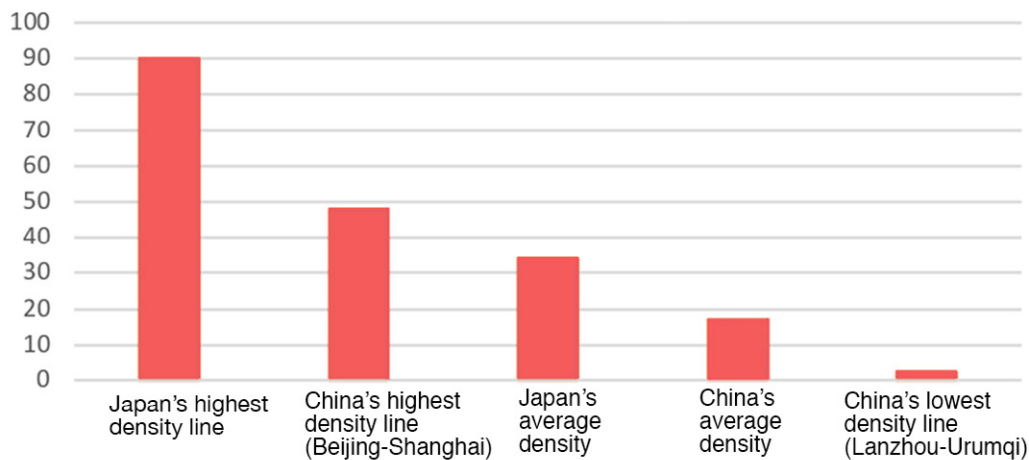
## Drop in air miles after high-speed rail installation



Source: IEA; Chart: chinadialogue; Please note the varying time periods

## Passenger density

millions of kilometres travelled by passengers ÷ millions of kilometres of track



Source: Zhao Jian (Caixin); Chart: chinadialogue

## Beijing to Shanghai in 4.5 hours

Where does China's rail network fall on this spectrum? An academic study of the lifecycle emissions of a key high-speed rail line in China provides some clues.

Researchers from the Chinese Academy of Sciences and other institutions analysed the Beijing-Shanghai high-speed line, which is China's most highly trafficked. They found

its carbon footprint to be much higher than high-speed railways in other countries.

This is largely due to the dominant use of coal for electricity generation in China. However, the authors' analysis suggests that the line actually has strong potential to fulfil many of the IEA's criteria for a low-carbon line.

According to the research, operating the line accounts for 70% of its emissions, while construction only accounts for 20%. As China continues to add more renewable energy to the grid this will be less of an issue. That is one of the key climate benefits of electric rail compared to oil-fuelled cars and planes.

The study also found that the number

of passengers on the train increased during the analysed period from 2011, when the train opened, to 2014, meaning the per passenger carbon footprint fell. This may be a common phenomenon in China, Jacob Teter, an energy policy analyst at the IEA suggests. Due to the rapid nature of the rail buildout, it may take years for the trains to reach full capacity.

Importantly, the IEA study also shows that the Beijing-

Shanghai line has managed to shift travellers away from flying, a key factor in reducing emissions.

### The white elephant problem

Far from the densely urbanized corridor between Shanghai and Beijing, high-speed rail projects in sparsely populated regions of western and northern China are more tales of caution than low-carbon success.

In a January Caixin op-ed, Beijing Transportation University professor Zhao Jian wrote that China's high-speed lines, besides the Beijing-Shanghai and Beijing-Guangzhou routes, are largely underutilised. By comparison, Japan's average high-speed rail utilisation rate is twice that of China's, he wrote. IEA's study also shows that the number of trains China runs on its high-speed tracks is almost half that of Europe and Korea, and lower than the global average.

A debt-fuelled infrastructure construction model has led to the development of ghost cities in China; it can also create perverse incentives for irrational high-speed rail development, according to Zhao Jian.

In a January Weibo post, well-known blogger "Beijing Saidong" criticised the funding of expensive high-speed rail projects in provinces with dwindling populations like Heilongjiang, the province in the far northeast bordering Russia. The blogger argued that resources would be best allocated to cities with expanding populations.

Data shows that sparsely populated western provinces have received a disproportionate level of rail and highway investment per capita. China's least trafficked high-speed route is the 12-hour ride from Lanzhou to Urumqi in China's far west.

As new megaprojects are built, sometimes between cities that do not have sufficient travel demand, high-speed rail's less glamorous cousin, freight rail, has been neglected. Only

17% of freight moves by rail now whereas 50% did in 2005. The increase in trucking has led to worsening air pollution and increased emissions in this sector. According to IEA, the emissions-intensity of freight rail is nearly ten times lower than trucks.


Through the latest national clean air action plan (2018-2020), the central government is trying to rectify this underinvestment by setting higher targets for freight by rail.

Commenting on this imbalance in an interview with chinadialogue, Zhao said, "At present, I don't think any more [high-speed rail] should be built ... What should be built now is conventional [passenger and freight] rail. It has a lot of space for growth."

### Low-carbon ticket?

The IEA's most ambitious rail scenario for 2050 projects that China could decrease its transport emissions 12% by continuing to massively expand rail, including reaching over 100,000 kilometres of high-speed track. China's approach could be a model for a world looking to decarbonise its transportation system.

But as the country aims to reach a total of 38,000 kilometres of high-speed rail by 2025, climate advocates remain watchful.

Lauri Myllyvirta, a senior air pollution analyst at Greenpeace, said, "China's major dilemma is that investment of all kinds is driven more by the perceived need to maintain artificially high levels of GDP growth and demand for energy-intensive commodities, rather than an actual need for the things being built. That doesn't mean all projects are poorly conceived of course, but it does increase the risk." 

*Lili Pike is a researcher for chinadialogue and the executive producer of the Beijing Energy Network's podcast, Environment China.*



# 中国昆明能否挽救全球生物多样性？

2020 年将在昆明举行的生物多样性公约缔约方大会被各方寄予厚望，它能否成为里程碑？

□ 冯 灏

**2019** 年 2 月 28 日，生态环境部召开例行新闻发布会宣布，中国已启动 2020 年《生物多样性公约》（CBD）第十五次缔约方大会（CoP15）筹备工作，会议地点确定为云南省昆明市。由于 2020 年是上一个联合国生物多样性目标的收官之年，在昆明举行的大会上，公约各缔约方将审议通过新的“2020 后全球生物多样性保护框架”。

2010 年，在日本爱知县举办的 COP10 通过了 2011-2020 年《生物多样性战略计划》，其 20 个纲要目标被统称为“爱知目标”。

现在来看，将于 2020 年进行最终评估的“爱知目标”恐怕难以全部落实。这意味着，接棒爱知的昆明将承载反思过去十年的教训并提出新路径的国际期待。

## 爱知挫折

《生物多样性公约》于 1993 年 12 月 29 日正式生效，目前共有包括中国在内 196 个缔约方。自 1994 年起，每两年数千名来自不同国家的代表齐聚

缔约方大会，讨论如何保护生物多样性。2016 年 12 月，中国获得了 2020 年第十五次缔约方大会主办权。

2010 年的“爱知目标”中，第 11 个目标要求到 2020 年，保护“至少 17% 的陆地和内陆水域以及 10% 的沿海和海洋区域”，类似国际气候谈判所制定的 1.5/2 摄氏度目标。

然而，世界目前距离达成这一目标还有不小的距离。根据联合国对于最近各国提交的国家生物多样性战略（NBSAPs）的评估，在制定目标层面，超过四分之三（77%）的国家战略目标要么低于爱知目标，要么没有涉及爱知目标的所有要素；对于已经制定的 2020 目标，67% 的国家报告显示，其进展的速度不足以在最后期限前实现这一目标。

“中国国内推动生态文明建设的进程，可能有助于在昆明 COP15 达成更具雄心的目标。”

“而目标 11 已经是爱知 20 条目标中唯一有可能达到的总体目标了”，《濒危野生动植物种国际贸易公约》（CITES）前秘书长 John E. Scanlon 表示，“但是，许多被划定为保护地的区域远非资金充足或管理良好，只能称之为纸上公园。此外，从生态角度来看，我们也不知道这些保护区是否都在正确的位置”。

可以说，无论是两年一度的生物多样性公约缔约方大会还是它后来推出的十年目标、全球环境基金（GEF），都还没遏制生态恶化趋势，也就是说目前的国际机制没能发挥有效的作用。

乔治梅森大学环境科学与政策系教授 Thomas Lovejoy 近日在北京表示，CoP15 在历史上非常重要，我们可能是可以拯救生物多样性的最后一代人。目前的情况是，如果不积极的努力，未来人类社会面临的混乱不可想象。

## “更有雄心的保护地目标”

有一些迹象表明，中国可能对

在昆明 COP15 提出更具雄心的目标持开放态度。

中国生物多样性保护国家委员会会议 2019 年 2 月在北京召开，在这次高规格会议上，主持会议的国务院副总理韩正表态称，“中国要积极做好筹备工作，全面履行东道国义务，确保举办一届圆满成功、具有里程碑意义的缔约方大会”。

中国国内推动生态文明建设的进程，可能有助于在昆明 COP15 达成更具雄心的目标。习近平于 2012 年提出“生态文明”理念，在他的构想中，2020 年正是中国“构建起生态文明制度体系”的时间点。

2018 年 3 月，中国国务院机构改革组建自然资源部和生态环境部，将“生态文明”的理念进一步落地。中国生态环境部自然生态保护司专门负责中国生物多样性保护相关工作，其生物处处长井欣在北京 2018 年末的一个研讨会上表示，最近几年，中国公众的认知和行为方式发生了根本的变化，生态环境部面临前所未有的改善生态环境的压力，主要来自国内。

2018 年的国务院机构改革也使中国各类自然保护地有了统一的管理机构。国家林业和草原局在此后的 6 月~12 月，对全国超过 1 万个，覆盖了陆地面积的 18% 左右的自然保护地集中开展了大检查。同样出于保护自然的目的，各省还在推进“生态保护红线”的划定，生态保护红线主要保护的是生态功能重要和生态环境敏感脆弱的区域，初步估计这一比例将达到或者超过中国国土面积的 25%。“据此来看，中国可以制定更有雄心的保护地目标”，中央民族大学生命与环境科学学院教授薛达元表示。

## 后 2020 框架

事实上，中国除了需要在 2020 年提出东道国方案，还需要考虑怎么支持所有缔约方政府达成合理的“2020 后全球生物多样性保护框架”。

在去年底结束的埃及 CoP14 上，欧盟提出后 2020 框架应该包含“具有雄心、现实、可以衡量和具有时间约束的目标。”中国则强调“科学群体的参与”。这些年来，牵头生物多样性公约履约的生态环境部得以在物种保护、自然保护区管理、生态保护红线管理上取得进步，很大程度上依赖科研机构的支撑。

国家海洋环境监测中心副研究员廖国祥举例说，在国家层面，生态环境部正积极联合科学技术部、中国科学院、国家林业草原局等中央机构科研力量，在整合现有的各类型生态系统科学观测研究站点基础上，大力推进“国家生态状况监测网络”建设，以更全面、系统地掌握我国生物多样性的现状及变化趋势。

廖国祥表示，“调查监测工作得到加强，生物多样性和生态环境状况家底摸得更清，才能更好地履行生物多样性国际公约”。他认为，除了部委直属研究机构之外，积极吸引高校院所的做法是有效的，这个成功经验可以延续。

法律、环境、发展与治理论坛（FLEDGE）主席 Balakrishna Pisupati 认为，在生物多样性公约缔约方大会中，“科学家的声音在政治色彩较浓的谈判过程中仍显微弱。”但涉及合成生物学、物种保护和生态走廊等议题的决议却又少不了科学的介入。

中国科学院是中国政策制定非

常重要的科学支持机构，根据该院副院长张亚平和美国国家地理学会首席科学家 Jonathan Baillie 2018 年联名在《科学》杂志上发表的社论文章，爱知目标中“17% 的陆地和内陆水域以及 10% 的沿海和海洋地区”的保护地目标对于确保实现其他爱知目标的任务是远远不够的，比如，如何防止已知物种灭绝以及如何促进生态系统的保护。

他们也在文章中建言各国政府制定到 2030 年保护海洋和土地 30% 的最低目标，重点关注生物多样性丰富、生产力高的地区，并力争到 2050 年保护 50% 的海洋和土地，“这将是具有挑战性的，但这是可能的”，张亚平和 Baillie 写道。

而达成目标需要具体的支持机制，以资金为例，由于 CoP15 将确定 2022-2026 年周期的全球环境基金（GEF）的资金需求，薛达元建议中国应该向全球环境基金捐出可观的资金，以更积极的姿态承担作为东道国的义务。

此外，中国在 2011 年出台《中国生物多样性保护战略与行动计划》（2011-2030 年），这个时间段，涵盖了爱知目标、以及接下来十年规划的阶段。2030 年预期将是新的联合国十年生物多样性目标的收官之年，同时还是联合国可持续发展目标（SDGs）的收官之年。中国生物多样性保护与绿色发展基金会副秘书长王豁认为，这些目标之间的如何协同，也将是本轮 CoP15 讨论的重点。☞

冯瀛，中外对话研究员

# China plans 'landmark' biodiversity talks

Next year Kunming will host the most important biodiversity conference for a decade

□ Feng Hao



© Jack Hynes

*Native to central and southwest China, the golden snub-nosed monkey is endangered*

In 2020, delegates from nearly 200 countries will meet in the capital of Yunnan province, southwest China, to agree on a new framework to halt biodiversity loss and protect ecosystems. The talks will be crucial to restoring the planet's health.

According to WWF, there has been a 60% decline in mammal, bird, fish, reptile and amphibian populations over the past 40 years. Another recent study that reviewed the evidence on biodiversity suggested that 40% of insects are threatened with extinction in the coming decades from



habitat loss, intensive agriculture, pesticide use and climate change. In the Asia-Pacific region where fisheries are a key source of food, there may be no exploitable fish populations left by 2048 if current fishing practices continue.

In 2010, countries party to the Convention on Biological Diversity approved a 2011-2020 Strategic Plan for Biodiversity. As the talks were held in Aichi, Japan, the plan's 20 overarching goals to end biodiversity loss and restore ecosystems are known as the Aichi targets.

It's unlikely these targets will be met by 2020 so the talks in Kunming must find a new way forward.

### Slow progress

A recent UN evaluation found that 77% of national biodiversity goals were lower than those set at Aichi. Two thirds of nations have said their progress is too slow to meet the 2020 goals.

For example, the 11th Aichi target calls for at least 17% of terrestrial and inland water and 10% of coastal and marine areas to be protected by 2020. But countries are still a long way from achieving this.

Only the 11th Aichi target could have realistically been met, according to John E Scanlon, former Secretary-General of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). "But many of these areas are not well-funded or well-managed, often being referred to as 'paper parks.'" Scanlon said it's unclear whether the "protected areas are all in the right places from an ecological point of view."

Thomas Lovejoy, a professor in the Environmental Science and Policy Department at George Mason University, said in Beijing recently that next year's talks were of historic importance. "We may be the last generation [able] to save the environment and humanity... If we don't work hard, future humanity will face unimaginable chaos."

**China could protect at least 25% of its terrestrial and inland water areas.**

### China's role

For its part, China is attempting to break with its destructive "pollute first, clean up later" approach to development. It's now pursuing an "ecological civilisation" that was first proposed by President Xi Jinping in 2012. The country is supposed to have built this by 2020, but actually doing so will require more ambitious targets to be set in Kunming.

There are some positive signs.

In February, vice-premier Han Zheng said that "China must actively prepare to carry out its duties as host nation and ensure a... conference of landmark significance."

In March 2018, ministerial reforms to better protect the environment saw the creation of the Ministry of Natural Resources and the Ministry of Ecology and Environment (MEE). The latter's Department of Nature and Ecology Conservation is responsible for the country's biodiversity. The head of its biodiversity protection office, Jing Xin, said at a seminar in Beijing in late 2018 that Chinese public awareness had changed in recent years and the ministry was now under much greater pressure to improve the environment.

Those 2018 reforms also brought China's various types of nature reserve under a single management body. Between June and December, the State Forestry and Grassland Administration, which sits under the Ministry of Natural Resources, inspected over 10,000 reserves – about 18% of the country. This is greater than the 17% Aichi target. Provinces have also set "ecological redlines" to protect vulnerable areas. Initial estimates claim over one quarter of the country will be covered.

"This shows China can set more ambitious targets for reserves," said Xue Dayuan, a professor at Minzu University of China's College of Life and Environmental Sciences. Xue thinks that China could protect at least 25% of its terrestrial and inland water areas.

### A focus on science

At the last UN conference on biodiversity in Egypt, the EU called for "ambitious, realistic, measurable and time-bound targets". The Small Island Developing States bloc requested



greater financial resources, while Costa Rica called for 1% of global gross domestic product to be directed at conservation. China stressed “scientific community involvement”.

Efforts by the Ministry of Ecology and Environment to deliver on the Aichi targets by protecting endangered species, managing nature reserves and establishing ecological redlines have required major support from scientific institutions.

For example, Liao Guoxiang, a deputy researcher at the National Marine Environment Monitoring Centre, said that the ministry is working with central bodies such as the Ministry of Science and Technology, the Chinese Academy of Sciences and the State Forestry and Grassland Administration to create a national ecological monitoring network.


“Better surveys and monitoring means improved understanding of biodiversity and the state of the environment, which is necessary to better implement the convention,” said Liao. He wants universities and research institutes to be involved as well.

Balakrishna Pisupati, chair of the Forum for Law, Environment, Development and Governance (FLEDGE),

said that decisions on issues such as synthetic biology, species conservation and habitat corridors will need more scientific support and engagement in the policy-making process.

“China and other countries have emphasised the need for better science and more scientists to be involved in decision making at the UN biodiversity conference and not just in making recommendations,” he said.

A similar point was made in a 2018 editorial in *Science*, written by Zhang Yaping, vice president of the Chinese Academy of Sciences, and Jonathan Baillie, chief scientist at the National Geographic Society. They argued that the Aichi target on protecting marine areas is nowhere near enough to ensure that other targets are met, such as preventing the extinction of known threatened species or promoting the protection of ecosystems.

They suggested that national governments commit to protect 30% of both the ocean and land, focusing on biodiverse and productive areas, rising to 50% by 2050. “This will be extremely challenging, but it is possible,” they concluded. 

*Feng Hao is a researcher at chinadialogue.*

# 万众瞩目的“绿色一带一路”

第二届“一带一路”国际合作高峰论坛如何交出环境答卷？

□ 白莉莉

为了庆祝第二届“一带一路”论坛的召开，北京街头悬挂起了“高质量共建‘一带一路’”的横幅。本次国际合作高峰论坛于4月25日至27日举行，共有37位国家元首汇聚北京，共同就这个中国发起的全球性基础设施发展倡议进行讨论。

与2017年召开的首届论坛相比，今年的论坛规模更大、规格更高。但最近，对于“一带一路”倡议在金融与环境领域的可持续性，有人提出了不同意见。这些意见给“倡议”带来了不小的震动，相关贷款也有所放缓。中国社科院“一带一路”研究中心秘书长王晓泉表示，正如最新提出的“高质量发展”口号所表达的那样，本次论坛可能就是要解答各种“反对、误解和曲解”。

习近平主席和部长级高层领导人们都对绿色“一带一路”给予了极大的支持。然而，环境治理的步伐远远赶不上项目的发展速度。那么，今年的论坛能否为改革提供一个机会呢？

## 论坛上的“绿色一带一路”

今年，与会者将拥有一个前所未有的参与“一带一路”环境责任讨论的机会。4月25日，中国生态环境部(MEE)与中国国家发展与改革委员会(NDRC)共同主办主题为“建设绿色‘一带一路’，携手实现2030年可持续发展议程”的分论坛。此次分论坛活动将举行一系列演讲和小组讨论，来自与会国政府环境部、非政府

组织、国际组织和企业的200多名代表受邀参与本次活动。

“欢迎各位与会代表为绿色‘一带一路’的发展建言献策”，与会者收到的一份文件上这样写道。此次分论坛活动只有半天时间，日程紧张，几乎没有时间进行深度反馈；尽管如此，这仍然会成为中国政府与其他“一带一路”参与方展开对话的一个全新平台。

论坛期间还将发布一些更具包容性的举措。在2017年的论坛开幕式致辞中，习近平主席曾倡议建立一个“一带一路”绿色发展国际联盟。经过中国生态环境部与联合国环境规划署(UNEP)的共同努力，该联盟在4月25日的第二届“一带一路”国际合作高峰论坛绿色之路分论坛上正式成立。

联盟合作伙伴之一——欧洲环保协会(ClientEarth)的中国区首席代表龙迪表示：“中国生态环境部主动与联合国环境规划署合作，成立了这个‘一带一路’绿色联盟，这说明，他们真的是说到做到。”

这个联盟共有120个合作伙

## “一带一路”：环境风险在哪里？

- 2014年-2017年，“一带一路”国家获得的能源贷款中有91%流向了化石燃料行业。
- 中国承诺或计划为海外四分之一的在建燃煤电厂提供资金。
- “一带一路”国家（不包括中国）的二氧化碳排放量占全球总量的26%。在最糟糕的情况下，到2050年这个数字将会增长到50%。



象征论坛开幕的巨型雕塑

伴，包括各国环境部、学术机构、以及国际组织和企业，基本上一半来自中国，一半来自国际。联盟宣传册显示，目前该组织已经确立了包括气候变化、生态多样性、绿色金融在内的 10 个领域。合作伙伴将在这些领域共同开展研究、项目开发、以及提供政策建议等。根据与会者收到的文件，具体工作计划将会在一场会外活动中进行讨论。

不过，这个联盟也并非毫无争议。去年，联合国环境规划署（UNEP）执行主任埃里克·索尔海姆辞职。根据英国《卫报》的报道，其手下工作人员对于他带领 UNEP 深度参与该联盟颇有微词。所以，联盟能否促成实质性政策对话和讨论还有待观察。

## 重温中国“绿色一带一路”愿景

和“一带一路”倡议类似，“绿色一带一路”的概念也非常宽泛，导致其变成了某种形式的罗夏试验（Rorschach test，一种投射法人格测试），从中测试出了多方对中国应负责任的各种不同看法。

在 2017 年首届“一带一路”论坛召开之前，中国政府在《关于推进绿色“一带一路”建设的指导意见》中阐述了其推动绿色发展的愿景，这也是该倡议中有关可持续发展的全面宣言。该文件由中国国家发改委、外交部、商务部和生态环境部四大中央部委共同发布。

该文件并没有给出太多政策细

节。但是结合生态环境部同期发布的《“一带一路”生态环境保护合作规划》来看的话，还是能从中对中国政府的绿色行动计划有一定程度的了解。全球环境研究所海外投资、贸易与环境项目经理任鹏表示：“生态环境部的这个规划很重要，因为这是从国家层面传递出的一个信号——中央和地方政府都在关注这个事情。”

首先，《指导意见》提出，用 3 到 5 年时间为“绿色‘一带一路’”打下“坚实基础”。

谈到具体的“绿色‘一带一路’”规划，《指导意见》鼓励海外运营企业遵守当地环保法律法规，同时还呼吁他们提高环境标准。文件认识到了企业追求绿色发展的经济逻辑，



并表示环境友好标准能够“提高绿色竞争力，引领绿色发展”。至于绿色金融，文件建议制定相关政策，防止项目投资引发生态风险。此外，文件还倡导建立绿色银行，充分利用中国的政策性银行落实政府政策，积极为绿色项目提供资金渠道。

然而，目前中国政府还没有为在海外运营的银行和企业建立具有约束力的环境标准。创绿研究院（Greenovation Hub）主任白韞雯表示：“如果企业不是这么做它会有什么样的处罚，这个（指导意见里）是有没有。”

中国国企和银行参与的一些项目造成的环境影响已经引发了当地的抗议活动和法律诉讼。比如，中方出资在肯尼亚拉穆建设的一座火电厂，以及在斯里兰卡的铁路和港口项目都引起了争议。

也有人指出，文件没有强调气候变化等重点领域。清华大学金融与发展研究中心访问学者谢孟哲告诉“中外对话”：“‘绿色一带一路’不够明确；首先，没有执行机制，其次，中国缺乏解决气候变化等与‘一带一路’相关的特定长期挑战的真实意愿。”

本周，中国政府发布了《共建“一带一路”倡议：进展、贡献与展望》报告，表示将坚持《巴黎协定》各项承诺，同时表示煤炭合作项目是目前该倡议所取得的成就之一。中国“一带一路”电力部门的贷款主要流向了煤炭项目。2018年，煤炭项目在中国政策性银行海外投资中所占的份额是最大的，达到了42%。

世界银行前首席经济学家尼古拉斯·斯特恩近日接受“中外对话”的采访时表示：“我认为，‘一带一

路’倡议背后的理念与它实际资助的项目之间还有差距。如果‘一带一路’的融资能够更贴近自己的理念，贴近中国国内正在发生的（倾向更清洁能源）巨变，那会很好。”

### 倡议推进还需具体政策

中国政府一直表示，“一带一路”是一个开放的多边平台，但是中国工商银行和牛津经济研究院在2018年的一项研究显示，其项目几乎都是由中国国有银行和企业资助的。由于参与主体基本都是国有机构而非私营资本，所以中央政府拥有绝对权力通过环境政策来塑造“一带一路”的发展路径。

白韞雯表示，像国家发改委与国有资产监督管理委员会（SASAC）这样的中央权利机构能够辅助生态环境部落实这些政策。他们现有的一些相关政策可以进一步应用到“绿色一带一路”项目上。比如，国有资产监督管理委员会的负面清单规定了国企在海外能够投资、以及需要

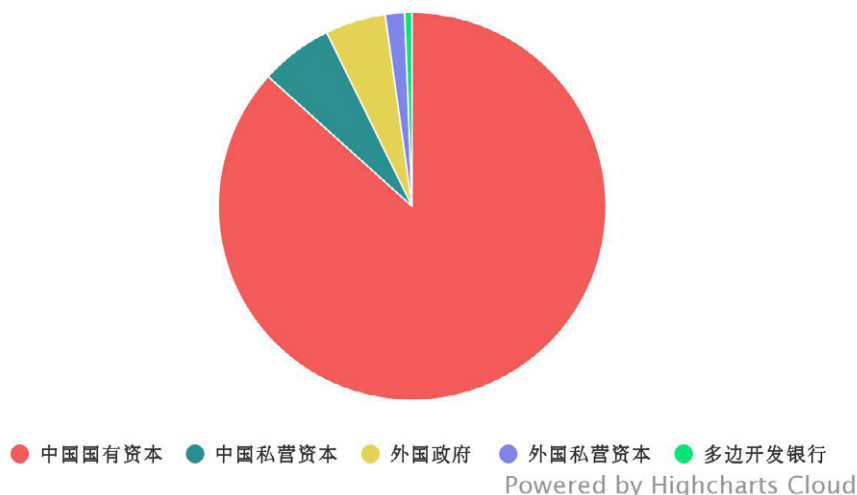
中央银行和银保监会批准的具体境外投资领域。

2013年，在“一带一路”倡议提出之前，商务部和环境保护部（MEP）就发布了《对外投资合作环境保护指南》。文件要求中国企业借鉴多边开发银行和国际组织的最佳实践。例如，不少多边开发银行都设立了公共环境标准和责任机制，而这些都是中国银行机构传统以来需要面对的强制要求。此外，大多数多边借贷机构都对煤炭项目融资做出了限制，并且经济合作与发展组织的出口信贷机构也同意逐步淘汰此类投资。

在去年11月举行的一次新闻发布会上，中国气候变化问题特使谢振华重申了这一立场：“不光是工业项目，其他的项目也应该采用中国国内现行的节能减排、应对气候变化的标准，另外也可以参照世界上最先进的标准，做到既能帮助这些地方的建设，又在这些地方实现减排。”

“一带一路”项目总投资各方占比

数据来源：牛津经济研究院





## 本次论坛能否带来变化？

在本次论坛会议间歇，由中国24个民间社会组织创建的“一带一路绿色发展平台”将为该倡议提出一系列的倡议。未来几日即将公布的一份清单显示，他们提出的建议主要包括将《巴黎协定》减排目标全面纳入“一带一路”倡议；除当地环境法规外，项目还应遵循国际最佳实践；除非存在不得已的情况，禁止煤炭项目融资。

此外，参与该倡议的各个国家还有机会在今年的论坛上就局势的变化发表意见。巴基斯坦是中国煤炭项目融资的最大受益国之一。不过，出于对债务增加和对煤炭项目产能过剩的担忧，近日巴基斯坦搁置了一个大型煤炭项目。与此同时，印度尼西亚政府近日也为“一带一路”项目设定了包括使用环保技术在内的四个条件。

“绿色一带一路”分论坛和“一带一路”绿色发展国际联盟将为各

国政府和组织提供一个深入探索“绿色一带一路”未来发展方向的机会。白韞雯表示，本次峰会不太可能公布任何细节政策。不过，大会议程和公告草案对都绿色发展表示了高度重视，这说明，未来“一带一路”倡议的确有可能会将可持续性提高到一个新的高度。<sup>⑤</sup>

白莉莉，中外对话研究员，北京能源网络 (Beijing Energy Network) 执行制作

# ‘Green Belt and Road’ in the spotlight

How will the second Belt and Road Forum address the global infrastructure initiative’s environmental impact?

□ Lili Pike

“Promote Belt and Road cooperation for high-quality development” read welcome banners for the second Belt and Road Forum flying over Beijing’s boulevards. The forum, running from 25-27 April, will convene 37 heads of state to discuss China’s flagship global infrastructure plan.

This year’s forum will be larger and higher level than the inaugural gathering in 2017. But recent complaints about the financial and environmental sustainability of the Belt and Road Initiative (BRI) have sent tremors through it, and lending has slowed. As the “high-quality development” rebranding suggests, the forum will likely aim to assuage the “opposition, misunderstanding and distortion” of critics, according to Wang Xiaoquan, secretary general of the Chinese Academy of Social Sciences’ Belt and Road Research Centre.

President Xi Jinping and high-level ministries have championed China’s commitment to green development along the Belt and Road. However, environmental governance has lagged behind rapid project development. Will this year’s forum provide an opening for reform?

## ‘Green Belt and Road’ at the forum

Participants this year will have an unprecedented opportunity to weigh in on the initiative’s environmental responsibilities. On 25 April the Ministry of Ecology and Environment (MEE) and the National Development and Reform Commission (NDRC) will host a sub-forum dedicated to building a “green Belt and Road” and aligning it with the UN’s Sustainable Development Goals. About 200 guests, including representatives from the environmental ministries of participating countries, NGOs, international organisations and businesses, have been invited to attend the sub-forum of speeches and panels.

“Delegates will be invited to share their views on green development of the Belt and Road,” stated a note sent to

### ‘Green Belt and Road’: What’s at stake?

- **91%** of energy-sector loans to BRI countries went to the fossil fuel industry in 2014-2017.
- China has committed or proposed to finance **one-quarter** of the coal plants under development outside the country.
- BRI countries, not including China, account for **26%** of global CO2 emissions. That could grow to 50% by 2050 in the worst-case scenario.

participants. The event's tight half-day agenda will allow little time for in-depth feedback; nonetheless, it will be a new platform for dialogue between the Chinese government and other Belt and Road parties.

A launch expected at the forum will also be a step toward greater inclusivity. In his speech at the 2017 forum, President Xi called for the creation of an International Green Development Coalition on the Belt and Road. The MEE and the United Nations Environment Programme (UNEP) have worked together to establish this coalition, and it is due to be officially unveiled on 25 April.

Dimitri de Boer, chief representative of ClientEarth in China, one of the new coalition's partners, said: "The fact that the Ministry of Ecology and Environment moved forward with the UN Environment on establishing this Belt and Road coalition – it shows that there is a genuine follow-up."

In total, the coalition has over 120 partners, roughly half of which are Chinese and half international. These partners include environmental ministries, academic institutes, international organisations and businesses. According to a pamphlet on the coalition, it has identified 10 areas within which partners will work together to conduct research,

develop projects and formulate policy recommendations. These include climate change, biodiversity and green finance. Work plans will be discussed at a side event, according to documents sent to participants.

The coalition is not without controversy. Last year, UNEP chief Erik Solheim resigned amidst reports about his excessive travel and spending. The Guardian also reported that his staff had criticized the Belt and Road coalition and his perceived closeness to China. Given the politics surrounding it, the extent to which the coalition will be a platform for substantive policy dialogue and input remains to be seen.

### Revisiting China's vision of a 'green Belt and Road'

Due to its broadness, the concept of a "green Belt and Road", like the initiative itself, has become something of a Rorschach test, eliciting diverse views on China's responsibilities.

Right before the first Belt and Road Forum in 2017, the Chinese government outlined its own vision in the "Guidance on Promoting a Green Belt and Road", a



A welcome banner for the Belt and Road Forum in Beijing

**So far the government has not established binding environmental standards for banks or companies operating overseas.**

sweeping manifesto for sustainable development within the initiative. It was published by four ministries central to the Belt and Road: the NDRC, the Ministry of Foreign Affairs, the Ministry of Commerce and the MEE's predecessor, the Ministry of Environmental Protection (MEP).

The guidance is scant on policy details. However, alongside a companion plan from the MEE, it sheds some light on the government's approach. Ren Peng, manager of the Overseas Investment, Trade and the Environment Program at the Global Environmental Institute said: "MEE's principles are important, at the national level it sends a signal: the central and provincial governments are paying attention to the issue."

At its outset, the document sets a timeline for laying "a solid foundation for a green BRI within three to five years".

As for what a "green Belt and Road" might look like, the guidance encourages companies operating overseas to observe local environmental laws while also calling on them to adopt higher environmental standards. It acknowledges the economic logic of companies pursuing green development, stating that environmentally friendly standards will "enhance their green competitive edge to lead green development". As for green finance, it proposes the creation of policies to prevent ecological risks from project investments. It also advocates for the creation of green banks and the use of China's policy banks, which are tasked with carrying out government policy, to actively channel funds to green projects.

However, so far the government has not established binding environmental standards for banks or companies operating overseas. A compliance mechanism is lacking, according to Bai Yunwen, executive director of Greenovation Hub. "If a company doesn't abide by [the guidance], what punishment will they receive? The guidance doesn't say," she said.

In projects undertaken by Chinese state-owned enterprises and banks, environmental impacts and violations of local laws have sparked protests and led to lawsuits. A Chinese-funded coal plant in Lamu, Kenya and rail and port projects in Sri Lanka have been sites of such controversies.

Others note the guidance's failure to emphasise certain priority areas like climate change. Simon Zadek, a visiting fellow at Tsinghua University's Centre for Finance and Development, told chinadialogue: "The 'greening the Belt and Road' story suffers from a lack of specificity: number one, an enforcement mechanism, and two, a lack of real will by China to address the particular and long-term challenge of climate change as it relates to the Belt and Road."

The government's progress report on the Belt and Road, released this week, vows to uphold the Paris Agreement at the same time it acknowledges cooperation on coal projects as part of the initiative's achievement to date. Coal projects have dominated China's Belt and Road power sector lending and accounted for the largest share (42%) of China's policy banks' overseas energy finance in 2018.

In a recent interview with chinadialogue, Nicholas Stern, former chief economist of the World Bank said: "I feel that there is a split between the ideas behind the Belt and Road Initiative and what has actually been financed under the initiative. It would be good if China's Belt and Road financing can get closer to the idea and to the great changes that are happening inside the country."

### Specific policies needed

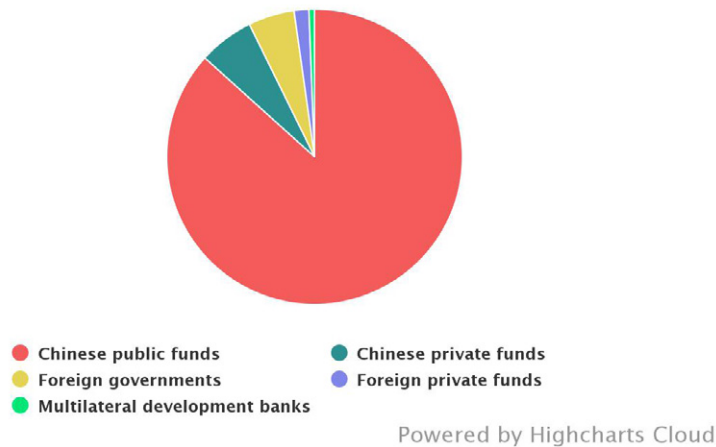
The Chinese government has presented the Belt and Road as an open, multilateral platform, but its projects have been almost entirely funded by China's state-owned banks and enterprises, according to a 2018 study by the Industrial and Commercial Bank of China and Oxford Economics. Because the main entities involved are state owned not private, the central government has unique power to shape the Belt and Road's development through its environmental policies.

Powerful central government bodies like the NDRC and the State-owned Assets Supervision and Administration



### Share of total identified funding for Belt and Road projects

Source: Oxford Economics



Commission (SASAC) could complement the MEE to deliver these policies, according to Bai Yunwen. They already have related policies in place that could be further applied to greening the Belt and Road. For instance, the SASAC has set a negative list that shapes what sectors state-owned enterprises can invest in overseas, and China's central bank and the Banking and Insurance Regulatory Commission have to approve outbound investments.

In 2013, before the BRI had begun, the Ministry of Commerce and MEP published a guidance on environmental protection in foreign investment. It calls for Chinese companies to borrow best practices from multilateral development banks and international organisations. Multilateral development banks have public environmental standards and accountability mechanisms that China's banks have not been required to create, for instance. Most major multilateral lenders have also restricted coal financing, and the Organisation for Economic Cooperation and Development's export credit agencies have agreed to phase it out.

At a press conference last November, Xie Zhenhua China's special envoy on climate change, reiterated this call saying: "Not only industrial projects, but other projects should also adopt China's domestic standards for energy conservation, emission reduction and addressing climate

change. They can also refer to the most advanced standards globally, so that at the same time we help these places to build, we also help them achieve emission reductions."

### Will the forum bring change?

On the sidelines of the forum this week the Belt and Road Green Development Platform, a partnership of 24 civil society organisations in China, will propose a series of joint recommendations for the initiative. According to a list to be published in the next few days, their proposal includes the full integration

of the Paris Agreement carbon emission reduction goals within the BRI, project compliance with international best practices beyond local environmental law and a ban on coal financing unless no other resources exist to meet demand.

Countries participating in the initiative will also have a chance to air changing views at this year's forum. Pakistan, one of the top recipients of Chinese finance for coal projects, recently shelved a large coal project due to rising debt and concerns about overcapacity in the sector. Meanwhile, the Indonesian government recently stipulated four conditions for Belt and Road projects, including requiring the use of environmentally-friendly technology.

The "green Belt and Road" sub-forum and the BRI International Green Development Coalition will provide an opportunity for governments and organisations to further weigh in on what a "green Belt and Road" should be. The summit is unlikely to unveil any detailed policies, according to Bai Yunwen. However, the emphasis on green development in the agenda and a draft communiqué suggest that the initiative may indeed be elevating sustainability to a new level of importance going forward. ☺

*Lili Pike is a researcher for chinadialogue and the executive producer of the Beijing Energy Network's podcast, Environment China.*

# 响水巨响：中国化学品管理 吸取天津教训了吗？

灾难性的化工厂爆炸事故再次将中国危险化学品安全治理体系推到风口浪尖。

□ 阚超群



拍摄于3月22日的事故处理现场

3月21日，江苏省盐城响水县陈家港化工园的剧烈爆炸画面通过新闻和社交媒体呈现在人们眼前，仿佛让人回到2015年8月天津化学品仓库爆炸的恐怖现场。

截至3月25日下午16时，事故已经造成78人死亡，仍有566名伤员在当地医院接受治疗。化工厂相关人员已被公安机关控制，事故原因还有待进一步调查披露。媒体

的调查和报道显示，这次重大的安全事故是一场本可以避免的人祸，中国危险化学品管理体系似乎还未从天津吸取教训。

## 早已埋下的隐患

此次的爆炸之前的很长一段时间里，已经有各种迹象在显示陈家港化工园和涉事的天嘉宜公司存在安全隐患。

2007年11月27日，园区内联化科技有限公司发生爆炸，致8人死亡，数十人受伤；2010年11月23日，园区内的一个氯碱化工公司发生氯气泄漏，导致几十人中毒住院。

媒体报道，当地居民曾多次投诉园区与居民区之间距离太近。此次发生爆炸的天嘉宜化工厂2公里范围内有三所小学，1.5公里范围内有两家幼儿园。

据《新京报》报道，负责天嘉宜公司安全检测的江苏省安全生产科学研究院曾被国家安监总局点名指出问题，包括“对重大危险源的辨识不够严谨，危险有害因素分析不全面，安全隐患排查不全面，整改措施建议针对性不强”等。

## “血的教训”

事故发生后两天，国家主席习近平作出关于救援和调查的指示。国务院安委会也发出紧急通知，要求就进一步做好安全生产工作，坚决防范遏制重特大事故。

截至24日，至少16个省(市区)开展了危险化学品生产安全隐患排查整治工作，并表态从响水事故中吸取教训。其中天津市委书记的表态尤为引人注目，他提出要不忘2015年“8.12”爆炸“血的教训”。

然而，天嘉宜化工有限公司的安全问题在2015年8月的天津事故后似乎并未得到改善。媒体报道显示，该公司的生产许可证在2016年过期后并未更新；原国家安监总局办公厅于2018年2月曾指出天嘉宜公司存在13项安全隐患。2016至2018年间，天嘉宜公司因违规排放、违反固体废物管理制度等问题，6次遭当地环保部门行政处罚。2018年6月，园区因为环境问题曾被停产长达7个月，但是到今年年初又重新开工。

2018年3月，负责危险化学品安全监管的原国家安监总局在国务院机构重组过程中成为了新成立的应急管理部的一部分。应急管理部同时整合了原属公安部的消防管理职责和原属民政部的救灾职责等，在行政级别上高于原安监总局，具有更有效地处置安全风险的能力。成立后，应急管理部曾多次组织针对危险化学品的安全生产监管行动，对全国危险化学品事故隐患和问题进行检查。其中，曾经导致天津事故的“危险化学品储存不规范”等问题一再被指出。

然而，这些行动似乎未能阻止此次大爆炸的发生。据财新记者根据厂区分布图和现场航拍图分析，爆炸很可能发生于堆放危险固体废物的存储仓库。这再次凸显中国自上而下的运动式监管模式应对日常安全和环境风险的局限性。

## 唯经济发展是图？

响水县处于苏南和苏北的交界地带，经济基础相对比较薄弱，属于

传统贫困区域。而它东临黄海，北面紧挨灌河，有着依赖水运的化工产业发展的先天交通优势。

为了确保经济快速增长，化工产业在过去的几年内在响水仓促上马，并渐渐成为了响水的财政支柱。新京报报道，在2011年，陈家港化工园的纳税额曾占到全县财政收入的1/6左右。

2011年有媒体调查称，陈家港镇积极吸引化工工业落户，并暗示当地环境容量足以承载这一产业。经济利益先行的情况下，安全被落在了后面。

## 长远环境影响

爆炸过后的环境影响仍在持续。据财新网报道，截至23日，响水爆炸地点周边河流有毒污染物仍大量超标。

生态环境部部长李干杰在会议中要求最大限度降低事故的环境影响。生态环境部介绍，目前陈家港化工园区内的河渠已经全部封堵，确保污染水体不入灌河。

但是长远看，此次爆炸对当地的环境的影响还很难评估。

中国占全球化学品销售总量的40%，并且这一数字到2030年预计将达到50%左右。如何让化学品大国的民众不用提心吊胆地生活在危险周围，将会在今后很长一段时间内考验中国环境安全治理水平。☞

阚超群，中外对话北京编辑



# China's latest chemical plant explosion was avoidable

The tragedy in Xiangshui has placed the country's chemicals industry back in the spotlight,

□ Karoline Kan

News and social media images of an explosion on March 21 in Xiangshui county, eastern China, call to mind the terrifying blast at a chemicals warehouse in Tianjin in 2015.

By March 25, 78 people were known to have died in the latest blast, which occurred at a plant in the Chenjiagang industrial park. A further 566 are receiving treatment in local hospitals. Officials from the plant, which belongs to Tianjiayi Chemical Company, have been detained.

The cause of the explosion is still under investigation. But media reports indicate that the tragedy was avoidable and that the lessons of Tianjin have still not been learned.

## Hidden risks

There had long been indications of risk at the Chenjiagang industrial park, and at the Tianjiayi plant in particular.

In 2007, another explosion at the park, at the Lianhua Technology plant, killed eight and injured dozens. Then in 2010, tens of people were hospitalised after a chlorine leak from a chloralkali process plant.

No improvements had been made at the plant after the Tianjin explosion.

According to media reports, locals had repeatedly complained of the park being too close to homes. Three elementary schools and two kindergartens are located within two kilometres of the Tianjiayi plant.

According to the Beijing News, the State Administration of Work Safety, which regulates occupational safety in China, had reported problems with the body responsible for monitoring safety at the Tianjiayi plant, citing insufficient analysis and identification of risk factors and hazards, and a lack of targeted measures to rectify issues.

## A bloody lesson

Two days after the blast, China's president Xi Jinping issued an instruction on the investigation into the explosion and on relief work. The State Council Work Safety Commission also issued an urgent notice on improving safety standards to prevent similar major incidents.

As of March 24, at least 16 provinces or cities had started checks on the safety of their chemical industries. They indicated that lessons would be learned from the Xiangshui blast. A statement by the party secretary of Tianjin drew particular attention. He called for the "bloody lessons" of the August 2015 explosion not to be forgotten.

It seems no improvements had been made at the Tianjiayi



plant after the Tianjin explosion. Media reports show that production licenses were not renewed once they had expired in 2016. In February last year, the safety authorities identified 13 different hazards at the plant. Between 2016 and 2018, the company was fined on six occasions for breaches of rules on waste gases or handling of solid waste. In June 2018, the Xiangshui industrial plant was shut down for seven months over environmental concerns, but it reopened early this year.

In ministerial reforms in March last year, the State Administration of Work Safety, responsible for safety in the chemical industry, was made a part of the new Ministry of Emergency Management. That ministry also took over other responsibilities, including fire-fighting, which was formerly the remit of the Ministry of Public Security, and disaster relief, formerly the responsibility of the Ministry of Civil Affairs. The Ministry of Emergency Management ranks higher than the original work safety body, and therefore has greater powers to tackle potential risks. It has organised a number of actions on chemical industry safety, auditing risks and issues in chemical production nationwide. Issues such as poor storage of chemicals, which caused the Tianjin blast, have been discovered at many sites.

But those checks did not prevent this latest explosion. According to a Caixin analysis of the factory layout and aerial photos of the scene, the blast is likely to have originated in a storehouse for hazardous chemical waste. This again highlights the limitations of China's top-down, campaign-style approach to dealing with day-to-day safety and environmental risks.

## Economic growth above all?

The county of Xiangshui, where the blast occurred, has long been relatively undeveloped. But its proximity to the Yellow

Sea and the Guan River has made it attractive to chemical manufacturers reliant on shipping for transportation.

To ensure rapid economic growth, chemical firms have been encouraged to build factories here, providing crucial revenue to the local economy. According to the Beijing News, at the highest point in 2011, about one-sixth of the county's tax income came from the Chenjiagang industrial park.

A media investigation in 2011 found that Chenjiagang was actively courting chemical firms, and implying the local environment could cope.

## Long-term environmental impacts

According to Caixin, rivers near the site of the explosion were still showing excessive levels of pollution as of March 23. Levels of dichloroethane and methylene chloride in the Xinfeng River were 2.8 times and 8.4 times higher than normal.

Environment minister Li Ganjie has called for the environmental impact of the explosion to be minimised. According to the Ministry of Ecology and Environment, rivers within the industrial park have been dammed to ensure pollution does not reach the Guan River downstream.

But it is hard to say what the longer-term environmental impacts of the explosion will be.

China accounts for 40% of global chemical sales, a figure that is expected to reach 50% by 2030. The avoidable tragedy at Xiangshui shows that China's regulators still have a long way to go to ensure that people surrounded by booming chemical industries nationwide do not have to live in fear. ☹

*Karoline Kan is the Beijing Editor at chinadialogue.*

# 中国的“铁腕”治污面临阻力

就业优先政策是否会影响绿色转型的速度？

□ 李 婧

**2014**年，李克强总理在一年一度的全国人大会议开幕式上承诺要以铁腕治污，严惩污染者和纵容污染的官员，宣告中国开始向污染宣战。各界对此举表示了赞赏，认为中国政府的这一表态具有里程碑意义，是从不惜一切代价保增长到认识环保价值的重大转变。

但在今年的“两会”上，总理的语气却有所不同。他在会上阐述了旨在帮助中国应对长期经济下行压力的“就业优先”政策。

虽然李克强总理郑重承诺要加强污染防治工作，但同时他也表示政府不仅要依法规范各行各业，还要听取他们的“合理诉求”并“给予帮扶指导”。

“（我们应该）给予企业合理的过渡期，避免处置措施简单粗暴、一关了之，”李克强对 3000 多名与会代表们说。

## 变化的风向

这一变化的背景是，有抱怨称严格的环境法规和对工业活动的

全面限制增加了企业的运营成本和失业，小型私营企业首当其冲。对此，生态环境部已经多次做出驳斥。

中国自上而下的环境治理模式面临着经济下行的考验，生态环境部部长李干杰在本周一举行的新闻发布会上做出承诺。

“我们将打击环保政策执行中‘一刀切’的做法…也坚决反对放松环境法规，”李干杰说。

他承认，一些地方政府确实存

在平常不作为，到了年终考核或中央生态环境保护督察组来的时候，才急急忙忙临时抱佛脚的做法。还采取一些不顾企业环保业绩，就勒令其全面停产的做法。

“这样的做法既影响和损害了我们的形象和公信力，也损害了合法合规企业的基本权益，”李干杰说。

## “中国式环保”受挑战

李干杰的话凸显了这种中央政



李克强总理在2018年两会期间会见中外记者

府制定目标、地方政府落实目标的自上而下的方式在环保领域的局限性。

2016 至 2018 年，中国仿照之前的反腐运动，高调启动了两轮环保督查。由部长级领导任组长的中央环保督查小组走访全国各省，听取当地民众的不满，并收集违规线索。这两轮巡视工作的目的是暴露那些因担心影响 GDP 增长而对污染企业视而不见的地方干部。

生态环境部盛赞这一运动取得了巨大成功。2016 至 2017 年第一轮督查期间，累计处罚了 2.9 万家违反环境法规的企业，罚款 14.3 亿元，约 1.7 万名来自行业内和地方政府的人员被追责，1527 人拘留。2018 年，督查小组对 20 个省进行了后续检查，罚款人民币 9.2 亿元，问责 8000 多人。

与轰轰烈烈的督查相伴的，是一些矫枉过正的地方官员急于求成，没有考虑对企业和公众的影响。2017 年冬季某些地区全面禁止煤炭

供暖，成千上万的农村居民因此挨冻就是一例。

这种高压手段虽取得了短期成效，但尚未转化为长期遵守环境法规的行为。当地环保官员必须在保证不严重影响生产的情况下对污染企业进行约束，这使得他们的工作受到了进一步的挑战。

“今年对地方环保官员来说会更不好过，李总理说的‘过保质期’就像是给了污染者豁免权…但如果我们官员没达成目标，还是要被追责的，”《财经》杂志援引华北一官员的话道。


## 环保成绩会否倒退？

李克强总理在讲话中要求今年空气中的二氧化硫和氧化氮减少 3%，并继续降低 PM2.5 水平（但未明确下降的幅度）。一个办法是加大空气治理方面的投入。今年中央预算将拨款 600 亿人民币用于空气、水和土壤污染的治理，较去年增加

48%。李干杰部长还承诺生态环境部将为寻求污染处理设施升级的污染企业提供技术援助。

中国若不能迅速改善环境治理，就可能会输掉来之不易的抗霾胜利。2013 至 2017 年间，京津冀地区的 PM2.5 水平下降了 40%。

现在已经出现了一些令人担忧的迹象。路透社分析官方监测数据后发现，去年 10 月至今年 2 月期间，中国北方（京津冀地区和汾渭平原）39 个城市中仅 6 个城市的 PM2.5 水平下降。同期，引发雾霾的污染物平均水平上升了 13%，达 88 微克。

去年下半年以来，中央政府加大了机场、道路、桥梁、铁路等基础设施的支出。中国不应该回到靠钢铁、水泥这种烟囱产业来支撑经济的“旧常态”。

李婧，自由撰稿人，关注环境与气候议题

# China's 'iron fist' against pollution is softening

Will Premier Li Keqiang's employment-first policy slow down the green transition?

□ Li Jing

In 2014, China declared a war against pollution when Premier Li Keqiang pledged to crackdown on polluters and negligent officials “with an iron fist” at the opening of the annual National People’s Congress (NPC). It was lauded as a landmark shift by the government away from economic growth at all costs to one that recognised the value of environmental protection.

But Li’s tone was quite different at this year’s conference in which he outlined an “employment-first” policy aimed at helping China battle a prolonged economic downturn.

While Li vowed to strengthen efforts on pollution prevention and control, he also said that the government should not only regulate industries according to the law but also hear their “reasonable demands” and “offer support”.

“[We should] allow enterprises a grace period for complying with environmental requirements and avoid simply shutting down factories.” Li told over 3,000 delegates.

## Winds of change

The shift comes amid complaints that stringent environmental regulations and blanket restrictions on industrial activities have increased business costs and job losses, particularly at small private companies, a claim the Ministry of Environment and Ecology has refuted.

The economic downtrend has put China’s centralised environmental governance to the test, with Li Ganjie, the minister of environment and ecology, promising at a press conference on Monday to fight negligence on addressing violations and arbitrary production suspensions.

“We will crackdown on the ‘one-size-fits-all’ practices in implementing environmental policies... we will also resolutely oppose relaxing environmental regulations,” Li said.

Li admitted that some local governments were not containing pollution until clean-up deadlines approached or national inspection teams arrived. They have also been imposing blanket production bans on businesses regardless of their environmental performance.

“Such a practice has damaged not only our credibility but also the basic rights of those law-abiding enterprises,” Li said.

## The green playbook in question

Li’s comments highlight the limitations of a top-down approach to environmental protection in which central government sets out targets to keep local subordinates in line.

Between 2016 to 2018, China launched two rounds of high-profile environmental inspection that were modelled



60 billion yuan has been allocated from central budget to tackle air, water and soil pollution this year.

on the country's anti-corruption campaign. Led by ministerial-level officials, the central inspection teams visited every province in China, hearing grievances from local people and collecting leads on violations. The inspections aimed to shine a light on local governments that were turning a blind eye to polluting businesses for fear of lowering GDP growth.

The Ministry of Environment and Ecology hailed the campaign as a great success. During the first round between 2016 and 2017 it collected 1.43 billion yuan (US\$213 million) in fines from 29,000 enterprises for violating environmental regulations. About 17,000 people from industry and local governments were held accountable, and 1,527 were detained. In 2018, the inspection teams revisited 20 provinces in follow-up checks, levying 920 million yuan (US\$137 million) in fines and disciplining over 8,000 people.

Meanwhile, some overzealous local officials tried to boost green performances to impress their bosses without considering the impacts on businesses and the public. The blanket ban on coal heating in the winter of 2017, for example, left thousands of villagers shuddering in the cold.

Such high-handed practices delivered short-term gains but have yet to translate into long-term environmental compliance. They are set to be further challenged as local environmental officials attempt to rein in polluters without hurting production too much.

"It'll get a lot harder for local environmental officials this year. Premier Li's comment about a 'grace period' is

like granting immunity for polluters... yet officials will still be held accountable if we fail to meet the targets," Chinese magazine *Caijing* quoted an anonymous official in northern China as saying.

## Environmental gains at risk

In his speech, Premier Li Keqiang asked the country to reduce sulphur dioxide and nitrogen oxide by 3% and further reduce levels of PM2.5 (without specifying the percentage). Sixty billion yuan (US\$9 billion) has been allocated from central budget to tackle air, water and soil pollution this year, a 48% hike on last year. Minister Li also promised that the ministry of environment and ecology will offer technological aid for polluting enterprises seeking to upgrade their pollution treatment facilities.

If China cannot switch to smarter environmental governance quickly, it may lose its hard-won battle against smog; between 2013 and 2017, PM2.5 levels dropped 40% in the Beijing-Tianjin-Hebei area.

There are already worrying signs. Reuters analysis of official monitoring data found that between October and February only six of the 39 cities in northern China – in the Beijing-Tianjin-Hebei area and the Fenwei Plain – had registered a drop in PM2.5. Average levels of smog-inducing pollutants rose by 13% to 88 micrograms over the period.

Since the second half of last year, the central government has boosted spending on airports, roads, bridges, rail lines and other infrastructure. China should not return to its "old normal" of relying on smokestack industries – iron, steel and cement – to prop up its economy. ☞

*Li Jing is a freelance writer covering environmental and climate issues.*

# 地震争议中的中国页岩气开发

因四川荣县地震而引发的页岩气开采争议  
为我们提供了一个重新审视中国页岩气发展雄心的机会。

□ 冯 灏



中石化重庆分公司涪陵作业区的工人在试运行后拆卸设备

**中**国页岩气行业近来正遭遇“震荡”

2月24日、25日两天，四川省自贡市荣县连续发生三起4级以上地震，造成两人死亡，12人受伤，多处房屋受损。当地居民质疑地震与

页岩气开采有关，据荣县政府公开的信息，有约三千人到县城聚集，抵制页岩气开采。

2月25日，“因地震安全原因和安全生产需要”，荣县政府要求当地页岩气开发企业暂停开采作业；截

至目前，当地政府尚没有公布何时重新开采的信息。页岩气开采及其可能引发的安全和环境风险再次引发热议，但专家认为，此次争议难以撼动中国政府和业界的页岩开发雄心。

“ 中外对话采访的专家普遍认为，无论是从市场需求推动的角度，还是从保障能源安全的角度，本次的地震争议都不会撼动中国政府和业界页岩开发的雄心，但有必要调和矛盾以化解风险。 ”

## 更清洁的能源

市场需求是中国在当前阶段加大页岩气勘探开发力度的主要推手。

页岩气被称为非常规天然气，其本质依然是“天然气”。在治理大气污染和应对气候变化的背景下，作为相对煤炭更清洁和低碳的能源，天然气被视为能源结构转型的过渡能源，需求量近年来呈现爆发式增长。2017年，中国北方供暖地区和全国的天然气资源供应缺口分别在48亿和113亿立方米左右。

北京世创能源咨询(BSC Energy)首席信息官娜敏表示，“供不应求，市场自然吸引更多的资本进入页岩气产业，鼓励上游企业的勘探增产”。根据世创的测算，到2020年，中国天然气的需求都会保持强劲增长的势头。

天然气需求的强势增长也使得中国的天然气进口依存度一再大幅攀升。能源安全的问题频繁引起决策层的关注，2018年9月，中国国务院首次发文促进天然气产业发展，要求国内各油气企业全面增加勘探开发资金和工作量投入，全面增储上产。

信达证券公共事业首席研究员李蓉分析说，常规气在短期内大发现的可能性较小，这就依赖页岩气、致密气和煤层气等非常规气上有一些新的突破，“可以说，以页岩气为代表的非常规气将是未来中国国产气产生增量的一个主攻方向”。

## 发展瓶颈

事实上，中国的页岩气开采雄心早于此轮的天然气需求的猛增。

页岩气的开采发端于美国，进入21世纪，随着技术的发展，美国页岩气工业获得快速发展，凭借页岩气的开发，美国的能源对外依存度大幅度降低。美国在页岩气开采上取得的成功给中国以极大的想象空间。据美国能源信息署估计，中国的页岩气储量居世界首位，其中现有技术可开采的储量比美国多68%，中国期待可以复制美国的成功经验，实现能源自足。

中国国土资源部自2004年起，跟踪调研页岩气资源状况，并于2009年实施了第一口页岩气战略调查井，掀开国内勘探序幕。

2012年，中国曾制定雄心勃勃的页岩气“十二五”规划，计划于2015年实现65亿立方米的页岩气开采目标，2012年至2015年，对页岩气开采企业给予每立方米0.4元的补贴。但直至2015年“十二五”规划收官之年，中国页岩气的实际产量仍不足45亿立方米，实现商业化页岩气开发的企业只有两大国有石油巨头中石油和中石化，想象中的页岩革命并没有到来。

究其原因，娜敏表示，中国相关部门虽然重视页岩气的战略重要性，但是在实际勘探和商业化生产的过程中，现实瓶颈不少，掣肘中国页岩气产量的进一步提升。

此次争议中心的四川盆地是中国天然气最富集的三大盆地之一，也是目前开采条件最为成熟的地区。但相较美国，此地面临储层埋深大、地质结构复杂的问题，相近地方的地质情况可能大有不同，这意味着在一个井口适用的技术难以应用到另一个井口，对于勘探或者商业化开发挑战性很大，成本很难控制。另外，该地区人口密集，集中开采还涉及公众情绪等社会问题。

西南财经大学副教授谭慧敏向中外对话介绍，她在2016年对四川省威远县居民进行深度访谈后发现，他们对于页岩开发的地下水污染和空气污染非常担心，并将风险与页岩气井的空间邻近联系起来。

尽管如此，中国页岩气“十三五”规划依然将产量目标进一步提升，“在政策支持到位和市场开拓顺利情况下，2020年力争实现页岩气产量300亿立方米”，尽管相对2015年之前提出的2020年实现600-1000亿立方米目标有所下调，但财政补贴和资源税减征政策的持续跟进表明中国对页岩气仍抱很大期待。

## 诱发地震的忧虑

公众反对页岩气开发的主要理由之一是质疑页岩气开采和地震的关系。页岩气作为非常规天然气的一种，储存于富有机质泥页岩及其夹层中，要将其采掘依赖一项特殊





的技术——水力压裂，即通过把水、砂和化学物质注入矿井形成高压，在页岩等岩层中撑开裂缝，将这些藏匿于缝隙中的油气挤出地表。

20 世纪 90 年代后期，美国得以实现页岩气革命，很大程度上正是得益于此项水力压裂技术的突破应用，但也恰恰是这项技术，具有一系列的安全和环境争议。

美国地质勘探局研究人员早在 2013 年就曾在《科学》杂志上发表研

究称，页岩气开发中回注的废水因以非自然的方式改变了断层压力，可能诱发地震。

2 月的地震中震源中心距荣县 8 公里、距威远县 18 公里、距自贡市 32 公里，正处于中石油“长宁—威远国家级页岩气产业示范区”范围之内。

但专家表示，此次的地震难以直接归因到页岩气开发。中国科学院水利部成都山地灾害与环境研究所副研究员张建强解释说，此次震群地震的震源深度在 5 千米，而开采深度是 3.4 千米左右，差别较大，可以初步排除其因果关系，而明确的归因还有待进一步的研究。

而据四川大学-

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而据四川大学-

表示，位于长江流域的四川水资源相对丰富，大尺度来讲不会增加太大的用水压力，但在局地、小范围可能产生短时的用水竞争。

## 难以撼动的雄心

地震争议过去不到一周，2019 年的“两会”期间，全国政协委员、中石油董事长王宜林在接受采访时表示，中石油计划 2020 年页岩气产量达到 120 亿立方米，而到 2025 年产量达到 240 亿立方米，产量再翻一番。

而四川是页岩气开发重要的战略开拓地。2018 年，中石油在四川盆地的钻井数为 330 口，是截至 2017 年底中石油累计投产存量（约 210 口井）的 1.5 倍。

中外对话采访的专家普遍认为，无论是从市场需求推动的角度，还是从保障能源安全的角度，本次的地震争议都不会撼动中国政府 and 业界页岩开发的雄心，但有必要调和矛盾以化解风险。

李蓉建议说，首先从科学预测的角度，要充分论证开采风险，以保障居民的人身财产安全，比如，在生产钻井的过程中，要请地震专家对于开采和地震的关系进行更紧密的监控；另外，在前期调研选址的过程中，将地震风险纳入环境评估必不可少。

关于页岩气开发耗费大量水的争议，罗天一表示，开采者需要根据年内水量的季节性变化、当地的水文特征和用水习惯，有针对性的规划好开采的时间和方式。⑤

冯源，中外对话研究员



# Earthquakes linked to fracking cause controversy in China

Protests against shale gas mining sparked by the Rongxian earthquakes unlikely to dent the sector

□ Feng Hao

China's shale gas industry has been shaken by controversy after three earthquakes in Sichuan province.

The earthquakes, all with a magnitude of over four, hit Rongxian near the city of Zigong on the 24th and 25th of February. They killed two people, injured 12 and damaged numerous buildings. Locals suspect shale gas extraction was to blame, and according to the local government, about 3,000 people gathered in Rongxian to protest the practice shortly after the earthquakes hit.

On the 25th the local government instructed shale gas firms to temporarily halt operations for the sake of what they called "earthquake safety". There has been no word as yet on when extraction will start again.

Shale gas mining has proved highly controversial worldwide due to its potential safety risks and environmental impacts. Although the public response in China has not been equivalent, February's protests are a sign of how high feelings run. Nevertheless, experts say

this is unlikely to reduce the ambitions of government and businesses.

## Cleaner energy

Market demand is behind China's increased efforts to find and extract shale gas.

Shale gas is referred to as an unconventional natural gas, but it is effectively the same fuel. A cleaner and lower-carbon option than coal, natural gas is viewed as a transitional source of energy as the mix of energy changes to tackle air pollution and climate change. As a result, it has seen rocketing demand. In 2017 demand for natural gas outstripped supply by 4.8 billion cubic metres in northern China (where need is higher due to heating demand) and 11.3 billion cubic metres nationwide.

Na Min, chief information officer with BSC Energy, said: "Shortages naturally mean more capital flowing into the shale gas sector, encouraging upstream companies to prospect and increase output." According to the firm's calculations, China's demand for natural gas will continue to grow in 2020.

Strong growth in demand for natural gas has also caused reliance on imported gas to escalate, with policymakers becoming concerned about energy security. In September

**Future increases in domestic gas production will mainly come from unconventional sources, such as shale gas.**

2018 the State Council published its first document promoting development of the natural gas industry, instructing domestic oil and gas firms to increase prospecting and development funding to boost output and reserves.

Li Rong, chief public sector researcher with Cinda Securities, said there is little chance of natural gas discoveries being made in China in the near term, so any breakthroughs will have to come from unconventional sources: shale gas, tight gas and coalbed methane. “Future increases in domestic gas production will mainly come from unconventional sources, such as shale gas,” she said.

### A growth bottleneck

But China’s shale gas ambitions predate the recent leap in demand for natural gas.

Shale gas extraction started in the United States, where technological improvements in the early 2000s led to rapid expansion, making the country much less reliant on energy imports. China is now looking to the US and hoping to replicate that success. According to estimates from the US Energy Information Administration, China has more shale gas reserves than any other nation – using current technology, its recoverable reserves are 68% larger than those of the US. China hopes this will provide energy self-sufficiency.

China’s Ministry of Land and Resources started investigating shale gas resources in 2004 and the first exploratory well was drilled in 2009.

2012 saw an ambitious five-year plan for shale gas development, with a production target of 6.5 billion cubic metres per year for 2015, and a subsidy of 0.4 yuan (US\$0.06) per cubic metre for shale gas firms between 2012 and 2015. But by 2015 production stood at only 4.5 billion cubic metres per year, with only the two state-owned oil and gas giants, CNPC and Sinopec, running commercial operations.

**61% of China’s shale gas reserves are in areas under high levels of water stress.**

BSC Energy’s Na Min says that further increases in output are being held back by bottlenecks in the prospecting and commercialisation process.

The Sichuan basin, where the recent earthquakes occurred, is one of China’s three richest natural gas basins and currently the most suitable for drilling. But reserves are deeper compared with the US, and the geology is more complex. That means technology used at one well may not be useful at another, even when its nearby, making prospecting and extraction more challenging and costs harder to control. The area is also densely populated, and intensive drilling could ferment public discontent.

The wells are already unpopular with local people. Tan Huimin, associate professor at Southwest University of Finance and Economics, conducted in-depth interviews with residents of the Sichuan county of Weiyuan in 2016. She found many were deeply concerned about water and air pollution, especially close to mining activities.

Despite this, the current five-year plan for shale gas has raised production targets again: “Assuming policy support is in place and market conditions are favourable, strive for annual shale gas production of 30 billion cubic metres by 2020.” This is lower than a pre-2015 target for 2020 of 60-100 billion cubic metres, but ongoing subsidies and tax breaks show that China still has high hopes for shale gas.

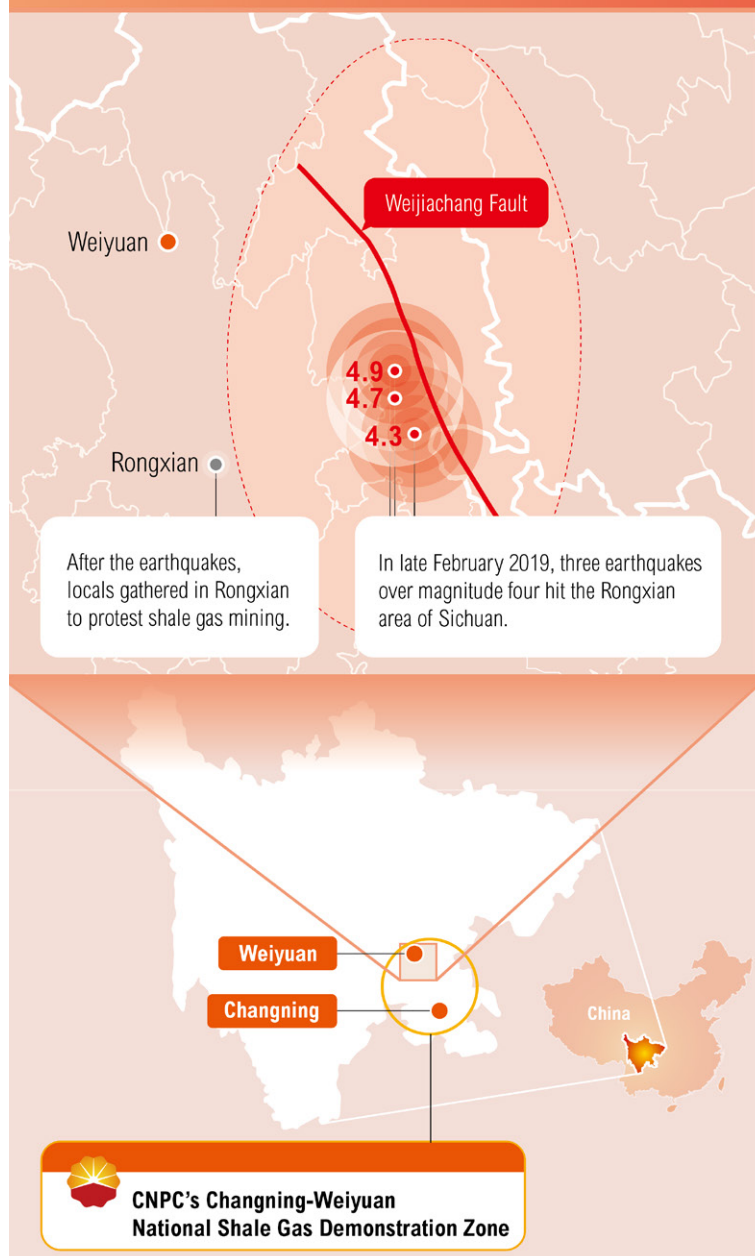
### Earthquake worries

One of the main reasons members of the public oppose shale gas extraction is the link with earthquakes. This is especially so in Sichuan, where memories of the 2008 earthquake that killed over 69,000 people are still raw.

The gas is found in layers of shale rock, and hydraulic fracturing – the high-pressure pumping of water, sand and chemicals into the rock formation – is necessary to extract it, by enlarging cracks and allowing the gas to escape. This creates a lot of contaminated wastewater, which is often dealt with by injecting it into deep disposal wells.

Although the whole process is controversial, for both safety and environmental reasons, it is the injection of this wastewater that is thought to trigger earthquakes. In 2013

## RECENT EARTHQUAKES AND SHALE GAS MINING IN SICHUAN



eight kilometres from Rongxian, right in the middle of CNPC's Changning-Weiyuan National Shale Gas Demonstration Zone. Despite this, some experts say it is hard to draw a direct link between the earthquakes and shale gas extraction in the region. Zhang Jianqiang, a researcher at the Chinese Academy of Sciences' Chengdu Institute of Mountain Hazards and Environment, explained that the epicentres lay five kilometres beneath the surface, some distance from the deepest fracking at about 3.4 kilometres. Zhang claimed that a causal relation could therefore be eliminated, although further research would be necessary. He made no reference to wastewater disposal wells.

According to Tian Bingwei, associate professor at the Sichuan University – Hong Kong Polytechnic University Institute for Disaster Management, this area is prone to seismic activity. There have been five earthquakes of magnitude four or above within a 50-kilometre radius of February's epicentres since monitoring began in 1970, a relatively high number.

But there are also other concerns about fracking, such as the huge quantities of water used. According to research from the World Resources Institute, 61% of China's shale gas reserves are in areas under high levels of water stress. But WRI researcher Luo Tianyi argued that Sichuan lies in the Yangtze River basin so has more water available than many other areas. As such, it shouldn't suffer increased water stress, but there may be localised competition for water in the short-term, he said.

### Unshakeable ambition

the US Geological Survey published research in *Science* saying "several of the largest earthquakes in the U.S. mid-continent in 2011 and 2012 may have been triggered by nearby disposal wells".

The epicentres of February's earthquakes were all about

On 4 March during the Two Sessions, China's biggest annual political meetings, CNPC chairman and delegate to the Chinese People's Political Consultative Conference Wang Yilin said in an interview that his corporation plans to pro-

duce 12 billion cubic metres of shale gas annually by 2020, and to double that to 24 billion cubic metres by 2025. This was only a week after the earthquake protests in Rongxian.

Sichuan is a focus for that expansion. In 2018 CNPC drilled 330 new operational wells in the Sichuan Basin – nearly 60% more than the total number of wells the company had in production by the end of 2017 (about 210).

Experts interviewed by chinadialogue generally agreed that the controversy over the earthquakes will not reduce the market and energy security ambitions of the shale gas sector and the government. But they said it will be necessary to address the discontent of residents and avoid putting the public at risk.

Li Rong of Cinda Securities said there should be a full scientific review of the risks of shale gas mining to ensure the safety of locals and their homes. She also suggested that during mining or well drilling, seismologists should be employed to monitor any links with earthquakes, and during initial site selection, seismic risks should be an essential part of environmental impact assessments.

Commenting on the huge quantities of water used, the WRI's Luo Tianyi said that mining firms need to plan when and how they mine in line with seasonal water availability, local hydrology, and local demand for water. ↻

*Feng Hao is a researcher at chinadialogue.*



# 生物多样性的丧失 将给人类带来“前所未有”的威胁

联合国重要报告警告称，100 万物种濒临灭绝，严重威胁全人类的未来。

□ 迈克·沙纳罕



© Alamy

中国的自给农业正在被商业化的单一种植所取代，这将导致传统作物品种丧失

一份经全球 130 多个国家政府批准的重要报告称，全球范围内的自然环境正在以前所未有的速度遭到破坏，这将对人类福祉造成严重影响。

这份报告于周一在法国巴黎发布，称必须对从农业、渔业到私人投资和治理的各个方面进行根本上的变革，以保障人类福祉。

虽然这样的警告并不是第一次，

但这份报告是迄今为止最全面、也是第一份经各国政府联合认可的评估。明年全球领袖将在中国参加《生物多样性公约》第 15 次缔约方大会，计划就生物多样性达成新的全球协

议。而这份报告中的发现必将对这些领导人产生影响。

“证据是无可争辩的，”报告编写者、生物多样性和生态系统服务政府间科学政策平台（IPBES）主席罗伯特·沃森说。“我们对生物多样性和生态系统服务的破坏已经对人类福祉构成了威胁，其严重程度不亚于人为引起的气候变化。给我们采取行动的空间越来越小，选择也越来越少。”

### 关键性发现

这份报告是数百名科学家历时3年审查了1.5万个信息源后得出的结果，揭示了自然对人类的重要性，以及其在提供食物、水、能源、药品、生计，满足人类精神文化需求方面的重要地位。报告同时也指出许多物种的数量和分布正在迅速下降，生态系统提供的储水和碳汇功能、传播种子以及授粉等服务正在崩溃。

报告称，人类“严重改变”了地球四分之三的陆地表面，并称有100万物种濒临灭绝，而且许多将在几十年内灭绝。沃森说，生物多样性的持续丧失“将有损大多数国家实现大部分可持续发展目标的能力”，联合国全体成员国承诺到2030年实现这些可持续发展目标。

气候变化会让情况恶化，一些防止全球气候变暖的努力也可能加剧这一情况。例如，IPBES称生物能源作物种植园可能会对生物多样性和生态系统服务有负面影响，而生物多样性和生态系统服务都是保障粮食和水资源安全的关键所在。

### 代价高昂的问题

报告称，生物多样性的丧失和生态系统的破坏是由一系列问题造成的，包括过度捕捞、森林砍伐、污染、农业扩张、海平面上升、不可持续的狩猎、非法野生动植物贸易、物种入侵和气候变化。报告还强调了一些重要的“间接成因”，如经济快速增长、城市化规划不善和人均消费增长。

### 聚焦中国

IPBES报告立足全球，对所有地区都进行了严格的解读。例如报告警告称，如果目前的趋势继续下去，未来几十年内自然为整个亚洲人民“贡献的经济和非货币价值可能会大幅下降”。中国有着多样化的自然景观且发展迅速，因此报告中描述的许多问题和潜在解决方案在中国都有体现。

近年来中国建立了多个保护区，森林面积大大增加，但中国同时也面临着严峻的养护挑战，尤其是旱地、湖泊、河流和沿海湿地的养护。目前沿海湿地的面积已经不足原来的一半。这些挑战包括过度开发、污染、采掘业和物种入侵，IPBES称这些都是“中国社会发展和生态安全面临的主要生态威胁”，为应对这些威胁，每年中国将耗费170亿美元。

### 消失的作物品种

根据IPBES的数据，1900年以来危害中国农业生态系统的入侵物种数量以每年约3种的速度增加，过去15年间的增长速度更是有所加快。物种入侵是一个巨大的威胁，尤其是对堪称作物多样性宝库的中国1.93亿个小型农场来说。生物多样性也受到了经济力量的威胁，为了满足市场需求，许多自给农业正在被商业化的单一种植取代，传统作物品种和相关农业知识的丧失导致人类适应气候变化过程中至关重要的选项越来越少。

“这是对整个传统农业体系的可持续性和抵御气候变化能力的威胁，”中国科学院农业政策研究中心的宋一青说，但他同时也表示由于收入增加、食品安全问题日益严峻、人们对环境问题愈发关注，中国对食品的安全、优质、多样化的需求也越来越大。“这是好消息，也是保护作物的生物多样性和改善农民种子系统的机会，”他说。

### 来一场革命

只有“转型性变革”才能确保到2050年及之后支持人类生命的自然系统不会进一步衰退，”报告称。“所谓转型性变革”，沃森说，“指的是技术、经济和社会因素的根本性

近年来中国建立了多个保护区，森林面积大大增加，但中国同时也面临着严峻的养护挑战，尤其是旱地、湖泊、河流和沿海湿地的养护。

的系统重组，包括范式、目标和价值观。”

此外，报告还呼吁以优化粮食、能源和水资源的生产使用方式，提高自然资源决策和治理的包容性，建立新的私人投资框架，以及环境保护的激励措施。报告敦促各国政府确保将生物多样性纳入从卫生到住房、从国防到金融所有领域的政策考量之中，并举例说明了保护和可持续利用生物多样性的有效政策、做法和治理结构。

## 学习中国

IPBES 重点提到的一个例子是中国的坡地改造计划（也称退耕还林），这是世界上最大的造林活动。该计划通过向农民支付一定费用，鼓励他们在自己土地和退化的土地上植树。该计划目前已经让 1500 多万公顷的退化农田和 1700 万公顷贫瘠山地覆盖上了自然植被。但在地方层面上，结果有些喜忧参半。

“这些数字确实很大了——400 亿美元，修复 3000 多万公顷土地，约 3200 万家庭参与其中。”总部位于印尼的国际林业研究中心的高级研究员西姆拉尔·巴拉尔说。“这是一项巨大的修复工作，许多国家都可以学习。它告诉我们，只要有经济

激励措施，就有可能恢复退化和边缘的土地。”他指出，尽管该项目在保持水土和防止山体滑坡等方面带来的益处是地方性的，但种植这么多树木所实现的碳储存效益惠及的却是整个地球。

## 前路

在中国工作过几十年的密歇根州立大学系统整合与可持续发展研究中心教授刘建国（音译）比较乐观。“已经发生了巨大的变化，”他说。“政府越来越重视环境问题，这当然是非常积极的，但仍有挑战需要应对。”

刘建国指出，过去政府官员的绩效考核主要是看国内生产总值（GDP），不考虑环境绩效。“GDP 越高，晋升的机会越大，”他说。“现在是环境 and 经济绩效都要看，如果环保方面表现不好，会受到处罚，不能晋升。”刘建国说希望这种方法“在全国范围内推广、实施和执行。”

## 新的全球协议

明年联合国《生物多样性公约》（CBD）第 15 届缔约方大会将在昆明举行。届时，中国在保护自然方面所做的努力将受到万众瞩目。即将召开的大会上，近 200 个国家的政

府代表将商定一个新的十年框架，以遏制生物多样性的丧失和保护生态系统。这可能会是一次沉重的会议，代表们将确认全球在达成 2010 年制定的“爱知目标”方面几乎没有进展。IPBES 报告表明，20 个“爱知目标”中的大多数都将无法实现。

“IPBES 全球评估告诉我们，我们做了多少，进展到哪里，哪里做的还不够，为什么不够，以及有哪些前进的选择，”《生物多样性公约》执行秘书克里斯蒂亚娜·帕什卡·帕尔默说，并表示报告的“贡献是不可估量的”，它将有助于在 2020 年后的全球生物多样性框架之下制定雄心勃勃且可实现的目标。

“评估还表明，政府无法单独应对生物多样性面临的威胁。”帕什卡·帕尔默说。“事实上，评估强调了转型性变革的迫切性，从而保卫大自然和决定着世间万物生死存亡的生态系统服务。这就需要每个人——包括企业、社区和个人——都参与其中，我们要为未来十年更加雄心勃勃的生物多样性议程奠定基础。”

迈克·沙纳罕，记者，自由撰稿人，致力于气候变化和生物多样性等环境议题



# Human wellbeing threatened by ‘unprecedented’ rate of biodiversity loss

Major UN report warns 1 million species are at risk of extinction

□ Mike Shanahan



*China has returned 17 million hectares of barren mountainous wasteland to natural vegetation*

Nature loss is accelerating worldwide at an unprecedented rate, with grave impacts for human wellbeing, according to a major report approved by more than 130 of the world's governments.

The report, launched in Paris, France on Monday, says fundamental changes are needed to everything from farming and fishing to private investment and governance to ensure the benefits continue to flow.



While such warnings have been heard before, this is the most comprehensive assessment to date, and the first that governments have come together to endorse. The findings are set to influence world leaders who are meeting in China next year, aiming to reach a new global agreement on biodiversity.

“The evidence is incontestable,” said Robert Watson, chair of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which produced the report. “Our destruction of biodiversity and ecosystem services has reached levels that threaten our wellbeing at least as much as human-induced climate change. We have a closing window of opportunity to act, and narrowing options.”

## Key findings

The report is the result of three years of work by hundreds of scientists who have reviewed 15,000 sources of information. It shows how nature is crucial to humanity, providing food, water, energy and medicines, as well as livelihoods and cultural and spiritual fulfilment. But it shows too that many species are fast declining in range and numbers, and that the services ecosystems provide, such as water and carbon storage, seed dispersal and pollination, are breaking down.

Humanity has “severely altered” three-quarters of the planet’s land surface, it says, adding that one million species are threatened with extinction, many within decades. Watson said the continued loss of biodiversity “will undermine the ability of most countries to achieve most of the Sustainable Development Goals”, which all UN member states have pledged to achieve by 2030.

While climate change will make all of this worse, so too

could some efforts to prevent global warming. IPBES says, for example, that plantations of bioenergy crops can have negative impacts on biodiversity and on ecosystem services that are key to food and water security.

## Costly problems

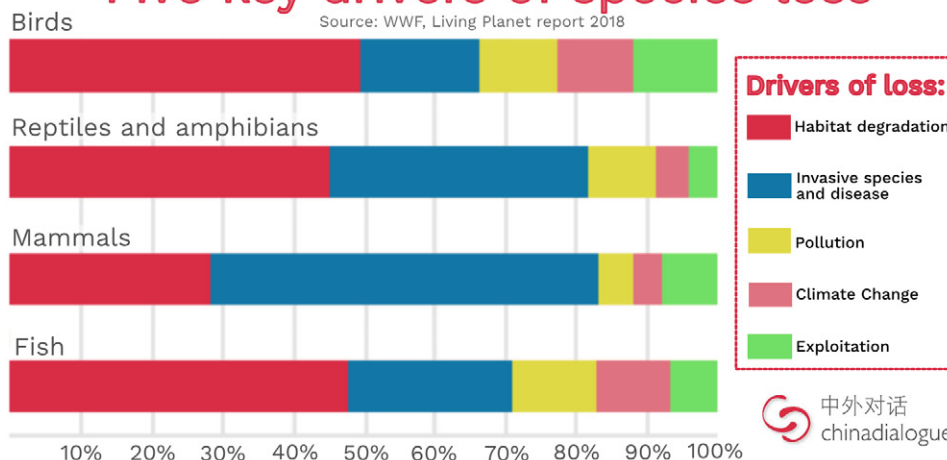
The report says biodiversity loss and ecosystem destruction is being driven by a litany of problems including overfishing, deforestation, pollution, agricultural expansion, rising seas, unsustainable hunting, illegal wildlife trade, invasive species and climate change. It also highlights important “indirect drivers” such as rapid economic growth, poorly planned urbanisation and rising per capita consumption.

## Spotlight on China

The IPBES report is global in scope and makes grim reading for all regions. It warns, for instance, that if the current trends continue “there could be a substantial decline in the economic and non-monetary value of nature’s contributions” to people across Asia in coming decades. With its diverse landscapes and rapid development, China exemplifies many of the problems and potential solutions IPBES describes.

The country has established many protected areas and greatly increased its forest area in recent years. But it also

## Five key drivers of species loss



faces significant conservation challenges, particularly in its drylands, lakes, rivers and coastal wetlands, of which less than half of the original area remains. These include overexploitation, pollution, extractive industries and invasive species, which IPBES has said are “key biological threats to China’s social development and ecological security”, costing US\$17 billion each year.

### Vanishing crop variety

According to IPBES, the number of invasive species harming China’s agricultural ecosystems has been growing by about three species a year since 1900, with a faster rate of increase in the past 15 years. This is a huge threat, particularly to China’s 193 million small farms, which are living repositories of crop diversity. That biodiversity is also threatened by economic forces. In response to market demand, many subsistence farms are being replaced by commercial monoculture. The loss of traditional crop varieties and associated local farming knowledge is removing options that could be crucial to efforts to adapt to a changing climate.

“This is a threat to the sustainability and resilience of the whole traditional farming system,” said Yiching Song, of the Centre for Chinese Agricultural Policy of the Chinese Academy of Sciences. At the same time however, said Song, there is growing demand in China for safe, good quality and varied food because of rising incomes, food safety issues and increasing concern for the environment. “This is good news and an opportunity for crop biodiversity protection and farmer seed system enhancement,” she said.

### Bringing about a revolution

Only “transformative change” can prevent further declines in humanity’s natural life-support systems by 2050 and

Now government officials are evaluated by environmental and economic performance.

beyond, says the IPBES report. “By transformative change,” said Watson, “we mean a fundamental, system-wide reorganisation across technical, economic and social factors, including paradigms, goals and values.”

Among other things, the report calls for better ways of producing and using food, energy and water, more inclusive decision-making and governance of natural resources, new frameworks for private investment and incentives for environmental protection. It urges governments to ensure that policies in all areas from health to housing, from defence to finance, take account of biodiversity. And it gives examples of effective policies, practices and governance structures to conserve and sustainably use biodiversity.

### Learning from China

One example that IPBES highlights is China’s Sloping Land Conversion Program (or Grain for Green), the world’s largest reforestation effort. By paying farmers to plant trees on their land and providing degraded land to rural families to restore, it has transformed more than 15 million hectares of degraded agricultural land and 17 million hectares of barren mountainous wasteland to natural vegetation. Though at a local level some results have been more mixed.

“The figures are really big – US\$40 billion spent, over 30 million hectares of land restored and some 32 million households engaged,” said Himlal Baral, a senior scientist at the Center for International Forestry Research, based in Indonesia. “This is a great restoration effort and many countries can learn lessons from this. It shows that if you put in economic incentives, there is potential to restore degraded and marginal land.” He noted that while some of the programme’s benefits such as soil and water conservation and landslide protection are local, the carbon storage achieved by planting so many trees benefits the whole planet.

### Ways forward

Having worked in China for several decades, Jianguo (Jack) Liu, a professor at the Center for Systems Integration and

Sustainability at Michigan State University is hopeful. “Enormous change has already taken place,” he said. “The government has increasingly paid attention to the environment. That is very positive, of course, but there are still challenges to be addressed.”

Liu pointed out that, in the past, assessments of government officials were based on gross domestic product (GDP) and took no regard of environmental performance. “The higher the GDP, the more likely someone would be promoted,” he said. “Now, they are evaluated by environmental and economic performance. If you have had a bad environmental record, you will be punished and will not be promoted.” Liu said he would like to see this approach “scaled up, implemented and enforced nationwide.”

## A new global deal

All eyes will be on China’s efforts to conserve nature next year, when Kunming, the capital of Yunnan province in southwest China, hosts the 15th Conference of the Parties to the UN Convention on Biological Diversity (CBD). Representatives of nearly 200 governments will meet there to agree a new 10-year framework to halt biodiversity loss

and protect ecosystems. It could be a sombre meeting, as delegates will confirm that progress towards the last agreed targets, set in Aichi, Japan, in 2010, has been abysmal. The IPBES report suggests that most of the 20 Aichi targets will be missed.

“The IPBES Global Assessment tells us how much we have achieved, where we are on track, where we are not, why, and what the options are for moving forward,” said the CBD’s executive secretary, Cristiana Paşca Palmer, who added that it will make an “invaluable contribution” to the process of setting ambitious, achievable targets in the post-2020 global biodiversity framework.

“The assessment also shows that threats to biodiversity cannot be addressed by governments alone,” said Paşca Palmer. “In fact, it underscores the urgent need for transformational change to safeguard nature and the ecosystem services that underpin all life. This requires everyone to get involved – including businesses, communities and individuals – as we lay the foundations for an even more ambitious biodiversity agenda for the next decade.”

*Mike Shanahan is a freelance writer and journalist, specialising in environmental issues such as climate change and biodiversity loss.*

# 打击濒危海洋物种贸易，难在哪里？

将海洋濒危物种纳入国际贸易管制范围只是第一步，相应的执法行动还需跟上。

□ 张 春

今年1月，在罗马举行的联合国粮农组织（FAO）的一次会议上，来自世界各地的科学家们讨论了是否需要将又一种鲨鱼列入“华盛顿公约”（CITES）的贸易管制名录，却因证据不足而作罢。

但会议结果难以否定鲨鱼生存普遍受到威胁的处境。作为一种传统美味，全世界有一半被消费的鲨鱼鱼翅，或者最终消失在香港这个弹丸之地，或者在这里停上一段时间，随后去往最终的目的地。这些鱼翅，大多来自易危甚至濒危的鲨鱼

种群。3月底，“中外对话海洋”在香港这个全球海洋濒危物种贸易枢纽之地举办研讨会，探讨濒危海洋物种保护之道。

会上，专家认为推动物种加入CITES名录只是第一步。要实现对物种的有效保护，还需要更多贸易相关环节的有效协作。

## 海洋生物进入“抢救名单”

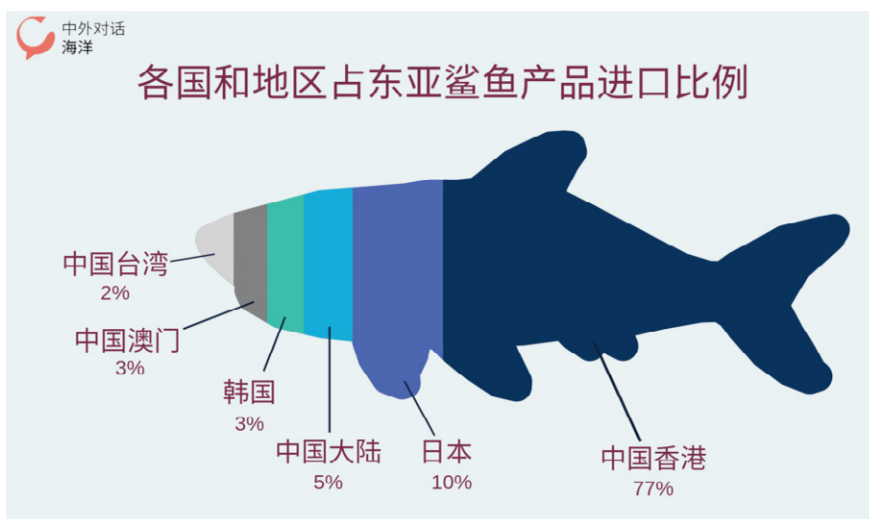
CITES是管制濒危物种跨境贸易的国际公约，于1975年生效。它

的三个附录，列入了因受贸易威胁需要专门跨境贸易管制的物种，其中附录一物种完全禁止国际贸易。

海洋物种在CITES框架下受到管制是相对近期的事。除了石首鱼等在1975年第一批列入的物种，直到2002年，在CITES公约生效二十多年后，才有新的海洋物种海马被列入，更多的海洋物种要到2010年之后才会被CITES和各国关注到。

消费与贸易是很多海洋物种逃不过的劫，苏眉鱼等物种就被“吃”进了CITES名录。按照CITES流程，原产国如果认为某物种已经符合进入CITES名录的条件，并需要他国协助限制其国际贸易，就可提出提案。随后，相关科学家将会对贸易是否真的威胁到该物种的野外存续进行评估，并在缔约方大会（COP）上对提案进行表决。

香港大学生物科学学院教授薛雯琦（Yvonne Sadovy）认为，将受威胁物种加入CITES公约名录，限制其贸易，对该物种保护十分重要。薛雯琦研究海洋生物已有数十年，她主要研究的珊瑚礁鱼类有不少面临过度捕捞的威胁。



数据来自海关统计，由TRAFFIC前东亚总协调人Joyce Wu整理提供。



不过，确认一个物种受到威胁并不容易，尤其当它一直被当作“食物”看待。中国濒危物种科学委员会主任助理曾岩指出，FAO 会参与 CITES 提案物种的评估，但它对经济性鱼类列入一直不太支持。“原来

有提案要把蓝鳍金枪鱼列入 CITES 名单，但是后来没有通过，”薛雯琦说。蓝鳍金枪鱼是日本寿司原料，随着日本料理在全球风靡，这个公认的“顶级食材”得到了越来越多的追捧，种群数量也随之下降。一些

蓝鳍金枪鱼亚种虽然在 IUCN 红色名录中被列为“极危”，但并未进入 CITES 名单。

而在中国，“除了列入国家野生动物保护名录的物种，其他的水生物种都是在《渔业法》下作为经济性资源进行管理的，”曾岩说。中国《渔业法》现有版本中没有要求对上岸渔获进行登记，导致根本无法确认某些鱼类的存量，更无法进行可持续管理。“很多发展中国家在管理这块资源方面存在很大挑战，因为这涉及到很多渔民的生计，”薛雯琦说。

## 执法难题

一个物种进入了 CITES 名录，是不是就进入了执法者的雷达范



香港的鱼翅批发商



3月底，“中外对话海洋”在香港举办的研讨会与会人员合影

围？理论上是这样的，因为按规定接受 CITES 管制的物种进出口，受到进出口国家严格的管制。但这仍难挡非法贩运。

“大概只有 10%（甚至更少）的非法贩运会被罚没或截获。”ADM Capital 基金会（ADM Capital Foundation）环境项目主任古素芬（Sophie Le Clue）介绍说。那些“过关”的非法商品，有些是没有被发现，有些则是没有被认出来。

走私方法多样，其中有几个问题比较难处理。一种是运输公司本身并不知道运输的是走私品，而无法协助管理部门执法，另一种是假借其他合规商品名义运输非法商品，这在集装箱运输中最为常见。至于借助小型渔船绕过正规口岸上岸，就更难监管了。

被非法贩运的物种活体或物种制品，有一部分通过肉眼可以识别它是否来自一个被管制的物种，有一些则无法识别，其中就包括各种各样的鱼翅——“你也许能用肉眼识别它们的成体，但是不同的幼体很难识别。”古素芬说。

还有不少走私品比鱼翅更难识别，例如鲸鱼牙齿、海龟壳制品、干鱼鳔、以及干鱼鳃，通常对执法人员来说，都需要借助专门技术来识别。曾岩和同事曾经花了很大的力气，去识别膨鱼鳃。

膨鱼鳃是蝠鲼的鱼鳃干品，在亚洲部分地区有将其入药的民间习俗，用于治疗麻疹、乳汁稀少等。2012 年 CITES 提案要保护前口蝠鲼，并指出其主要贸易地在中国。由

于它没有载入中国药典，中国协助履约的研究人员也对其了解不多。为了给执法人员进行培训，他们到市场上采购了 200 多个样品，通过形态结构判断、DNA 检测、并借助电脑分析判断特定种的特征，帮助执法人员判断哪些鱼鳃来自需要管制的蝠鲼。

另外，执法力度的不同也会影响贸易路径。贩卖价值约两百万的石首鱼鱼鳔，在中国内地判刑高达八年，而类似案件在香港最高刑期不超过两年。量刑差异，会让一些不法之徒选择避重就轻，走风险更小的地方走私。“只要堵上一个法律漏洞，就可以解决很大的问题。”香港大学法学院副教授韦凯雯（Amanda Whitfort）说。

## 根本问题

由于履约不到位，很多 CITES 名录中的物种仍然在减少。例如墨西哥加州湾的石首鱼，虽然从上世纪七十年代就列入了附录一，仍然持续减少，导致其最大兼捕受害者——同样生活在加湾的小头鼠海豚现在只剩下不到 30 头，濒临灭绝。

一直帮深圳海关鉴定走私品的汕头大学海洋生物学郑锐强博士认为海关执法不是问题的终极解决方案。因为事情一直在变，包括执法的对象都可能发生变化。“有海关人员透露，象牙贸易被禁止之后，在海关查到的鲸鱼牙齿突然多起来了。”郑锐强说。

这不是孤例。BLOOM Association 香港分部海洋项目总监余国豪（Stan

Shea）参与的一份调查发现，香港鱼翅消费经过多年环保倡议开始下降后，许多消费者认为可以把花胶、海参等纳入到宴席菜单中替代鱼翅。花胶（即一些鱼类的鱼鳔干制品）和海参，都同样存在濒危物种贸易问题，不过很多消费者并不知道。他们可能也不知道，为了满足亚洲市场的花胶需求，远在东非肯尼亚维多利亚湖的尼罗河鲈鱼现在也面临过度捕捞的威胁。

曾岩认为一种被管制的物种有替代品是正常的，但比起一个接一个地追着保护特定种群，更应该关注贸易和消费的根本目标——什么样的需求是合理的和可持续的。“我们需要的是更大层面的策略和框架，找到渔业和可持续保护之间的平衡点，找到更合理的解决方案。”她说。

“很多时候，大家认为中国几百年上千年的饮食偏好没有办法改变，但我觉得并不是这样的。”悉尼科技大学传播学院副教授迈克尔·法比尼（Michael Fabinyi）发现，不论是关税政策，还是市场宣传，或者人为造势，都可能会影响到一些海鲜的消费，比如中国政府的反腐行动就使得北京市场奢侈海鲜消费显著下降。

余国豪认为，是文化决定了我们会吃什么，也决定了我们的未来。‘年年有鱼’是中国人的文化。“我不希望我们这一代被后人记住，是因为我们把鱼都吃光了。”他说。<sup>⑤</sup>

张春，中外对话高级研究员

# Tackling the trade in endangered species

Trade controls crucial for conservation of ocean creatures, but face challenges

□ Zhang Chun

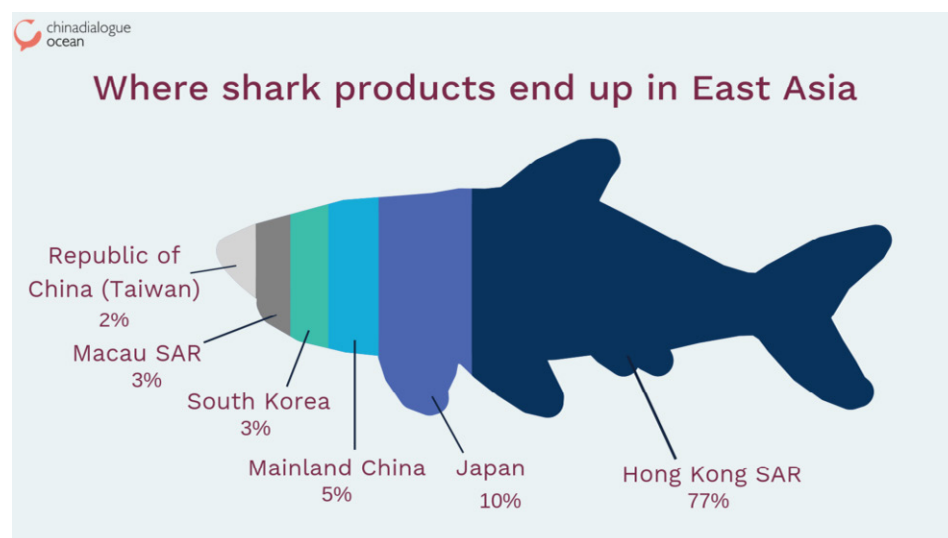
Earlier this year in Rome, scientists from around the world debated the need to control trade in the endangered shortfin mako shark. The meeting of the United Nations Food and Agriculture Organisation (FAO) was to determine if this species, along with a handful of others, should be given protection under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The decision in the end was not a positive one for the shortfin mako, with the expert panel declaring insufficient evidence to list the species. But threats to its survival, and many other shark species, remain.

Shark fin is a traditional delicacy in Hong Kong. Half of all shark fins harvested are either consumed in this tiny territory or pass through it on the way to other markets. Most of them come from vulnerable or endangered populations.

Hong Kong is a hub for the trade in a wide range of endangered marine species. In late March, chinadialogue ocean held a seminar in the territory to discuss improved protections for these animals.

Experts at the seminar agreed that a CITES listing is only a first step. More cooperation on preventing illegal trading is also needed.



Source: Customs data organized by Joyce Wu, former East Asian Director of TRAFFIC

## A hard list to get on

CITES is an international agreement controlling the trade in endangered species that came into effect in 1975. It has three appendices listing species at risk from international trade and in need of special protections. Cross-border commerce is banned for those species listed on Appendix I. The other two appendices offer lower levels of control.



Some marine species, such as the totoaba, have been listed on the CITES appendices since the beginning. But it wasn't until 2002, when all species of seahorse were given protection, that new marine animals began to be added.

Under CITES processes, if the country of origin of a species thinks it is suitable for CITES protections and needs other nations to help prevent trade, it can propose its inclusion. Scientists first assess if trade does actually threaten the survival of the species in the wild, and then there is a vote on the proposed inclusion at a conference of parties to the treaty.

Yvonne Sadovy, professor of marine biology and ecology at the University of Hong Kong, says the trade restrictions that listing on CITES allows are crucial for conservation.

But even if a species is in decline, gaining agreement that it needs protection under CITES trade controls is no easy task, especially when it's regarded as a food source.

Sadovy explains one of the reasons for this is that the majority of the 183 parties to the convention need to agree before a proposal can be accepted.

An example is the bluefin tuna. A proposal to ban the trade in a sub-species, the Atlantic bluefin, was put forward in 2010, and rejected by 68 votes to 20, with 30 abstentions.

The bluefin is widely used in sushi, and as demand has increased with the spread in popularity of Japanese cuisine, populations have fallen. The Atlantic bluefin is considered endangered, just one of the three sub-species on the International Union for Conservation of Nature's (IUCN) Red List. No bluefin tuna are currently listed in on any CITES appendices.

But things are changing. According to Sadovy, acceptance is growing that trade in a small number of threatened marine species needs to be controlled to within sustainable levels. "The need for more attention to manage fisheries is growing

all the time. We have no choice, without management, one by one species will decline, the most vulnerable ones first," she said.

### A hard trade to control

In theory, a CITES listing should put a species on the radar of law enforcement agencies, as the treaty calls for strict controls on imports and exports. But that doesn't stop smugglers.

Sophie Le Clue, director of environment at the ADM Capital Foundation, estimates that only 10% of smuggled species are confiscated or interdicted. The remainder is either not discovered or not identified, she said.

Smugglers have a range of methods, some very hard to tackle. The firms transporting the goods may not even be aware of what they are carrying, making them unable to help the authorities. Illegal goods may also be labelled as legitimate products, a method that is particularly common in containerised shipping. It is even harder to monitor small fishing vessels, which can land cargoes away from official ports.

For the authorities, identification is a major challenge. Some illegally smuggled species can be identified by eye, whether as live specimens or as products. But some, including shark fin, are harder to spot. According to Le Clue, you might be able to identify fins taken from adult sharks, but it's hard to determine the species of a fin taken from a juvenile.

For other smuggled animal products, such as the teeth of cetaceans, turtle shell products or dried fish swim bladders and gills, identification often requires special technology.

Manta ray gills have been a particular focus for staff at China's CITES Endangered Species Scientific Commission. Both species of this giant ocean creature were listed by CITES in 2014, with China named as the centre of trade.

Dried manta ray gill is used as an ingredient in traditional medicines in parts of Asia, allegedly to treat measles and increase the production of breast milk. In China, it is not officially listed as a medicinal ingredient, which means that although it is used, it is not widely known. To help enforce

**When ivory trading was banned, the number of cetacean teeth being smuggled increased.**



the new trade restrictions, the commission's researchers purchased over 200 samples of medicines for analysis and DNA testing. They were then able to teach law enforcement officials how to identify products containing the organ.

Smugglers also choose their routes to avoid harsher punishments. Selling totoaba swim bladder worth two million yuan (US\$297,340) can incur an eight-year jail sentence on the Chinese mainland, but no more than two years in Hong Kong. This means Hong Kong is a less risky, and so more popular, destination for smugglers. For Amanda Whitfort, a professor at the University of Hong Kong's Faculty of Law, blocking that loophole would solve a major issue.

## A hard problem to pin down

Although smuggling is a serious issue, failures to implement the CITES treaty are also central to the continued decline of many listed species. The totoaba of Mexico's Gulf of California has been on Appendix I since the 1970s, but populations are still falling. This has had a significant impact on a species of porpoise that shares its habitat with the totoaba – the vaquita is now facing extinction with fewer than 20 mature individuals left in the wild.

Zheng Ruiqiang of Shantou University's Marine Biology Institute helps customs officials identify smuggled species. But he says even effective enforcement at the border is not a lasting solution, as the situation is constantly changing. "Customs officials have reported that when ivory trading was banned, the number of cetacean teeth being smuggled increased," he said.

That isn't an isolated case. An investigation by Stan Shea, marine projects director for the Bloom Association's Hong Kong branch, found that while shark fin consumption has started to fall in Hong Kong after years of campaigning,

many diners think it is acceptable to replace it with swim bladder or sea cucumber. They are unaware that these choices again result in the trade in endangered species, or that the demand for fish swim bladder, for instance, is leading to overfishing of the Nile perch in East Africa's Lake Victoria.

Zeng Yan, assistant to the director of China's CITES commission, thinks it is normal for a banned product to be replaced with an alternative. She says that rather than spending time protecting species after species, it would be better to look at the underlying motivations driving trade and consumption, and ask what is reasonable and sustainable. "We need wider-ranging policies and frameworks to find a balance between the fishing industry and sustainable conservation and find a better solution," she said.

According to Michael Fabinyi, associate professor at the University of Technology Sydney's School of Communication, people often think that China's eating habits are centuries old and can't be changed. "I don't think that's necessarily the case," he said. He has found that food consumption can be affected by things like tariffs and marketing, as well as what might at first appear to be unrelated changes. Recent anti-corruption campaigning by the Chinese government, for instance, has led to a significant drop in the consumption of luxury seafoods in Beijing.

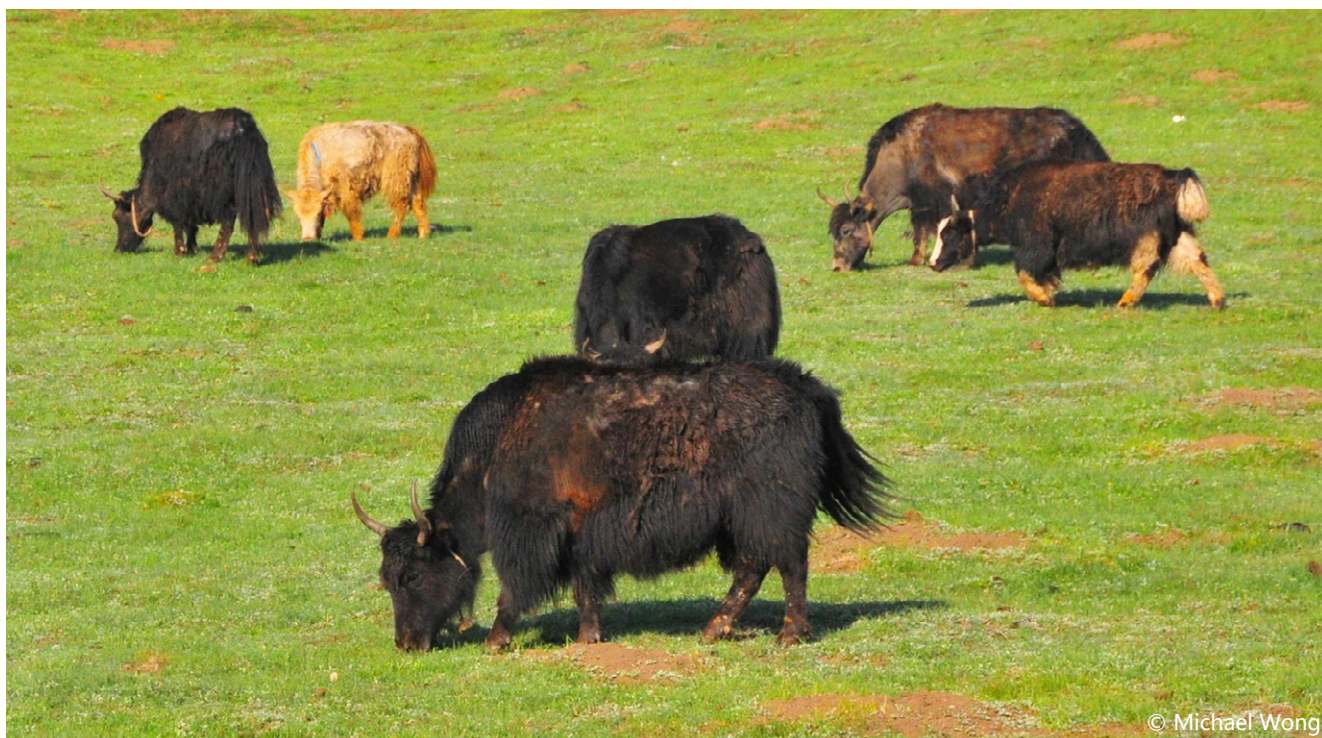
According to Stan Shea, culture determines what we eat, and also our future. For the Chinese, fish on the table symbolises a plentiful supply of food. "I don't want to be remembered as the generation that ate it all," he said. ☺

*Zhang Chun is a senior researcher at chinadialogue.*

# 若尔盖的湿地大修复

湿地修复让牧民受益匪浅，但如何确定草原生态系统的畜牧承载力？

□ 弗雷德·皮尔斯



若尔盖草原上的牦牛

**牦**牛在这片终年大风的高原上悠哉游哉的生活着。有时一眼望去，我能看到上千头牦牛。被藏民奉为神鸟的黑颈鹤也在中国西部青藏高原的这片边缘地带繁衍生息。这里海拔 3400 米以上，是黄河的发源地，同时也是世界上最大的高山湿地之一。尽管这里的湿地修复工

作成绩斐然，但除了牦牛和黑颈鹤这些见证者之外，鲜有人注意。

上世纪六七十年代，四川北部广袤的若尔盖草原上曾因错误的建议挖掘了很多排水沟。如今，这些排水沟已经被填堵上了。泥炭沼泽的“复湿”对自然和牦牛牧民来说都是好消息。牦牛作为一种长毛耐

寒动物，在这片并不宜居的土地上繁衍壮大，不仅为人类提供牛奶、牛肉、牛皮，而且可以作为运输工具，粪便也可用作燃料。

但当地生态学家认为，目前，这一地区的牦牛数量太多了。

面对城里人对牦牛产品的旺盛需求，牧民不断扩大养殖规模。可



是，他们又被告知为了维持草原的恢复，必须减少牦牛数量。当地政府的处境很微妙——既要维护若尔盖的生态系统，又要让西藏的牦牛文化存续下去。

## 大干涸

若尔盖草原面积 2.7 万平方公里，其中大部分是厚达 10 米的泥炭沼泽，这些沼泽为数百万头牦牛提供着给养，对全国的水文也至关重要。若尔盖草原泥炭沼泽位于长江和黄河这两大河流的源头，旱季时黄河上游 45% 的水都来自这里。

上世纪六、七十年代，为了提高若尔盖的畜牧能力，人们在这里挖沟排水，开沟达 700 多公里，导致若尔盖沼泽地区的水位降低了近 50%，给这个巨大的天然水库带来了巨大的威胁。

这些排水沟引发了一场生态危机。随着水位下降，茂盛的草原被旱生植物所占据，涌入排水沟的水造成

了前所未有的土壤侵蚀。草原上的 17 个湖泊中有 6 个完全干涸。这里的沼泽就像海绵一样，过去一直不断地给黄河提供着稳定的补给，而后来变得高峰期流量增多，关键的旱季流量却减少了，从而给黄河两岸华北粮食产地直至入海口的供水带来了威胁。

## 湿地大修复

由于担心发生水文灾害，在总部位于荷兰的“湿地国际”等国际环保组织的谏言下，中央政府开始介入草原管理工作。1999 年，政府下令禁止进一步排水，并设立了包括若尔盖自然保护区在内的 5 个自然保护区。负责这里大部分监管工作的四川湿地管理中心的顾海军说，2004 年开始填堵排水沟后，若尔盖草原逐渐变成了世界上最大的湿地恢复项目所在地，恢复高原湿地面积约 64 平方公里。

1 月的若尔盖之行让我看到了许多成功修复的区域。那些排水工

程的小型水坝几乎都被新的泥炭和及膝高的植被淹没，草原上最大的湖泊——花湖的面积已经增加一倍，达 6.9 平方公里。

藏族人鲁克(音译)11 年来一直在国家自然保护区守护花湖。他在岸边告诉我，花湖重新焕发生机引来了鸟类的回归，这里也日益成为夏季旅游胜地。他还说，夏季湖边聚集的 200 多种鸟类，最令人激动的是，其中黑颈鹤的数量占全球总量的十分之一。

鲁克的主要任务就是保护在这里筑巢的数千对黑颈鹤。黑颈鹤已经成为当地保护活动的标志。当地乡镇的很多建筑物都以其形象为装饰，数量之多一点也不亚于当地大量的传统天然标志物——牦牛角。

## 以牦牛为中心的生态系统

随着工作的深入，国家自然保护区的工作人员称，全面恢复若尔盖需要的不仅仅是封堵排水沟。虽然牧场状况有所改善，但大家的观点都很一致，那就是牦牛太多了——目前的数量是 50 年前的 4 倍。

问题是多少才算太多？“这取决于你问谁，”顾海军说。

一些环保主义者想让牦牛彻底从这里消失。“保护区最初的想法是彻底停止放牧来保护这里的生物多样性，”国家自然保护区副主任永秀(音译)说。但现在的想法又不同了。一项在 200 公顷的围挡区内进行的为期 3 年的禁牧实验表明，禁止放牧可能不是正确的解决办法。

围挡区看起来很壮观，即便在冬天也长满了披碱草这样高大的草类，但它们挤占了矮草、药草和莎



若尔盖自然保护区内的黑颈鹤

© Dave Curtis

草的生长空间。其中，莎草经常被黑颈鹤用来筑巢。“我们需要牦牛来维持生物多样性，”永秀总结说。

外国湿地生态学家对此表示认同。德国格赖夫斯瓦尔德大学的汉斯·朱斯滕表示，生态系统不可能回到没有牦牛之前的状态。几千年来的牦牛放牧和踩踏已经让沼泽草原发生了不可逆转的变化。结果是出现“一片被认为是美丽的自然和文化遗产的新景观……世界上最震撼人心的开放景观之一”。

### “牦牛是藏人命之所系”

目前保护区内每公顷土地上平均有超过 10 头牦牛和羊，是估计承载力的数倍。这一数字应该减少多少目前还没有答案。永秀说，生态可能不是唯一的决定因素，文化也很重要。

“牦牛是藏人的命，”她说。“牦牛提供了我们所需的一切。牦牛角是我们身份的象征，是藏传佛教的圣物。牦牛意味着地位，现在仍被视为财富的标志。”

草原上的地方政府希望为牧民提供其他生计，旅游就是其中之一。红原县有一个大型游客中心，每年 8 月都会举办牦牛音乐节。这里曾是 1935 年红军长征路上一个重要的落脚点，游客可以走上瓦切湿地的木板路，沿着“红军长征体验大道”走一遭。县里还在沿路设立了一些摊位，牧民们可以在这里为游客提供牦牛奶、骑马等商品和服务。

牧民还有机会成为护林员。红原县雇佣了 1000 多人，负责巡逻发现草原上的入侵者、维护围栏、以及照顾野生动物。自然保护区也在做同样的事。



西藏的牦牛牧民

我就遇到了一位护林员。尚特(音译)是个地地道道的藏民，穿着御寒的传统藏袍，外套的长袖子几乎垂到地面，即便不戴手套，双手也不会受冻。尚特说他家还养着 50 头牦牛，但也提到他热爱自己照看的野生动物：藏羚羊、在草丛里玩耍的幼狼以及在“他的”溪边住着的 6 对黑颈鹤。

往日不可能重来。现在大多数牧民都骑着摩托而不是马去照料动物，住在城镇边缘的房子里，而不是帐篷里，他们的孩子会上学，很多还上了大学。

市场力量也是他们日常生活的一部分。养牦牛可以赚钱。一头 4 岁的健康牦牛卖肉能够赚大约 750 美元。中国城市居民喜欢瘦牦牛肉和酸奶等乳制品，这些被认为是绿色有机食品。

### 牧民最清楚

永秀相信，修复泥炭湿地的方法是延续和适应西藏的文化传统。她说：“我们需要在保护和生计之间取得平衡，怎么实现牧民最清楚。”长期从事

该地区牧场管理研究的耶鲁大学人类学者高煜芳说，牧民给了他信心。

上世纪 80 年代政府推行农业集体化改革，若尔盖草原上的放牧权下放到牧民个人。他们用围栏把原先开阔的草场变成了一个迷宫。但事实证明，这种做法让草原深受其害。集体农业草原优化利用的方法已经丢失，高煜芳说。

我开车穿过草原的时候，常常会看到围栏的两边，一边因过度放牧而光秃秃的，另一边却牧草茵茵。这种隔离对环境和牧民而言都没有意义。

牧民们已经意识到这个问题，我遇到过好几个牧民把牧群集中起来，并且拆掉围栏。一些政府官员也支持这么做，高煜芳说。

我离开时，西藏的寒风愈发凛冽。在黄河上游的圣地唐克附近，一群牦牛走过激起尘土飞扬，不远处则有另一群在冰上踉跄着觅食。一边是充沛的水源，一边是不断逼近的沙漠，这种对比显得尤为奇特。

弗雷德·皮尔斯，英国自由记者、自由撰稿人，同时也是耶鲁 360 的常驻作者



# The great rewetting on the edge of the Tibetan plateau

Herders benefit from a vast effort to restore wetlands.  
But how many yaks is too many for the Zoigê grassland ecosystem?

□ Fred Pearce



*Yaks observed en route to Tibet*

The yaks are in clover. At times I could see more than a thousand in a single view across the windswept plateau. Black-necked storks, a bird revered by Tibetans, are also proliferating on the edge of the Tibetan highlands in

western China. Both are testimony to a remarkable but little noticed restoration of one of the world's largest alpine wetlands, over 3,400 metres up in the headwaters of the Yellow River.

Ill-advised drains dug during the Cultural Revolution have been blocked across the sweeping grasslands of the Zoigê (also known as Ruogergai) plateau in northern Sichuan. The “rewetting” of the peat bogs is a good-news story both for nature and yak herders, whose hairy and hardy animals prosper in the inhospitable terrain, providing milk, meat, hides, hair, transport and fuel in the form of dung.

But local ecologists say there are now too many yaks.

Herders tempted by buoyant urban markets for yak produce to increase their numbers are being told they must reduce them in order to sustain the recovery of the grasslands. The authorities face a delicate balancing act – sustaining the Zoigê ecosystem, while allowing Tibetan yak culture to persist.

### The great drying out

The Zoigê plateau covers 27,000 square kilometres, much of it consisting of peat bogs up to 10 metres thick. The bogs provide grazing for millions of yak, and are vital to the nation’s hydrology. They sit at the head of China’s two biggest rivers, the Yangtze and the Yellow River. In the dry season, 45% of the water in the Yellow River’s upper reaches comes from the plateau’s peat.

This great natural reservoir was threatened during the 1960s and 1970s, when cadres attempted to boost the plateau’s capacity for livestock by digging more than 700 kilometres of drains to dry out the wetter pastures. They lowered water levels across almost 50% of the boggy plateau’s peatlands.

The drains unleashed an ecological crisis. As water levels fell, lush grasses turned to dry scrub and water rushing into the drains caused unprecedented erosion. Of the plateau’s 17 lakes, six dried out entirely. The boggy sponge that had provided a constant supply of water into the Yellow River delivered more peak flow but less of the critical dry-

season flow, threatening water supplies in China’s northern breadbasket all the way to the ocean.

### The great rewetting

Fearing a hydrological disaster, and encouraged by outside conservation groups such as the Dutch-based Wetlands International, Beijing stepped in. In 1999, the government banned further drainage and created five nature reserves on the plateau, include the Zoigê National Nature Reserve. From 2004, it began plugging up the drains, gradually turning the Zoigê plateau into the scene of one of the world’s largest wetland restoration projects, with some 64 square kilometres of plateau rewetted, says Gu Haijun of Sichuan Wetlands Management Centre in Chengdu, who oversaw much of it.

My tour of the plateau in January saw many successfully restored areas. The small dams were often all but submerged by new peat and knee-high vegetation. The plateau’s largest water body, Lake Hua, had doubled its surface area to 6.9 square kilometres.

On the lake’s shore, Ruke, a Tibetan who for 11 years had superintended the lake for the national nature reserve, said its revival had triggered a resurgence of birdlife in an area increasingly seen as a summer tourist attraction. Most excitingly, he said, the 200-plus bird species that congregated near the lake in summer included a tenth of the world population of black-necked cranes.

Protecting the thousand nesting pairs was Ruke’s main task. They have become the symbol of conservation in the area. Buildings in local towns are decorated with almost as many images of the birds as of the more traditional local icons of nature’s bounty, yak horns.

### The yak-defined ecosystem

While the recovery continues, the staff at the national nature reserve say full restoration of Zoigê will require more than plugging the drains. Despite the improvements to their grazing grounds, everyone agrees that there are too many yaks – four times as many as half a century ago.

**Yaks bring status. They are still seen as an indication of a person’s wealth.**

How many is too many? “It depends who you ask,” says Gu.

Some conservationists would like to remove them all. “The original idea at the reserve was to totally stop grazing, to protect its biodiversity,” said Yong-Xiu, the deputy director at the national nature reserve. But now there are second thoughts. A three-year-old experiment with banning all grazing from a 200-hectare enclosure suggests that might not be the right solution.

The fenced-off area looks magnificent. Even in the midst of winter, tall grasses such as Dahurian wildrye, are everywhere. But the tall grasses are crowding out shorter grasses, herbs and the sedges favoured by black-necked cranes for nesting. “We need the yaks to maintain the biodiversity,” concludes Yong-Xiu.

Foreign wetland ecologists agree. Hans Joosten of Greifswald University in Germany says there is no going back to a pre-yak ecosystem. The boggy grasslands have been changed irrevocably by thousands of years of yak

grazing and trampling. The result is “a new landscape that is recognized as a beautiful natural and cultural heritage... one of the most impressive open landscapes in the world”.

### ‘The yak is life for the Tibetans’

There are currently more than ten yak and sheep per hectare on the reserve, several times the estimated carrying capacity. How much this should be reduced by remains an open question. Ecology might not be the only deciding factor, said Yong-Xiu. Culture matters too.

“The yak is life for the Tibetans,” she said. “It has always provided everything. The yak horn is a symbol of our identity and is revered in our Buddhist religion. Yaks bring status. They are still seen as an indication of a person’s wealth.”

Local authorities on the plateau want to introduce other livelihoods for herders. One is tourism. Hongyuan county



A yak herders in Tibet



has a big visitors' centre and runs a yak music festival each August. The area also exploits its history as an important stopping off point during the Long March in 1935. Visitors can take a boardwalk over the Waqie wetland, following the "Red Army's Long March Experience Avenue". Over the road, the county provides stalls where herders sell tourists anything from yak milk to horse rides.

Herders are also being offered employment as conservation rangers. Hongyuan employs more than a thousand to scour the grasslands for intruders, maintain fences and look after wildlife. The nature reserves are doing the same thing.

I met one ranger. Shangte was every inch a man of the plateau, wrapped in traditional Tibetan garb against the cold, including double-length jacket sleeves that almost dangle to the ground, keeping hands warm without gloves. He still kept his family herd of 50 yaks, he said, but spoke also of his love of the wildlife under his charge: the Tibetan gazelles, young wolves playing in the grass, and the six pairs of cranes down by "his" stream.

There is no going back to the old days on the plateau. Most herders today tend their animals from motorbikes rather than horses, and live in houses on the edge of towns rather than in tents. Their children attend schools and many go to university.

Market forces are part of their daily lives, too. Yaks are profitable. A healthy four-year-old for slaughter fetches around US\$750. Chinese urbanites enjoy lean yak meat, as well as dairy products such as yoghurt. They are seen as green and organic.

### Herders know best

Yong-Xiu believes the way to restore the peatlands is to sustain and adapt Tibetan culture and traditions. "We need a balance between conservation and livelihoods, and the herders know best how to achieve that balance," she said. Herders are underlining her faith, says Yale anthropologist, Gao Yufang, who has been researching rangeland management in the region.

When the government privatised the country's farming collectives in the 1980s, grazing rights on the Zoigê grasslands were given to individual herder families. They turned the formerly open grasslands into a maze of fenced pastures. But that has proved to be bad news for the grassland. Collective methods of optimising use of the grasses have been lost, said Gao.

Often, driving across the plateau, I saw fences dividing badly overgrazed areas from adjacent fields of lush ungrazed grass. It made no sense for either the environment or herders.

The herders have recognised the problem. I met several who had pooled their herds and torn down the fences between them. Some government officials were now giving their support, said Gao.

As I left the plateau, the bitter Tibetan wind was intensifying. Near Tangke, a holy site overlooking the Yellow River, yaks were kicking up dust, while close by others were slipping on ice in search of grasses. It was a strange contrast, in a land where abundant water and the spread of deserts persist side by side. ☞

*Fred Pearce is an author and journalist based in the UK.*



# 跨国执法能铲除花胶走私吗？

花胶非法贸易已经见证了至少三个物种的衰落，中美墨的三方联合努力能够扭转局势吗？

□ 张 春

**干**瘪，透明、泛黄、带着海水的腥气，干货店里的“花胶”看上去不过是一片晒干的鱼鳔。然而，只要看过它比毒品还高昂的价格，你就会本能地嗅出这块鱼干背后复杂的故事。

事实上，如果你看到的花胶价格出奇昂贵，那么它很可能来自一种濒临灭绝的鱼类，并且是通过非法贸易渠道来到你的面前。

据上海海关通报，3月底，一名从墨西哥返回的20岁中国籍孕妇，

由于携带一百多个加湾石首鱼干鱼鳔入境被逮捕。此前一年，同样在上海被抓获的两名花胶走私者已分别被判处七年和八年有期徒刑。

自2018年来，在五起有公开报道的中国海关查获石首鱼鱼鳔走私案件中，共有32人被捕，其走私货物总价值超过3亿元人民币。这既反映出中国和墨西哥、美国联手对这一非法贸易链进行打击的效果，也让人惊叹这小小的鱼鳔牵扯的巨大利益。

## 花胶贸易背后的物种衰亡史

干货市场上的花胶，不是某种特定的鱼鳔，它是所有用于“滋补”的干鱼鳔的统称。但根据来源鱼种不同，花胶的价格差异很大，一斤花胶的价钱从几百块到数十万不等。这种昂贵的食物，是包括中国南方在内一些亚洲地区的传统滋补品。

花胶的贸易同时也是一部野生鱼类的物种衰亡史。加湾石首鱼甚至不是第一个受害者。中国传统上最“顶级”的“黄唇鱼”（金钱鳘）鱼鳔才是最正宗的花胶，其价比黄金，号称金钱胶。不过，由于过度捕捞等原因，原本栖息在中国东南部海域的黄唇鱼几十年前就开始衰落，如今已经很少能见到。黄唇鱼早在1989年就被列入中国二级保护动物禁止国内贸易，又因数量持续减少在2006年入列IUCN红色名录极危物种。

在黄唇鱼销声匿迹后，栖息在遥远的墨西哥加州湾的加湾石首鱼成为了花胶商人新的目标，延续了这种石首鱼接近一个世纪的灾难。



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黄唇鱼因其鱼鳔被受追捧现已绝迹

从上世纪中前期起，墨西哥就向美国大量出口石首鱼鱼肉，过度捕捞导致其在上世纪 70 年代就进入 IUCN 红色名录，又在随后的近 20 年内变为濒危直至极危物种。花胶需求让其命运雪上加霜。

只是，石首鱼鱼鳔在繁忙的海关被抽检到的几率很低；即便被查到，海关人员也可能并不认识。因此，尽管“华盛顿公约”（CITES）附录一明确禁止加湾石首鱼的国际贸易，这条跨越半个地球的非法贸易链始终未曾断开。

当然，更倒霉的还得算是同属墨西哥加州湾特有物种的小头鼠海豚。它因与石首鱼个头相近，共享栖息地，常成为石首鱼捕捞的附带牺牲品，目前成年个体只剩下 18 头。

### 地下花胶贸易浮出水面

加湾石首鱼和小头鼠海豚的处境直到 2013 年后才得到国际社会关注。

这一年，因为一位听闻过石首鱼花胶贸易的海关人员警觉，美国海关第一次在墨西哥边境查获了非法入境的石首鱼鱼鳔，并意外发现走私数量可观。一位墨西哥鼠海豚专家也在当年发布了他的新研究，指出此前的保护措施并未有效减少小头鼠海豚的死亡。2014 年，保护组织生物多样性保护中心（Center for Biological Diversity）发布了一封关于石首鱼贸易的公开信，呼吁遏制鱼鳔非法贸易，保护濒临灭绝的小头鼠海豚。

因为这封公开信，作为中国 CITES 履约科学支持机构的中国濒危物种科学委员会才开始关注这个远在地球另一边的物种。“我们（濒

科委）知道这个东西在 CITES 名录上，是禁止贸易的。但一直不知道它和中国有什么关系。”濒危科委主任助理曾岩说。

2018 年中国查获的第一例石首鱼走私案，正是濒危科委远程协助海关官员侦破的。当时，一名海关人员不确定查获物是什么，将照片通过微信发给濒危科委专家，并在曾岩协助下识别了石首鱼花胶。

“（2015 年）中国这边初次调研的时候，才了解到这个东西是完全被隐藏在地下，在市场明面上不太能看见……一线的工商人员海关人员，其实并不是所有人都见过，”自然资源保护协会（NRDC）中国办公室生态部主任华宁说。

### 联合执法同盟发力

对于加湾石首鱼这样跨越半个地球的大规模走私，仅靠一方之力难以限制。从 2013 年美中相继开始关注这一问题之后，又经过了数年，一条联合了物种栖息地墨西哥、主要中转美国和美国和主要消费市场中国的执法阵线才得以建立。

2015 年，中国当局对石首鱼和小头鼠海豚的关注经历了一次升级。当年 6 月，在有两国高层参与的中美战略经济对话中，瓦解石首鱼等非法贸易网络成为双边合作内容之一。

环保 NGO 的调查曝光也加速了各方联合行动。绿色和平东亚办公室于当年 5 月发布报告，指出香港和广州有不少海货店都

## 中美墨三国联合 打击石首鱼鱼鳔贸易

- **2014年9月**  
美国Center for Biological Diversity 发布公开信
- **2015年6月**  
中美战略经济对话，合作瓦解石首鱼等非法贸易网络成合作内容之一
- **2015年11月**  
中国濒危办牵头的调查小组进入广州海货市场进行调查
- **2016年1月**  
中美墨三方在日内瓦第一次讨论石首鱼鱼鳔贸易
- **2016年5月**  
中美战略经济对话，再次将联合打击石首鱼非法贸易列入
- **2016年10月**  
CITES缔约方大会，中美墨三国联合打击石首鱼鱼鳔走私写入大会决议
- **2016年12月**  
中国在广州举办第一次加湾石首鱼执法研讨会
- **2017年1月**  
“打击石首鱼和黄唇鱼非法利用”专项执法活动在广州启动
- **2017年8月**  
墨西哥举办第二次三方执法研讨会
- **2018年1月**  
石首鱼鱼鳔成为中国海关年度联合执法行动重要对象之一，并在桂林发现第一例走私案

“对于加湾石首鱼这样跨越半个地球的大规模走私，仅靠一方之力难以限制。”

能提供加湾石首鱼鱼鳔。同年5月和11月，香港和中国大陆的官方调查人员分别第一次走进香港和广州的干货市场，搜查走私花胶。

要阻止问题蔓延，最好的做法仍然是提升海关人员的侦察意识和能力。

2016年10月，在日内瓦CITES第十七次会议上，中美墨三国正式做出联合保护石首鱼决议。

12月，由国家濒危物种进出口办公室等部门联合国际环保组织自然资源保护协会(NRDC)和野生救援(WildAid)在广州举行了加湾石首鱼研讨会，以帮助与会的广州海关、渔政、市场监管和海警等近百人识别石首鱼鱼鳔。

会议讲述了加湾石首鱼鳔及其干制品识别技术，并发布了手机适用的

快速视觉鉴定电子指南，而与会的美国鱼类与野生动物管理局、墨西哥联邦环境检察署代表，则在会上分享了发生在各自国家的石首鱼故事。2017年7月，第二次培训在小头鼠海豚和加湾石首鱼的栖息地、墨西哥 San Felipe 城举行。2018年，中国海关成功破获第一笔此类走私。

## “强力”执法之后

绿色和平香港办公室项目官员邵敏琳认为，值得担忧的是，石首鱼鱼鳔走私越来越地下了。

2015年之后，香港只有一例被指控的石首鱼走私案，发生在海关入境处。香港渔农署保护稀有动植物咨询委员会的一次会议记录显示，在2015年第一次检查之后，随后直到2016年，市场上都没有发现非法花胶。

但贸易并没有消失。国际环保组织 Sea Shepherd Global 前亚洲总监 Gary Stokes 说，2017年两名计划拍摄石首鱼鱼鳔贸易纪录片的德国人，在他的建议下去到中国澳门，只花了四个小时就找到一个可以卖给

他们这种顶级花胶的人。对方展示了货物照片，并称货在香港，但是“运过来没有问题”。

虽然如此，邵敏琳认为，大陆海关的行动对消费者和贸易商来说，都是一个非常重要的信号。她认为海关的行动和宣传，可以让之前只知道鱼翅的消费者开始关注到鱼胶消费可能的影响。

这并非杞人忧天。由于当前网络传播更加广泛，且旅游也变得更加便利，更多原来没有听说过鱼胶的人也开始成为这个“滋补佳品”的消费者。远在西非尼罗河流域的鲈鱼因为成为了鱼胶的新来源，正面临过度捕捞的威胁。

至于只剩18只成体的小头鼠海豚，这个花胶贸易最无辜的受害者，打击走私能起到的作用可能有限。

“挽救海湾鼠海豚，不是仅靠打击鱼鳔走私能完成的，”曾岩说，走私只是威胁小头鼠海豚生存的因素之一，源头栖息地保护才是最关键的。“只有他们(来源国)才能真正完成让物种在其原生境中存续的任务。”

张春，中外对话高级研究员



# Cracking down on the swim bladder smugglers

Can cooperation between China, the US and Mexico stem the illegal trade in totoaba fish maw?

□ Zhang Chun



© Earnest Tse

*Fish maw for sale*

China's craze for the swim bladder of the totoaba, a giant Mexican fish, has driven it close to extinction. Dubbed "aquatic cocaine", trade in the delicacy is banned, but smuggling is still a major problem. There is new hope, however, thanks to increased awareness of the issue in China and better cooperation with both Mexico and the United States, a major transit point.

Since the beginning of 2018, Chinese customs authorities have uncovered five cases of smuggling in totoaba swim bladders, also known as fish maw. Thirty-two people have been arrested and 300 million yuan (US\$45 million) worth of contraband seized.

But is this action enough to save the totoaba?



## The decline of a species

In China, swim bladder is popular for its believed nutritional and medicinal properties. Sold dried, prices vary widely from a few hundred yuan per kilogramme to hundreds of thousands of yuan, depending on the species of origin. Trade in the maw of most species is not banned – selling the totoaba swim bladder, however, has been illegal since 1976, when the fish was added to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

The swim bladder of the totoaba is particularly prized due to its large size and thickness, as well as its perceived health benefits. It is not the first victim of the Chinese taste for maw. The Chinese bahaba, native to the waters off south-eastern China, has a swim bladder with similar properties. Its popularity led to market prices so high it was known as “golden maw” – by weight, it cost more than gold. This led to overfishing and a rapid decline in the species’ population. Although trade was banned on the Chinese mainland in 1989, numbers have continued to fall. In 2006 it was added to the International Union for Conservation of Nature’s (IUCN) Red List as critically endangered.

With the bahaba nowhere to be found, China’s maw traders turned their attention to the totoaba. But the totoaba was already in crisis – in the early to mid-twentieth century, Mexico exported large quantities of the fish to the United States, where it was prized for its flesh rather than its swim bladder. By the 1970s, overfishing had led to its inclusion on the IUCN Red List. With the increased demand from China, it is now listed as critically endangered.

It is not just the totoaba that has suffered. Overfishing in the Gulf of California has also spelt disaster for a small

porpoise similar in size to the totoaba. The vaquita is often accidentally caught in the fine-meshed gillnets used to catch the fish. According to the IUCN, there are currently only 18 adult vaquita still alive.

## Exposing the underground trade

The plight of the totoaba and vaquita only came to international attention in 2013, when an alert customs officer triggered the first US seizure of totoaba maw at the Mexican border.

In that year a Mexican vaquita expert published research showing that existing conservation measures had failed to stop the cetacean being killed. In 2014, the Centre for Biological Diversity, a US conservation group, published an open letter calling for a ban on gillnet fishing to protect the critically endangered animal.

That letter prompted the China CITES Endangered Species Scientific Commission to take note of these distant species. “We knew they were on the CITES appendices and that trade was banned. But we hadn’t realised the connection with China,” said Zeng Yan, assistant to the director of the commission.

When China cracked its first totoaba smuggling case in 2018, it was with remote assistance from the commission. A customs official at Guilin’s international airport in south China, unsure of what he had found, sent an image to the commission’s experts and, with help from Zeng Yan, identified the contraband as totoaba maw.

“It was only during our first investigation [in 2015] that we realized there was an underground trade... Front-line commercial and customs officials haven’t necessarily seen it,” said Hua Ning, head of the ecology department at the China office of the Natural Resources Defense Council, an American advocacy group.

## A joint enforcement alliance

It is hard for any one country to tackle an illegal supply chain that stretches halfway around the world. It also takes time to set up cooperative mechanisms. It was only in June

With better policing, there is a risk that totoaba maw smuggling is now moving further underground.

## China-US-Mexico cooperation against the totoaba trade



2015 that China and the US first had high-level discussions on how to tackle the smuggling.

Investigations by environmental groups helped spur action. In May 2015, Greenpeace reported totoaba maw on sale in a number of shops in Guangzhou and Hong Kong. That year saw the first official investigations, which also found specimens for sale in Hong Kong and the mainland.

At a CITES conference in October 2016, China, the US and Mexico formally proposed to protect the totoaba together.

One of the toughest challenges in policing the trade in totoaba maw is identifying it, especially at a busy customs post. To address this, in December 2016, various government bodies, including China's State Office for the Trade in Endangered Species, and international environmental groups the Natural Resources Defense Council and WildAid, held a workshop in Guangzhou. The event was attended by over 100 people, including representatives from China's customs, fisheries, markets and coastguard authorities.

It showcased technology that can be used to identify totoaba maw and issued a quick visual identification guide to be stored on mobile phones. Representatives from the US Fish and Wildlife Service and the Mexican environmental authorities also shared their experiences of totoaba conservation.

In July 2017, a second workshop took place in San Felipe, Mexico, close to the habitats of the totoaba and vaquita. Both of these training initiatives were key in enabling the Chinese customs authorities to crack their first totoaba smuggling operation the following year.

### What's next?

With better policing, there is a risk that totoaba maw smuggling is now moving further underground, according to Bonnie Tang a campaigner with Greenpeace Hong Kong.

In Hong Kong, only one case of totoaba maw smuggling has resulted in charges since 2015. Minutes taken from a 2017 meeting of the Hong Kong Agriculture, Fisheries


and Conservation Department's Endangered Species Advisory Committee show no totoaba swim bladder was found in the region from its first discovery in 2015 to the end of 2016.

But the trade has not stopped. Gary Stokes, former director of Sea Shepherd Asia, relates that two German filmmakers hoping to document the illegal totoaba trade had, on his recommendation, visited Macau. Within four hours they found someone willing to sell them top-grade totoaba maw. They were shown pictures of the goods, which were said to be in Hong Kong, and were told it would be no problem to have them shipped over.

Despite this, Bonnie Tang thinks the increased enforcement by China's customs authorities is sending a crucial signal to both traders and consumers. Greater media coverage is also helping people understand the

impact of totoaba swim bladder consumption. Such public awareness is crucial, as online communication and easier travel continue to boost its popularity as a "nutritional" food.

This will no doubt help another species of fish currently threatened by China's hunger for swim bladder, the Nile perch. But for Mexico's vaquita, so close to the precipice of extinction, much more needs to be done.

"We can't save the vaquita just by tackling fish maw smuggling," said Zeng Yan, pointing out that habitat protection is also crucial. "Only they [the countries of origin] can ensure a species is able to survive in its natural habitat," she added. 

*Zhang Chun is a senior researcher at chinadialogue.*

# 中国对美“水逆差”增大

生产商品要用水，中美之间水的分配情况正在变化。

□ 丹妮尔·内珀

无论吃穿用，我们生活的方方面面背后都需要水。庄稼需要灌溉、衣服用的棉花需要水洗、燃料的获取需要水来压裂和处理。与碳很像，水的消耗也有足迹。这不仅包括我们饮用、洗涤和其他日常所需的水，而且包括我们的产品中所隐藏的用水。

这种水通常被称为虚拟水，在全球货物贸易中扮演着引人注目的角色。随着货物贸易和运输的全球化，用来制造或种植它们的水也就

随之被交易了。当贸易现状发生显著变化时，一国的水进出口及其整体供水也会同样变化。

中美贸易战正在改变两国间的用水分配格局。2017年，中国是美国头号贸易伙伴。在美国强行对华加征关税之前，中国向美国出口了很多水密集商品，从而使中国成为世界最大的虚拟水出口国，而美国则是最大的进口国。

随着两国贸易受阻，“水平衡”也发生了变化。比如，2018年11

月中国从美国进口的大豆数量为零。与2017年11月的470万吨相比，这不仅意味着美国农民失去了18亿美元的收入，也意味着中国从美国得到的虚拟水少了50.8亿立方米。

在这一新的现实之下，中美两国必须调整其水预算，否则就会发生水短缺风险。中国的人均可用淡水供应量是美国的四分之一，这使得其面临的水短缺风险尤为巨大。

尽管美国的水资源量明显比中国多，但2012年中国对美虚拟水净出口为24亿吨，足够630万个家庭一年所用。这个“逆差”中的近一半（46%）是中国对美出口的机械和设备出口造成的，其次是纺织品（19%），再次是农产品。机械、服装和农作物是迄今中美贸易中水密集度最高的商品。

## 水足迹及 虚拟水贸易不平衡

两国都对很多此类商品加征关税。随着中美贸易放缓，两国之间的水平衡也在发生变化。下面是一个这



© Kay Ledbetter

随着中美两国贸易受阻，“水平衡”也发生了变化



商品	虚拟水含量 (升/公斤)	中国加征关税	美国加征关税
猪肉	5988	X	X
牛内脏	15415		X
蔬菜	322		X
新鲜水果	962	X	X
谷物	1644		X
果干	962	X	X
酒	610	X	
橡胶	13058		X
铝	88		X
铜*	74		X
汽车	383720	X	
管材（钢）	39	X	
染料及涂料	250	X	
生皮及皮革	17093	X	
棉	2495	X	
毛	170000	X	
丝	64103	X	
<b>虚拟水贸易不平衡 (升/公斤)</b>		<b>646222</b>	<b>38513</b>

\*铜的水足迹与开采技术密切相关，这里采用的是露天和地下开采的平均数。

数据来源：Waterfootprint.org、WellBeing、URS、美国贸易代表办公室、世界贸易组织

三大产业加征关税商品及其虚拟水含量(单位为升/公斤)的列表，体现了两国加征关税产品中虚拟水含量的明显区别：中国对美加征关税商品中的虚拟水含量约为被美国加征关税的中国商品中的虚拟水含量的两倍。这意味着中国如今从美国得到的虚拟水更少，虚拟水“逆差”更大。

此外，中美间包括未受关税影响的商品在内的整体货物贸易也发生了变化。自从2018年7月贸易战打响以来，美国从中国进口的商品实际比以前更多。在加征关税之后的三个月里，美国对华货物出口比前三个月平均减少了18%，而同期从中国进口的货物却增加了7%。

令人惊异的是，自从贸易战开始美中贸易总逆差增加了17%，是10年来最高的。中国对美出口了更多商品，进口却在减少，两国之间的“水逆差”将变得更大。

比如，中国的纺织产业为世界65%的服装市场提供材料，每公斤纺织品不仅要消耗4万升水，还会产生600升废水。这些含有化学品的废水经常直接排入了江河溪流。随着中国服装出口的持续增加，供水将面临双重风险：一是牺牲了无数的淡水，二是污染了自己的河流。如果不对其使用的虚拟水进行有效管理，就业人数过千万的中国纺织产业将面临一个充满不确定性的未来。

随着中美重启贸易谈判，两国应该在谈判时将这个世界上最珍贵的资源纳入考量。中国通过出口将越来越多的水送到国外，其商品制造能力也面临风险。如果不考虑货物贸易中虚拟水的影响，中美会将依赖充足供水的各项出口导向型产业推向危途。<sup>⑤</sup>

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# China is losing water in US trade war

Producing goods uses water, and the balance between the two countries is changing

□ Danielle Neighbour

Water is hidden in everything we use, eat and wear. Crops must be irrigated, cotton for clothing must be washed, and fuel sources must be fracked and processed with water. Much like with carbon, water consumption has a footprint. It comprises not only the water we use for drinking, laundry and other daily needs, but also the hidden water in our products.

This “virtual” water plays a significant role in the global goods trade. As goods are shipped and traded around the world, the water used to make or grow them is therefore also traded. When significant changes in the trade status quo occur, so does a nation’s water imports or exports – and thus its overall water supply.

The US–China trade war is shifting the way water is spent between the two nations. In 2017, China was the United States’ largest trading partner. Before the imposition of tariffs, China exported many water-intensive products to the US, helping to make China the world’s largest exporter of hidden water, and the US the largest importer.

**China exported a net 2.4 billion metric tons of virtual water to the US in 2012.**

As trade between the two nations stymied, the “water balance” has also changed. For example, China imported zero soybeans from the United States in November 2018. Compared to November 2017, the 4.7 million tons it imported from the US not only represent US\$1.8 billion of lost value for US farmers, but also 5.08 billion cubic metres of virtual water not received by China.

Under this new reality, the US and China must adjust their water budgets or else risk shortages. China’s per capita available freshwater supply is one quarter that of the US, making it especially at risk of a water shortage.

Despite the US’s significantly larger water resources, China exported a net 2.4 billion metric tons of virtual water to the US in 2012 – enough to support 6.3 million households for a year. Nearly half (46%) of this imbalance was accounted for by water used to manufacture general machinery and equipment in China, which was then shipped to the US. Another 19% went into textiles. Agriculture accounted for the next largest portion. Machines, clothes and crops are by far the most water-intensive goods traded between the US and China.

Both countries have tariffed many such goods. As trade in them has slowed, the water balance has shifted. Below, a list of tariffed goods from these three industries and their virtual water content (in litres per kilogram) indicates

a clear difference in the virtual water tariffed by each country. China's tariffed goods in these categories have approximately double the virtual water content of the US's. As tariffed goods are traded less, this indicates China is now receiving comparatively less virtual water from the US, and the virtual water trade imbalance is increasing.

## Water footprint and virtual water trade imbalance

In addition, overall goods traded, including goods unaffected by tariffs, between the US and China has changed. Since the trade war began in July 2018, the US has actually imported more Chinese goods than it did before. In the three months after tariffs were implemented, US

exports of goods to China decreased by an average of 18% compared to the three months before. However, US imports of Chinese goods increased by 7% in the same period.

Surprisingly, the total trade imbalance of goods has increased by 17% since the beginning of the trade war – a 10-year high. As China exports even more goods to the US, and receives fewer in return, the water imbalance between the two nations will grow further.

For example, China's textiles sector, which makes 65% of all clothing in the world, not only uses up to 40,000 litres of water per kilogram of textile, but also creates 600 litres of wastewater per kilogram. This chemical-ridden water often directly enters rivers and streams. As China continues to export more clothing, it doubly endangers its water supply – first, by sacrificing thousands of litres of freshwater, then

again by polluting its rivers. Employing over 10 million workers, the future of China's textile industry is uncertain unless its virtual water use is properly managed.

As trade talks resume, the United States and China should take the world's most precious resource into consideration as they negotiate. As China sends increasingly more of its water abroad in the form of exports, the country's ability to manufacture goods is put at risk. Without considering the impact of virtual water in traded goods, the United States and China risk endangering the very export-oriented industries that rely on an ample water supply. ☞

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*Danielle Neighbour is a Schwarzman Fellow at the Woodrow Wilson International Center for Scholars' Kissinger Institute and China Environment Forum, where she researches wastewater treatment, water recycling and environmental policy.*

Product	Virtual water content (litres/kg)	Tariffs imposed by China	Tariffs imposed by US
Pork	5988	X	X
Beef intestine	15415		X
Vegetables	322		X
Fresh fruit	962	X	X
Cereals	1644		X
Dried fruit	962	X	X
Wine	610	X	
Rubber	13058		X
Aluminium	88		X
Copper*	74		X
Automobiles	383720	X	
Pipes (steel)	39	X	
Dyes and paints	250	X	
Raw hides and leather	17093	X	
Cotton	2495	X	
Wool	170000	X	
Silk	64103	X	
<b>Total virtual water content (litres/kg)</b>		<b>646222</b>	<b>38513</b>

\*Copper's water footprint depends on how it's mined; this figure is an average of open pit and underground techniques. Sources: Waterfootprint.org; WellBeing; URS; USTR; WTO

# 中国审慎对待拉美贷款

新数据表明中国国有银行正在减少对拉美的贷款。

□ 罗伯特·苏塔

**根**据位于美国的智库“美洲对话”和波士顿大学的一项新的研究，相对于过去十年，去年中国主要国有银行对拉美地区的贷款有所收紧，表明其对该地区的投资更为审慎。

去年中国对拉美 5 笔贷款的总额为 77 亿美元，高于 2017 年的 62 亿，但仍然是 2005 年以来中国国家开发银行（国开行）和中国进出口银行（进出口行）开始对该地区贷款以来最低的年份之一。2008 年中国对拉美贷款只有一笔，此后从来没有低于 5 笔。

2018 年，中国政策性银行给予了委内瑞拉 50 亿美元的贷款，占当年中国对拉美总贷款的三分之二。过去十多年中，这个饱受危机打击的国家总共从中国得到了 670 亿美元贷款，占中国国开行和进出口行对拉美贷款的近一半。

除了委内瑞拉、巴西、阿根廷和厄瓜多尔等“常客”，2018 年多米尼加共和国也第一次从中国获得了 6 亿美元的贷款。这项针对输电项目的贷款合同是随着同年 11 月两国建交正式达成的，利率也低于大多数贷款。



相对于过去十年，去年中国主要国有银行对拉美地区的贷款有所收紧

新的数据显示，尽管上述以支持中国海外发展目标为使命的两大银行去年的贷款总额较低，但也达到 1410 亿美元，超过世界银行与美洲开发银行的总和。

## 普遍的疑惑

深陷混乱的委内瑞拉与阿根廷、厄瓜多尔和巴西等一连串拉美国家一样，近年来一直依靠中国财力平安度过经济危机。

这些国家占了中国对拉美贷款

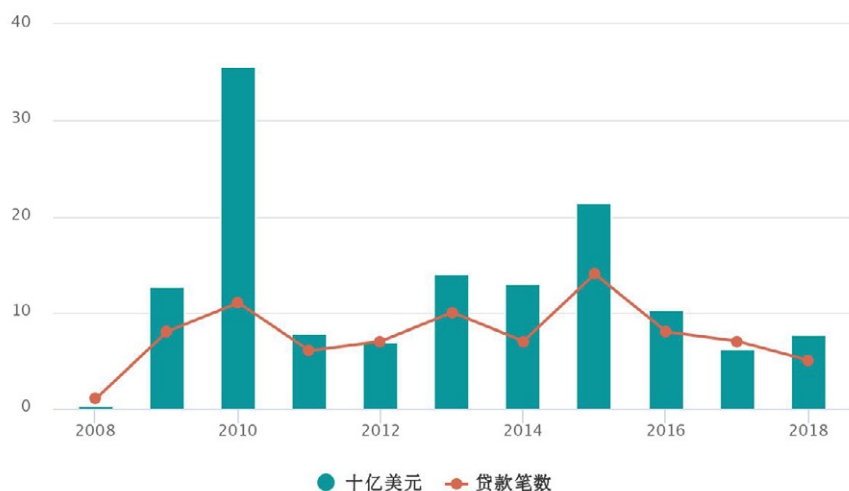
总额的 90% 以上，但它们不可能永远指望来自中国的支持。

“美洲对话”和波士顿大学的研究报告说：“对经济更加脆弱的拉美国家来说，国开行和进出口行能在多大程度上继续发挥生命线的作用还不清楚。”

去年已经是国开行给予委内瑞拉的贷款偿还宽限期的最后期限，这意味着这个产油国必须开始偿还中国债务的本金，而非只是利息。很多债务都靠出售石油抵消，但是由于危机和石油业雇员外逃，



国开行及进出口行对拉美及加勒比海地区国家的贷款情况

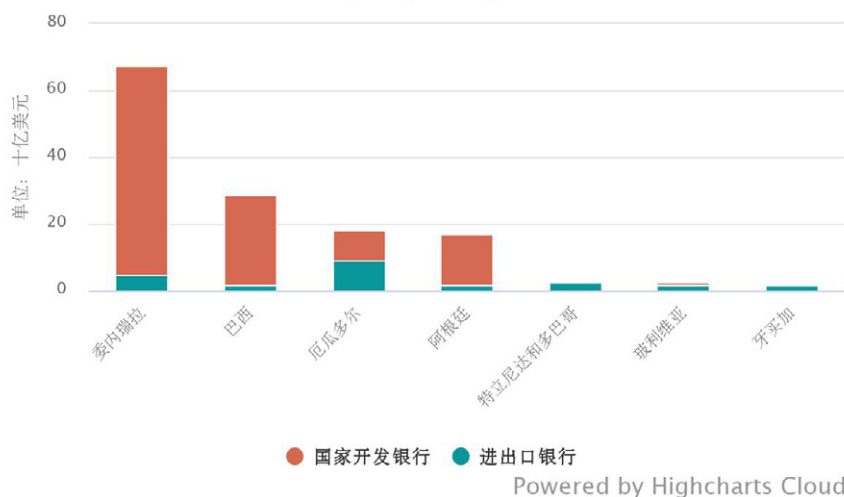


数据来源: Gallagher, Kevin P. and Margaret Myers (2019)

"China-Latin America Finance Database," Washington: Inter-American Dialogue

中国的银行向拉美及加勒比国家提供的国家间贷款情况

(2005年-2018年)



数据来源: Gallagher, Kevin P. and Margaret Myers (2019)

"China-Latin America Finance Database," Washington: Inter-American Dialogue

石油供应线和油田机械交付都步履维艰。

观察家们也注意到,中国不愿公开承认支持委内瑞拉这个严重依赖国际油价的经济体。

除了在委内瑞拉这类国家面临的高主权风险之外,很多中国支持的拉美项目也面临着巨大的环境风险。过

去,中国投资者冒着比西方金融机构更大的风险拿下项目。如今,大型能源和基础设施项目仍然占中国政策性银行对拉融资的大多数。

报告中说,中国投资的厄瓜多尔科卡科多-辛克雷水电站和玻利维亚的罗斯塔斯水电站都是多年前提出的项目,但许多多边发展银行

因其环境和社会风险都放弃了投资机会。

受到拟建的罗斯塔斯项目影响的社区声称,并没有人就可能的影响与他们进行协商。这些影响包括牧场被淹和通往市场的道路受阻等。玻利维亚总统埃沃·莫拉莱斯提议就该项目进行一次全民公决,显然打算以此压制当地社区的反对。

## 烧钱的面子工程?

中国企业在一些拉美项目上积极应对当地社区压力的同时,中国国内也出现了针对其海外支出的不安声音。

一些海外事业被批评为亏损的“面子工程”,缺乏尽职调查,只是为了彰显中国作为发展伙伴的国际立场而存在。

《中国简讯》2018年的一篇文章指出,中国正在对其海外数百亿美元有问题的项目进行清理。各大银行在“一带一路”倡议下贷出的款项占中国海外贷款的大多数。中国国内有呼声要求减少这些贷款,但是这些呼吁会不时受到审查。实际上,自2015年以来中国向海外提供的贷款一直在减少。

过去两年对拉美贷款的减少是否反映了一种新的谨慎态度还有待观察。

“美洲对话”和波士顿大学的报告说:“不过中国政策性银行将更加谨慎,因为它们同时也在努力解决拉美问题性贷款协议,降低信誉风险,也在摸清其国内正进行转型的管理环境。”

英文原文首发于中外对话子网站中拉对话

罗伯特·苏塔,中拉对话执行编辑,常驻英国伦敦,拥有西班牙研究学士学位及(拉丁美洲)比较政治硕士学位

# China reins in lending to Latin America

New data shows state-backed banks are making fewer loans in the region

□ Robert Soutar

China's major state-backed development lenders issued fewer loans to Latin America last year than they have for a decade, suggesting a more cautious approach to investing in the region, according to new research from the Inter-American Dialogue and Boston University.

Last year's five loans totalled US\$7.7 billion, more than the \$6.2 billion issued in 2017 but still one of the lowest figures for state-to-state loans from China Development Bank (CDB) and the Export-Import Bank of China (Exim) to Latin America since 2005, when they began lending to the region. Not since one loan was issued in 2008 have there been fewer than five in a year.

At US\$5 billion, Venezuela accounted for almost two-

thirds of all lending from Chinese policy banks to Latin America in 2018. Over more than a decade, the crisis-stricken country has been the recipient of US\$67 billion, nearly half all CDB and Exim bank loans to the region.

Aside from usual borrowers Venezuela, Brazil, Argentina and Ecuador, the Dominican Republic received its first major Chinese loan in 2018, a US\$600 million package for electricity transmission projects. The deal, which was agreed at a lower interest rate than for most loans, followed the establishment of diplomatic relations between the two countries in November.

Despite last year's low, the US\$141 billion total lent by the two banks, which are tasked with supporting China's

development goals overseas, still outweighs financial support from equivalents the World Bank and Inter-American Development Bank, the new data showed.

## Usual suspects

Mired in turmoil, Venezuela is one of a cluster of Latin American countries, which includes Argentina, Ecuador and Brazil, that have relied on Chinese finance to weather economic crises in recent years.

These countries account for over

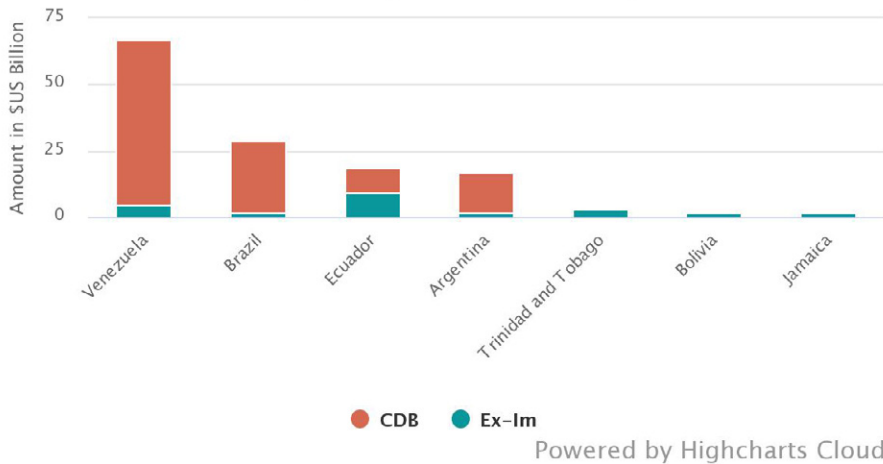
CDM & Exim loans to Latin American and Caribbean countries

Source: Gallagher, Kevin P. and Margaret Myers (2019) "China-Latin America Finance Database," Washington: Inter-American Dialogue



### Chinese state-to-state loans to Latin American and Caribbean countries by bank (2005–2018)

Source: Gallagher, Kevin P. and Margaret Myers (2019) "China–Latin America Finance Database," Washington: Inter–American Dialogue



Communities affected by the proposed Rositas project claim they have not been consulted on its likely impacts, which include flooding animal pasture and impeding access to markets. President Evo Morales has suggested holding a nationwide referendum on the project in an apparent attempt to steamroller local community resistance.

### Splashing the cash?

While Chinese companies have shown themselves to

90% of all loans. Yet they may not be able to count on unending support from China.

“It is unclear to what extent CDB and Exim are still acting as a lifeline for the region’s more fragile economies,” the report said.

Last year, a grace period extended to Venezuela by CDB expired, meaning the petro-state must begin repaying its principal China debt, not just the interest. Much of the debt is underwritten by sales of oil, which it has struggled to pump with supply lines and machinery deliveries hit by the crisis and oil-sector employees fleeing the country.

Observers have also noted China’s reluctance to publicly acknowledge that it has helped prop up Venezuela, an economy heavily dependent on international oil prices.

As well as high sovereign risk in places like Venezuela, many China-backed projects in Latin America involve huge environmental risks. In the past, Chinese investors have taken on riskier projects than Western financial institutions might. Big energy and infrastructure projects still attract the majority of Chinese policy bank finance in Latin America.


China-backed hydro projects Coca Codo Sinclair in Ecuador and Rositas in Bolivia were proposed years ago but multilateral development banks passed up the investment opportunity owing to their environmental and social risks, the report said.

be responsive to community pressure in some Latin American projects, there has also been disquiet in China over its overseas spending.

Some foreign undertakings have been slammed by critics as loss-making “face projects”, which lack due diligence and serve only to enhance Beijing’s international standing as a development partner.

A 2018 article published by China Brief suggested that China is coming to terms with the tens of billions of dollars it has tied up in problematic investments abroad. Lending by major banks as part of the signature Belt and Road initiative, which accounts for most of China’s overseas lending, has dipped since 2015 amid sometimes censored calls to scale back.

Whether or not lower lending to Latin America in the past two years reflects a new wariness remains to be seen.

“One could expect more caution from all of these entities, however, as they grapple with problematic loan agreements in the region, try to mitigate reputational risk, and navigate a shifting regulatory environment at home,” the Inter-American Dialogue and Boston University report said. 

*This article is republished from Diálogo Chino*

*Robert Soutar is Managing Editor of Diálogo Chino, based in London. He holds an MSc in Comparative Politics (Latin America) and a BA in Hispanic Studies.*

# 留住湄公河流域的心跳

湄公河流域从水电转向太阳能发电将保护世界上最大的淡水渔场洞里萨湖。

□ 艾·博 考特尼·韦瑟比



柬埔寨的洞里萨湖

人们通常认为青藏高原是湄公河的发源地。从地图上来看，它从喜马拉雅山出发，蜿蜒 4500 公里，穿过中国的西南部地区，然后沿着老挝、缅甸和泰国三国之间的边界游走，并将柬埔寨和越南所在的湄公河三角洲一分为二，最终汇入大海。

然而，湄公河还有另一个意义上的发源地：柬埔寨的洞里萨湖（Tonle Sap Lake）。每年都有大量来自洞里萨湖的生命（以鱼群为主）迁徙到湄公河水系的上游和下游。

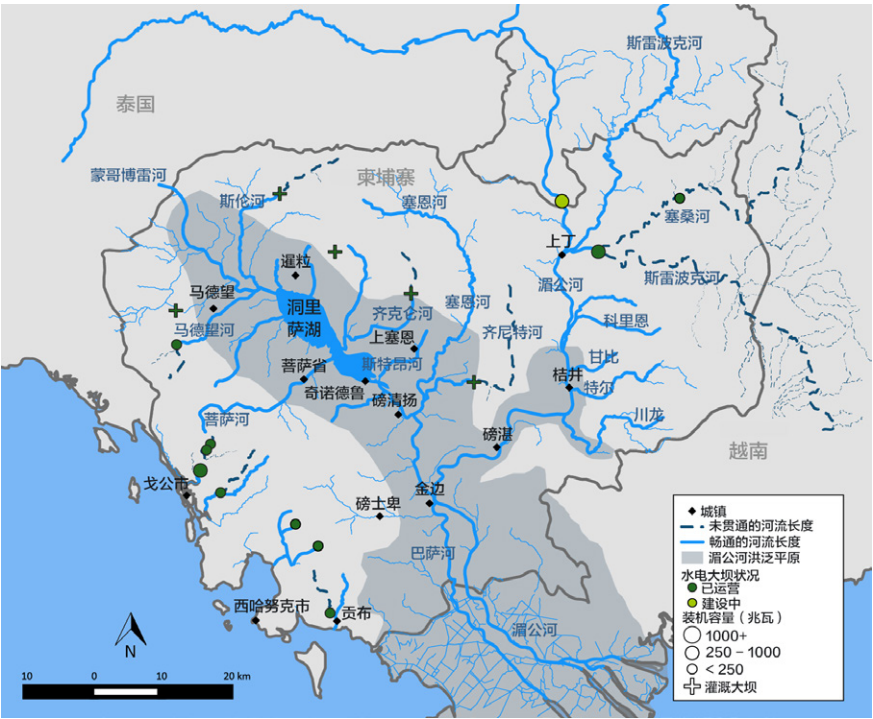
每年的大迁徙为整个湄公河流域的数千万家庭提供了日常的蛋白质供给。北美所有湖泊和河流上野生渔业

每年的总渔获量为 16 万吨，而相比之下，湄公河水系的渔获量则为 260 万吨。仅洞里萨湖的渔获量就达到约 50 万吨，占柬埔寨人蛋白质摄入量的 75%，是世界上最大的淡水渔业。

但洞里萨湖丰富的资源正面临上游大坝建设、过度捕捞、不受管制的农业实践以及气候变化的威胁。



柬埔寨境内洞里萨湖和湄公河支流的互通性



大坝的问题

我们最近发表的一份报告从更广泛的角度探讨了人类活动的影响，给出了水、能源和粮食生产之间权

衡关系更加优化的发展路径。采用的方法包括，对整个流域的水和能源进行规划，以及进一步扩大水电以外的可再生能源在柬埔寨未来电力结构中的比重。

每年，季风脉冲会使河水逆行，倒灌入洞里萨湖多于平时 70 倍的水量、有机物、还有鱼类。在湄公河地区采用上文提到的更佳优化的发展方法而非建设大坝的话，那么这种季风脉冲将被自然地保留下来而不受破坏。

洞里萨湖就像是湄公河流域的心脏，而每年湖水的往复则像脉搏一样为整个流域注入了生命力。然而，这一过程正受到柬埔寨、老挝、越南和中国在洞里萨湖上游在建和拟建的水电及灌溉大坝的威胁。水坝和其他建筑结构阻塞或减少了湄公河的流量，不仅导致每年进入洞里萨湖的水量、鱼类和营养物质减少，还限制了鱼类寻找上游生境的能力。

仅柬埔寨建设的 2 座水电大坝和 6 座灌溉水库就使该国境内 1.1 万公里的湄公河 / 洞里萨湖水系的互通性下降了 31%。

其中一座水电大坝，位于塞桑河和斯雷波克河交汇处正下方、装



受到塞桑河下游2号大坝影响的村民在国际河流行动日上的活动

© International Rivers

机容量 400 兆瓦的塞桑河下游 2 号水电站在 2017 年完工时切断了通往湄公河水系其他部分以及洞里萨湖的长 3300 多公里的支流。该河段高峰季节鱼类迁徙的通过量达到每小时 30 吨，虽然大坝开发商建造了鱼类洄游上溯的鱼梯，但面对如此庞大的通过量，显然力不能及。

此外，即使有些鱼能够借助鱼梯洄游至上游产卵，每年随着湄公河季风脉冲被冲回下游洞里萨湖的鱼卵和鱼苗很可能会随着河水逐渐靠近大坝速度放缓，而沉降，然后死亡。盖伊·齐夫等人 2013 年发表的一篇同行评议文章考察了支流大坝对湄公河水系的影响，称塞桑河下游 2 号大坝将导致湄公河鱼类种群数量减少 9% 以上。

我们研究发现，柬埔寨境内湄公河支流上的大坝建设相互独立，没有整体性规划。在支流（而非干流）上筑坝可能会导致洞里萨湖和湄公河水系其他部分之间的互通性降低 60%。此外，极具争议的松博（Sambor）和上丁（Stung Treng）两处干流大坝将彻底切断洞里萨湖与湄公河的连接，终止该湖泊的季节性吞吐节奏。

柬埔寨拟建的水坝大多准备通过签署谅解备忘录或者达成特许协议的方式与中国开发商合作。中国投资未来几年内的表现将决定柬埔寨境内湄公河段开发的成败，也将影响洞里萨湖的生产能力以及数千万靠这座湖泊为生的人。

仅在柬埔寨境内塞桑河下游 2 号电站以上的湄公河流域修建水坝，或许才是保护洞里萨湖的务实之选。我们的研究表明，相比目前的状态，这么做将带来 1000 兆瓦额外的装机

容量，且对洞里萨湖的连通性和渔业生产力的净影响为零。

然而，这一开发方案的前提是满足塞桑河下游 2 号大坝上游柬埔寨高地和少数民族社区的搬迁需求，但柬埔寨这方面的能力向来不足。

### 该地区的太阳能带？

另一种方案是，可以利用柬埔寨蒙多基里省和腊塔纳基里省丰富的太阳能和风能资源，或者在全国范围内发掘风能、太阳能和生物质产能，以此减少大坝上游水电建设的扩张。

柬埔寨是整个东南亚地区电价最高的国家之一，城市地区电费高达 0.25 美元每千瓦时，农村地区则超过 80 美分。该国大部分地区仍使用柴油发电或从越南和泰国进口电力。降低电价可以刺激经济发展，这一压力促使柬埔寨走上了扩大能源结构的新道路。

发展水电之外的可再生能源是柬埔寨实现能源结构多样化，避免水电过度开发的绝佳机会。柬埔寨 65% 土地上的太阳辐射水平都超过 1800 千瓦时 / 平米，能提供总计 8000 兆瓦的太阳能开发量。与该国的 10000 兆瓦的水电潜力相比，这一数字已经相当可观。亚洲开发银行的一项研究显示，柬埔寨的风电开发潜也可能高达 6500 兆瓦。

洞里萨湖就像是湄公河流域的心脏，而每年湖水的往复则像脉搏一样为整个流域注入了生命力。

2017 年，亚洲开发银行宣布投资柬埔寨首个装机容量 10 兆瓦的商业规模太阳能发电厂。接着，又于 2018 年 6 月宣布对一项 100 兆瓦的太阳能发电场进行招标。此后，太阳能投资成为热门话题。2019 年 1 月，柬埔寨首相洪森访问北京，会见了大坝开发商华能澜沧江水电公司负责人。但他在此行中却并没有签署新的水电项目协议，而是签署了几项太阳能协议。

虽然柬埔寨尚未制定太阳能开发的硬性目标，但新的法规和指南却为投资者提供了明确的信息。例如，大型公寓楼、工厂及其他大型建筑等能耗大户可以在安装太阳能（超过 5 兆瓦）的同时继续接入国家电网。

柬埔寨城市贡布的集茂英思（Chip Mong Insee）水泥厂最近在屋顶和厂区分别安装了 9.8 兆瓦的屋顶太阳能和浮动太阳能装置。柬埔寨唯一的公用事业公司柬埔寨电力公司也在逐步开放向私有太阳能生产部门购买太阳能。这会推动分布式发电在全国各地的推广，鼓励个人对太阳能的投资。正在制定中的《国家环境法》也将有望支持家庭太阳能系统，并为使用太阳能的公司提供税收减免政策。

除了监管，发展太阳能发电面临的主要挑战来自土地。发放给外国开发商的“经济用地特许经营权”长期以来一直与土地侵占联系在一起。其中一些土地特许权由于开发停滞和政府的再分配而被取消，还有一些则由于近年来农产品价格低下而处于休耕状态。如果利用得当，这些闲置的租让地中有一部分，尤其是高用电需求地区附近的土地，可以用来开发太阳能电场的。



下面的地图显示，大多数特许用地都位于适合部署太阳能光伏发电的高太阳辐射区。

在外国投资者和发展伙伴的帮助下，湄公河流域大多数国家正在

考虑加大对太阳能等非水电可再生能源的利用。虽然可再生能源在减少碳排放方面的重要性正逐渐被人们所理解，但非水电可再生能源在改善生态系统服务、提高水资

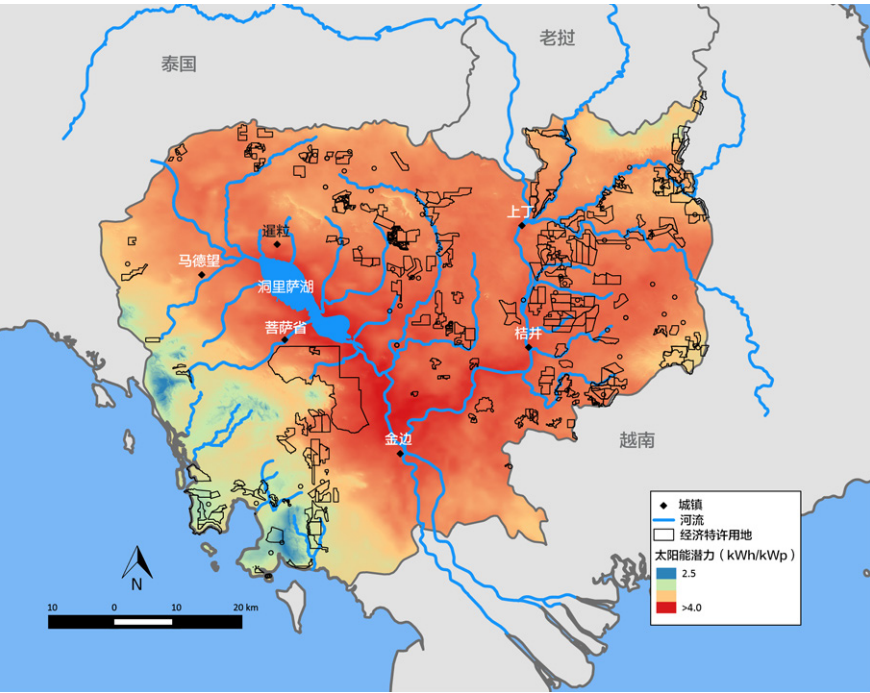
源和淡水鱼类等自然资源的供应量方面发挥的作用仍未得到足够的认识。

我们的报告展示了柬埔寨如何在发展本国电力部门的同时，立足整个湄公河流域，不仅保护洞里萨湖的渔业，而且可以成为本地区可持续发展和资源保护领域的领导者。

艾·博，华盛顿特区史汀生中心东南亚项目主任在，著有《湄公河最后的岁月》一书

考特尼·韦瑟比，史汀生中心东南亚项目研究分析师

柬埔寨的经济特许用地和太阳能潜力



# Sustaining the heartbeat of the Mekong Basin

Moving from hydro to solar could protect the Tonle Sap Lake, the world's largest freshwater fishery

□ Brian Eyler Courtney Weatherby



*Sorting the catch*

The Mekong River is often depicted as originating in the Qinghai-Tibet Plateau. Maps show it flowing downstream through China's southwest, and then forming the borders of or flowing through Laos, Myanmar and Thailand, before bisecting Cambodia and Vietnam's Mekong Delta on its 4,500 kilometre journey from the Himalayas to the sea.

However, the Mekong has another point of origin: the Tonle Sap Lake in Cambodia. Each year life springs from

the lake, mostly in the form of a massive fish population that migrates to the far reaches of the Mekong system both upstream and downstream.

This annual migration provides tens of millions of households throughout the Mekong Basin with regular protein. While the total catch from wild fisheries in all of North America's lakes and rivers is 160,000 tons, each year the Mekong system produces 2.6 million tons. The Tonle



Sap alone provides around 500,000 tons, comprising 75% of Cambodians' protein intake, and making it the world's largest freshwater fishery.

But this rich resource is threatened by upstream dam construction, overfishing, unregulated agricultural practices and climate change.

## The problem of dams

We recently published a report that explores the impact of human activities from a broader perspective. It offers alternative development pathways to optimise trade-offs between water, energy and food production. These approaches include basin-wide water and energy planning and a deeper incorporation of non-hydropower renewable energy sources into Cambodia's future power mix.

These approaches can avoid upstream fragmentation between the Tonle Sap and the rest of the Mekong system. This way, the monsoon pulse which each year reverses the direction of the river, draining the lake and sending 70 times more water, organic material and fish back into it, can be preserved.

The annual flooding and draining of the lake acts as a heartbeat pumping life throughout the Mekong Basin. This process is threatened by the construction of and future plans for hydropower and irrigation dams upstream of the Tonle Sap in Cambodia, Laos, Vietnam and China. Dams and other built structures block or reduce flows in the Mekong, which reduces the amount of water, fish and nutrients going into the Tonle Sap each year and also constricts the ability of fish to find upstream habitats.

In Cambodia alone, the connectivity of the country's 11,000 kilometres of the Mekong/Tonle Sap river system has already been reduced by 31% by the construction of two hydropower dams and six irrigation reservoirs.

**Building the dams at Sambor and Stung Treng would annihilate Tonle Sap connectivity.**

## The connectivity of the Tonle Sap and Mekong tributaries in Cambodia

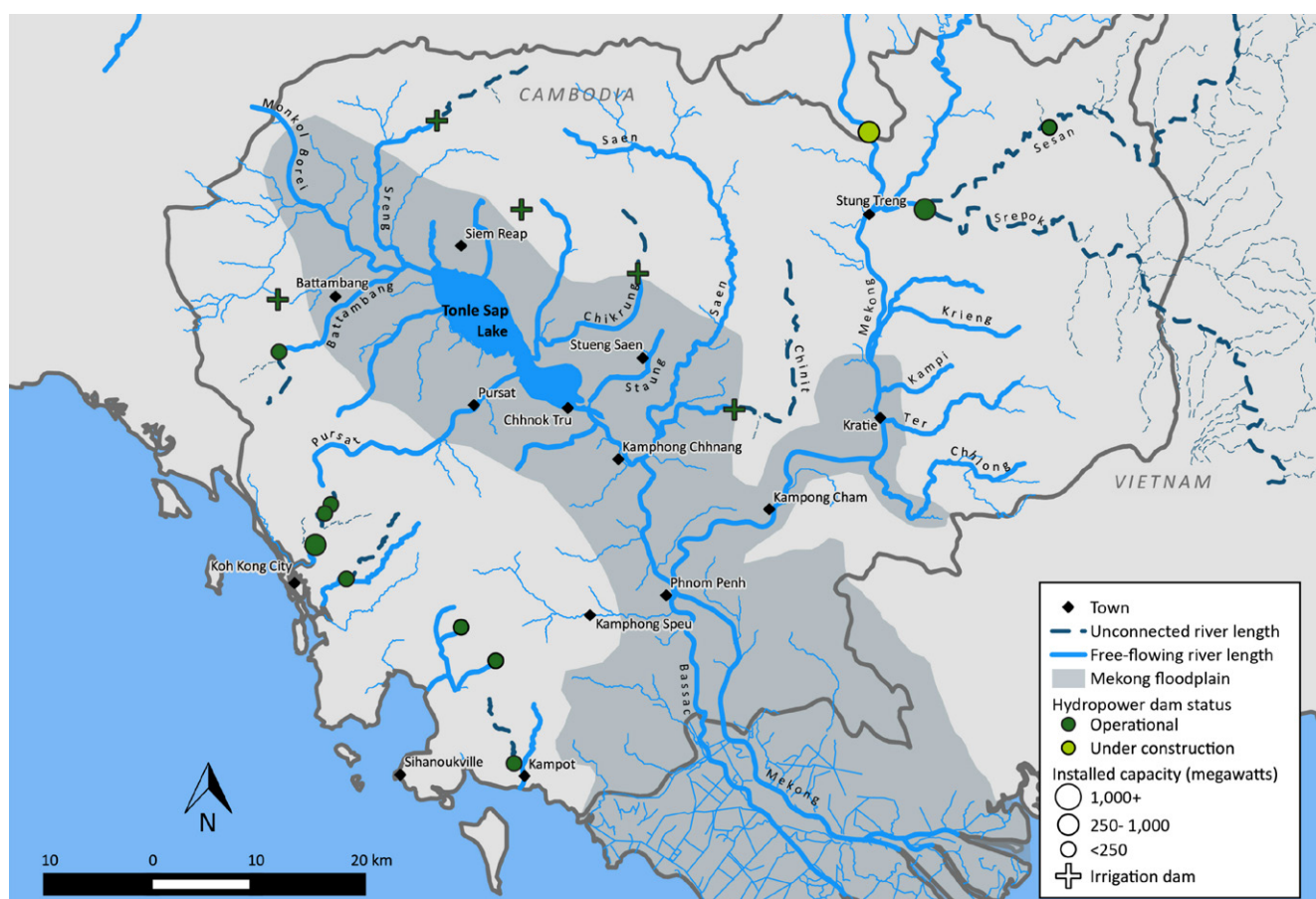
One of those hydropower dams, the 400-megawatt Lower Sesan 2, located just below the confluence of the Sesan and Srepok rivers, cut off more than 3,300 kilometres of tributaries to the rest of the Mekong system and the Tonle Sap when it was completed in 2017. The fish ladders incorporated by the dam developer, Chinese state-owned enterprise Huaneng Hydrolancang, are unlikely to accommodate a meaningful quantity of fish in a system that is known to have as many as thirty tons swimming through in one hour during peak migration season.

Further, even if some fish do make it past the ladders to spawn upstream, the eggs and fish larvae washed back downstream towards the Tonle Sap by the annual Mekong flood pulse will likely sink and perish behind the dam as the river slows on its approach. A 2013 peer-reviewed article by Guy Ziv and colleagues, which examined the impacts of tributary dams on the Mekong system, claims the Lower Sesan 2 dam will reduce the Mekong's fish population by more than 9%.

Our study finds that the Cambodian tributaries of the Mekong are being dammed one project at a time with no comprehensive plan. Damming tributaries (rather than the mainstream) could reduce connectivity between the Tonle Sap and the rest of the Mekong system by 60%. Further, building the controversial mainstream dams at Sambor and Stung Treng would effectively annihilate Tonle Sap connectivity, terminating the lake's rhythm.

Many of the dams in Cambodia's inventory are poised for development through memoranda of understanding or concession agreements with Chinese dam developers. How these Chinese investments play out in the coming years could make or break Cambodia's Mekong, the viability of the Tonle Sap and the tens of millions of people it supports.

Only building dams in Cambodia's portion of the Mekong Basin above the Lower Sesan 2 dam could be a pragmatic option that protects the Tonle Sap. Our study shows how this could result in the generation of more than 1,000 megawatts additional capacity whilst potentially



having zero net effects on Tonle Sap connectivity and fisheries productivity compared to the status quo.

However, such development should not be considered unless the resettlement needs of Cambodia's upland and ethnic communities upstream of the Lower Sesan 2 dam can be met. Cambodia's track record on resettlement is inadequate.

### The region's solar belt?

Alternatively, the expansion of hydropower above the dam could be reduced or augmented by tapping into robust solar and wind endowments in Cambodia's Monduliri and Ratanakiri provinces, or exploiting wind, solar and biomass capacity across the kingdom.

Cambodia has some of the highest power prices in the whole of Southeast Asia, as high as US\$0.25 per kilowatt hour in urban areas, whereas rural residents have often paid more than 80 cents. Much of the country still runs

on diesel generators or imports power from Vietnam or Thailand. Pressures to lower electricity prices, which would spur economic development, have set Cambodia on new pathways to expand its power generation mix.

The greatest opportunity for diversification of Cambodia's energy mix and shifting away from over-development of hydropower lies in non-hydropower renewables. On 65% of Cambodia's land, solar irradiation levels are above 1,800 kilowatt hours per square metre. This offers a total solar potential of 8,000 megawatts, which is significant given the country's 10,000 megawatts of hydropower potential. Cambodia's wind potential could be as high as 6,500 megawatts according to an Asian Development Bank study.

In 2017, the Asian Development Bank announced its support for the first 10 megawatt commercial-scale solar farm in Cambodia and then continued in June 2018 with the announcement of a 100 megawatt solar farm tender. Since then solar investment has become a hot topic. In January 2019, Prime Minister Hun Sen visited Beijing and met

with the dam developer Huaneng Hydropower. Instead of signing agreements for new hydropower projects, he inked deals for solar power.

While Cambodia has yet to set hard targets for solar development, new regulations and guidelines provide clarity for investors. For example, heavy consumers such as large apartment buildings, factories and other large compounds can install solar (above five megawatts) while maintaining connections to Cambodia's national grid.

The Chip Mong Insee cement factory in Kampot recently became installed 9.8 megawatts of solar across its rooftops and in floating solar installations on its property. Cambodia's sole utility company, Electricity du Cambodge, is also moving toward the purchase of solar power from private producers. This could lead to high levels of distributed generation across the country and encourage individual investments in solar. Development of a National Environmental Code is also expected to support household solar systems and provide tax breaks for companies that utilise solar power.

Aside from regulation, the major challenge to developing more solar power is land. Issuing "economic land concessions" to foreign developers, most of them

Chinese, has long been tied to land grabbing efforts.

Some of these land concessions have been revoked due to lack of development and the government's redistribution processes, others still lie fallow because of low agricultural commodity prices in recent years. A portion of these deserted concessions, if properly utilised, could be used for solar farms, especially those close to areas of high demand.

The map below shows that most land concessions are within the areas that receive the high solar radiation favourable to solar photovoltaic deployment.

### Cambodia's economic land concessions and solar potential

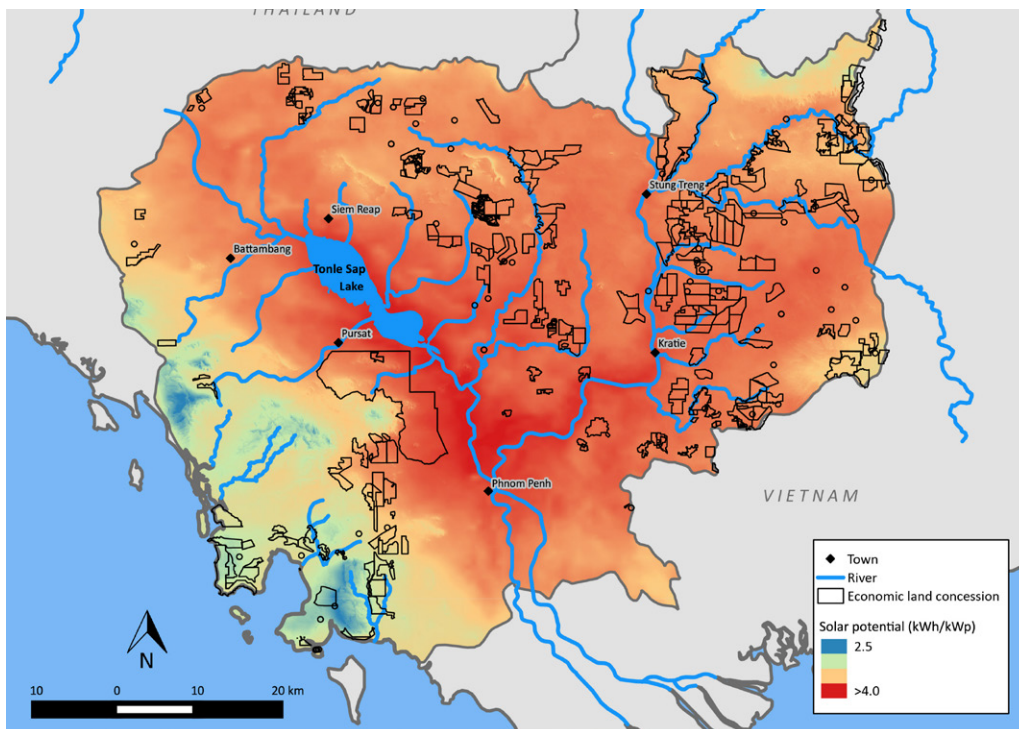
With the help of foreign investors and development partners, most countries in the Mekong region are considering a greater role for solar and other non-hydro renewables. While the importance of renewables in reducing carbon emissions is increasingly understood, the role that non-hydro renewables can play in improving ecosystem services, and the availability of natural resources such as water and freshwater fish catches, is still undervalued.

Our report demonstrates how Cambodia can develop its

power sector with a basin-wide vision that not only conserves the fisheries of the Tonle Sap Lake but also provides a pathway for the country to rise as a leader in sustainability and conservation efforts.

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# 改变海洋化学结构能否延缓气候变化？

要想除去多余的二氧化碳，我们可以尝试在海洋中添加碱性物质。

□ 威尔·伯恩斯 格雷格·劳

目前，世界各国还远未完成《巴黎协定》（Paris Agreement）中有关全球气候变化的行动目标，即相较于 19 世纪水平，将全球升温幅度控制在 2 摄氏度内，更不要说更为理想的 1.5 摄氏度的温控目标了。

联合国环境规划署（United Nations Environment Program）最新发布的《排放差距报告》（Emissions Gap Report）指出：“全球温室气体排放并没有出现达到峰值的迹象。”而另外一份研究显示，人类在 2100 年前将全球变暖幅度控制在 2 摄氏度以内的可能性不超过 5%，到本世纪末，全球平均升温幅度很有可能在 2.6 到 3.7 摄氏度之间。

这些不容乐观的趋势使得人们越来越关注如何从大气中去除二氧化碳。目前正在探索的方法之一就是向海洋中添加碎石或其他碱

性物质，来中和海洋中的二氧化碳，让海洋吸收和 / 或存储二氧化碳，从而最终消耗掉大气中的二氧化碳。

这种大规模的二氧化碳清除行动能否起到作用？以下的这份研究详细说明了海洋二氧化碳去除法的潜在环境利弊，以及由此带来的更为复杂的技术、经济和国际监管问题。

## 碳捕捉与碳存储，陆地还是海洋？

目前，海洋每年被动吸收约 100 亿吨二氧化碳，约合全球年排放总量的四分之一，因此我们及其他一些研究人员认为，向海洋寻求去除多余二氧化碳的方法是顺理成章的。此外，海洋中的碳远远超过了大气、土壤、植物和动物中所含碳的总和，所以应该有潜力再存储上万亿吨的碳。

政府间气候变化专门委员会

（Intergovernmental Panel on Climate Change）的最新报告重点关注的是陆地碳捕集和封存的方法。其中使用的主要技术之一叫做“生物能源与碳捕集和封存”（BECCS），即通过燃烧植物生物质产生可用能源，同时将燃烧产生的二氧化碳泵入地下。

但是，人们对大规模采用 BECCS 技术和其他土地 - 植物模式可能带来的潜在负面影响存在不少疑虑，尤其是担心大量农业用地会被用于种植此类专用作物，从而有可能减少低收入群体的粮食获取，增加用水需求，并且因为生态系统遭到破坏而对生物多样性产生严重负面影响。

## 加速地球化学

海洋二氧化碳去除法中最广为人知，有时也是最有争议的或许要数通过刺激光合作用来增加二氧化碳吸收这种方法了。例如，在海洋植物生长受铁元素限制的区域中添加铁元素可以增加二氧化碳的吸收和存储，而在这个过程中至少会有一部分形成的生物质碳最终沉入并埋藏在海底。其他的海洋去除法还包括恢复、增加或培植

海洋二氧化碳去除法中最广为人知，有时也是最有争议的或许要数通过刺激光合作用来增加二氧化碳吸收这种方法了。



海洋植物或微生物,“蓝碳”行动采用的就是这种策略。

考虑采用的另外一种技术则是尝试通过加速二氧化碳与常见岩石矿物的反应,也就是众所周知的矿物风化这个自然过程。碱性岩石和二氧化碳遇到雨水会发生化学反应,在土壤中生物活动的催化下,二氧化碳被转化为可溶的矿物碳酸氢盐和碳酸根离子,并最终流入海洋。矿物风化在消除大气中过量的二氧化碳方面发挥着重要的作用,只不过这个过程是以地质时间为尺度的,也就是说要耗费十万年甚至更久远的时间。

矿物风化的自然过程始于降水,雨水会从空气中吸收二氧化碳,然后与土壤中的岩石和生物发生反应,形成可溶的矿物碳酸氢盐和少量的碳酸根离子。随后,这些物质会流入海洋,而其中的碳元素将以这些形式在海洋中储存数千年,然后变成碳酸盐矿物质沉入海底。通过添加碎石或其他碱性物质,使其与海水中的二氧化碳反应。这种方法可以极大地加快风化进程,从而最终消耗大气中的二氧化碳,使其变成可溶解的矿物碳酸氢盐和碳酸盐这两种海洋中早已大量存在的化合物。

目前提出的加速矿物风化和海洋碳封存的方法有很多,比如向地表水域中添加碱性矿物质细粉,或生石灰( $\text{CaO}$ )、氢氧化钙( $\text{Ca(OH)}_2$ )和碱液或烧碱( $\text{NaOH}$ )等常见的工业碱性化学物质。这些化合物一旦加入海洋,就会与海洋和大气中的过量二氧化碳发生反应,形成稳定、可溶的矿物碳酸氢盐,从而去除和封存二氧化碳。

上述这种海洋碱化过程可以通过从陆地上或者利用船只向海中添加碱性物质来实现。另外一种提案则建议就地取材,利用海洋能源(如利用海洋垂直温差进行发电)在海上制造碱性物质。还有一个方案就是让废弃二氧化碳与矿物质在岸上发生反应,然后将反应产生的可溶碱性物质泵入海洋。上述所有这些方案都只是增加了海洋中本就丰富的碳酸氢盐和碳酸盐储量而已。

海洋碱化的另外一个好处就是有助于对抗海洋酸化,而后者正是海洋吸收过量二氧化碳而导致的另一个问题。海洋酸化会干扰牡蛎、蛤蜊和珊瑚等钙化生物骨骼或外壳的形成过程,并影响其他对海洋酸碱性较为敏感的海洋生物。

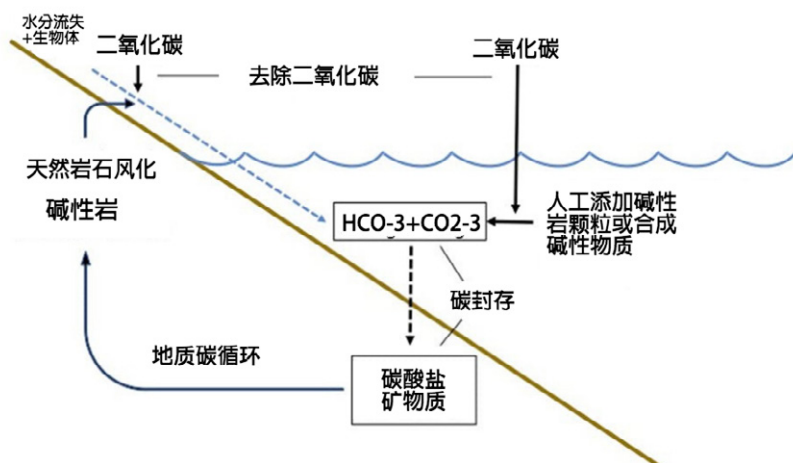
## 那些我们不知道的事情

目前,海洋碱化在对抗气候变化和海洋酸化方面的实际作用还是未知。

考虑到提取或制造碱性物质并进行投放的物流、成本和影响,研究估计,将空气中二氧化碳排放量降低 30ppm 甚至更低可能还是比较现实的。鉴于工业化之前大气中的二氧化碳含量为 260ppm 到 270ppm,而现在的水平为 410ppm,这种方式在对抗气候变化方面还是有些帮助的。

我们通过计算发现,将全球大气二氧化碳含量降低 30ppm 需要人类活动接近零排放水平,同时清除和封存大约 4700 亿吨二氧化碳。要想实现这个目标,至少需要约 5000 亿吨矿石制造海洋碱化所需的碱性物质。目前,全球岩石年开采量为 500 亿吨。因此,必须在其他岩石用量保持稳定的情况下,将开采量增加 50%,才能在理论上满足我们未来 20 年的二氧化碳清除需求。当然了,我们需要广泛开展小范围测试,以确定现实的全球开采量和开采率可能是多少。

我们不仅要考虑碱性物质的生产问题,还要考虑海洋碱化对海洋生态的潜在负面影响。除 PH 值和碱度(瞬时或逐渐)升高的影响外,添加的碱性物质中可能还会含有其他成分或化合物,比如微量金属和二氧化硅,而这些成分或化合物也会影响海洋生态化学环境。虽然目前针对这类问题的研究还很少,但目前得到的研究结论通常是,海洋碱化要么对海洋生物没有影响,要么会带来积极影响。要想充分了解这



一过程相关的环境和生态后果，我们必须进行深入的调查研究，包括进行中小规模的实地试验。

无论采取哪一种去除模式，都必须遵守严格的监管规定，评估大规模开采此类操作的环境效益和负面影响。自然矿物风化和由此向海洋输送碱性物质的过程在自然界已经有数十亿年的历史（目前，全球海洋每年消耗和封存大约 10 亿吨的二氧化碳）。显然，这种碱性物质的输入或许并非海洋生态系统所必须的，但它却能很好地适应其存在。这一点也许能够让海洋碱化在某种程度上具有一定的可信度。不过，安全、显著地扩大这一自然过程的可能性还需要进一步的研究。

## 法律问题

从法律层面来看，各国还必须解决这种方式相关的国际监管问题。既

“  
目前，海洋碱化在对抗气候变化和海洋酸化方面的实际作用还是未知。  
”

然《巴黎协定》侧重于解决气候变化问题，那么它理所当然可以成为应对这一问题机制的一个机制。无论海洋碱化在各国削减温室气体排放方面将发挥怎样的作用，都要制定规则，对潜在的影响进行评估。《巴黎协定》可以为此提供便利，因为该协定在不少条款中都提到了必须在生态系统、可持续性、发展和人权的语境下对气候变化应对措施的影响进行评估。

而《防止倾倒废物和其他物质污染海洋公约》、《联合国海洋法公约》和《海洋法公约议定书》等海洋领域的国际机制也可以参与评估和监管，当然，还包括《生物多样性

公约》。开展海洋碱化行动的过程中，如何协调上述所有机制的潜在干预也是一个不小的挑战，而在其他可能产生跨境影响的二氧化碳去除行动中也可能存在同样的问题。

到本世纪末，气候变化可能带来一系列灾难性的风险，而这也激励人们研究出了各种新的大规模去除海洋和大气二氧化碳的技术方案。但是，这些方案本身也可能会带来风险。通过增加碱性物质来加速矿物风化就是一个这种值得认真考虑的方法，不过在正式实施前还是要进行严格的审查。⑤

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# Can we tweak marine chemistry to stave off climate change?

To remove excess carbon dioxide we should consider adding alkaline materials to the ocean

□ Wil Burns   Greg H Rau

The world's nations are nowhere near to meeting the global Paris Agreement's goals on climate change of holding global temperature increases to 2C compared to nineteenth-century averages, much less its more aspirational goal of holding temperatures to a 1.5C rise.

The most recent Emissions Gap Report from the United Nations Environment Program notes "global greenhouse gas emissions show no signs of peaking". According to another study, the chance that humans can limit warming to no more than 2C by 2100 is no more than 5%, and it's likely that temperatures will rise somewhere between 2.6 and 3.7C by the end of the century.

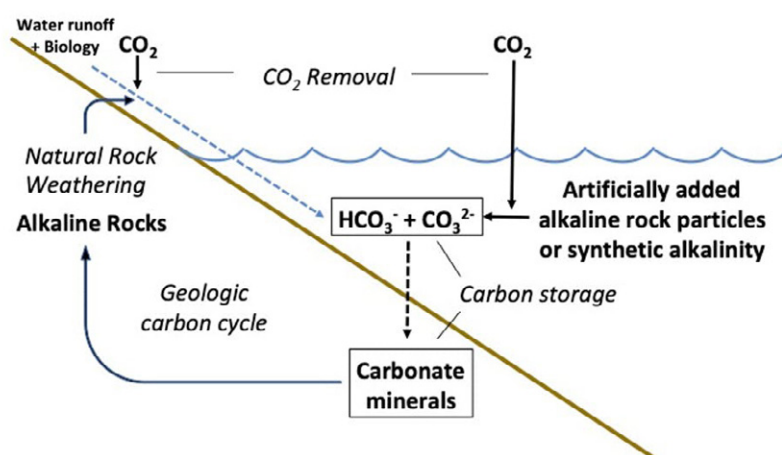
These foreboding trends have led to an increasing focus on ways to remove carbon dioxide from the atmosphere. Among the methods being explored is the use of the ocean to absorb and/or store carbon by adding crushed rocks or other sources of alkalinity to react with CO<sub>2</sub> in seawater, ultimately consuming atmospheric CO<sub>2</sub>.

Could this type of large-scale carbon dioxide removal work? A closer look illustrates the potential environmental trade-offs of deploying marine carbon dioxide removal and the complex technical, economic and international governance issues it raises.

## Land versus ocean carbon capture and storage

We and other researchers see the ocean as a logical place to look for additional carbon dioxide removal opportunities since it currently passively absorbs about 10 gigatons (10,000,000,000 tons) of CO<sub>2</sub> per year or about one-quarter of the world's annual emissions. In addition, the oceans contain vastly more carbon than the atmosphere, soils, plants and animals combined, and may have the potential to store trillions of tons more.

The latest report from the Intergovernmental Panel on Climate Change focused heavily on land-based methods for carbon capture and storage. One prominent technique is called bioenergy with carbon capture and storage,



BECCS, where plant biomass would be burned to produce usable energy and the resulting CO<sub>2</sub> is pumped underground.

However, there are a number of concerns about the potential negative impacts of large-scale deployment of BECCS and other land-plant-based methods, notably the worry that huge amounts of agricultural land would be diverted to grow dedicated crops. This could reduce access of low-income populations to food, place demands on water and have serious negative impacts on biodiversity due to ecosystem disruption.

### Speeding up geochemistry

Perhaps the best-known – and at times, controversial – method for marine carbon dioxide removal is stimulating photosynthesis to increase CO<sub>2</sub> absorption. For example, in regions where marine plant growth is limited by iron, this element can be added to enhance CO<sub>2</sub> uptake and carbon storage where at least some of the biomass carbon formed eventually sinks to and is buried in the ocean floor. Other approaches include restoring, adding or culturing marine plants or microbes, such as Blue Carbon.

Another technique being considered is to try to accelerate the chemical reaction of CO<sub>2</sub> with common rock minerals, a natural process known as mineral weathering. When rain reacts with alkaline rocks and CO<sub>2</sub>, there's a chemical reaction, which can be catalysed by biological activity in soils, that converts the CO<sub>2</sub> to dissolved mineral bicarbonate and carbonate ions which then typically run off into the ocean. Mineral weathering plays a major role in removing excess atmospheric CO<sub>2</sub>, but only on geologic time scales – 100,000 years or more.

The natural process of mineral weathering starts with rain which absorbs carbon dioxide from the air and then reacts with rock and biota in soils, forming dissolved mineral

bicarbonate and a much smaller quantity of carbonate ions. These then run off into the ocean where the carbon is stored in these forms for many millennia before precipitating to the ocean floor as carbonate minerals. The idea of enhanced weathering is to greatly speed up this process by adding crushed rocks or other sources of alkalinity to react with CO<sub>2</sub> in seawater, ultimately consuming atmospheric CO<sub>2</sub> and adding it as dissolved mineral bicarbonate and carbonate to the already very large reservoir of these compounds in the ocean.

Various ways to accelerate mineral weathering and ocean carbon storage that have been proposed include adding to surface waters finely ground alkaline minerals or adding common, industrially produced alkaline chemicals, such as quicklime (CaO), calcium hydroxide (Ca(OH)<sub>2</sub>), and lye or caustic soda (NaOH). Once added to the ocean, these compounds react with excess CO<sub>2</sub> in seawater and air, principally forming stable, dissolved mineral bicarbonate, thus removing and sequestering CO<sub>2</sub>.

Such ocean alkalization could be achieved via distribution from shore or by ships. Another proposal is to manufacture alkalinity at sea using local marine energy sources: for example, employing electricity derived from the ocean's very significant vertical temperature gradient. Reacting waste CO<sub>2</sub> with minerals on shore and then pumping the resulting dissolved alkaline material into the ocean is also an option. All of the preceding would simply add to the already vast bicarbonate and carbonate reservoir in the ocean.

An additional benefit of ocean alkalization is that it also helps counter ocean acidification, the “other CO<sub>2</sub> problem” stemming from the ocean's absorption of excess CO<sub>2</sub> from the air. Acidification can interfere with the ability of calcifying organisms, such as oysters, clams and corals to construct their skeletons or shells, as well as impact other pH-sensitive marine biogeochemical processes.

The spectre of catastrophic climate change by the end of the century has stimulated interest in an array of technology to remove CO<sub>2</sub> from the ocean and atmosphere.



## What we don't know

The actual practical capacity of ocean alkalization to counter climate change and acidification remains uncertain.

Considering the logistics, cost and impacts of extracting or manufacturing alkalinity and dispersing it, studies estimate that air CO<sub>2</sub> drawdowns of perhaps 30 parts per million or less might be realistic. This would be helpful given that the level of CO<sub>2</sub> in preindustrial times was 260-270 parts per million and is now 410 parts per million.

We calculate a global drawdown of atmospheric CO<sub>2</sub> by 30 parts per million would require near-zero emissions from human activities, plus the removal and storage of some 470 gigatons of CO<sub>2</sub>. To achieve this, a minimum of roughly 500 gigatons of rock would need to be used to generate the required alkalinity. Current global rock extraction is on the order of 50 gigatons per year, so holding other rock uses steady while increasing this extraction rate by 50 percent could theoretically allow us to achieve the drawdown in 20 years. This obviously needs to be tested at vastly smaller scales to determine what global capacity and rates might be realisable.

Nor is this just a matter of alkalinity production; there are potential negative impacts of ocean alkalization on marine ecosystems that need to be considered. In addition to the effects of pH and alkalinity elevation (either instantaneous or gradual), alkalinity addition would likely carry with it other elements or compounds, such as trace metals and silica, that can also affect marine biogeochemistry. Little research has been conducted on these points, but the results so far generally find no or positive effects on marine life. Further investigation is needed to fully understand the environmental and ecological consequences, including conducting small and medium-sized field trials.


Any deployment would need to be subjected to strict monitoring requirements to assess both the environmental benefits and well as the negative impacts of large-scale deployment. Some measure of confidence in the use of ocean alkalization might be found in the fact that natural mineral weathering and alkalinity delivery to the ocean has naturally occurred for billions of years (currently at the

rate of about 1 gigaton of CO<sub>2</sub> consumed and stored per year), apparently with the marine ecosystem well adapted to, if not requiring, this input. Nevertheless, the possibility of significantly and safely scaling up this natural process requires further research.

## Legal questions

At a legal level, countries would need to address international governance issues associated with this approach. Presumably, the Paris Agreement would be one of the regimes involved given its focus on addressing climate change. Any role ocean alkalinity could play in countries' pledges to mitigate emissions would require provisions that mandate assessment of potential impacts of deployment. The Paris Agreement could facilitate this given its references in various provisions to the need to assess the impacts of response measures in the context of ecosystems, sustainability, development and human rights.

Ocean-focused regimes such as the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and the Law of the Sea Convention, and its Protocol, might also seek to be engaged in assessment and regulation, as well as the Convention on Biological Diversity. Coordinating the potential interventions of all of these regimes' responses would be another challenge posed by deployment of ocean alkalinity, as would the many other carbon dioxide removal approaches that could have transboundary impacts.

The spectre of potentially catastrophic climate change by the end of the century has stimulated interest in an array of new technological options to remove CO<sub>2</sub> from the ocean and atmosphere at large scale. But they could also pose risks of their own. Adding alkaline materials to speed up mineral weathering is one such approach that deserves serious consideration, though only after thorough scrutiny. 

*This article is republished from The Conversation*

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# 大卫·奥布拉： “拯救珊瑚礁，我们做的还不够”

中外对话海洋在阿布扎比举行的世界海洋峰会上  
采访了珊瑚专家大卫·奥布拉，了解珊瑚的未来情况。

□ 杰西卡·奥尔德雷德

3月，“中外对话海洋”出席了在阿布扎比举行的经济学人世界海洋峰会。此次会议上，决策者、商界和科技界领袖、科学家以及民间社会团体齐聚一堂，共同讨论全球海洋面临的威胁，以及创建可持续海洋经济需要采取的措施。

我们采访了非营利组织印度洋沿海海洋研究与开发（CORDIO）东非项目主管、国际自然保护联盟珊

瑚专家小组主席大卫·奥布拉。他向我们介绍了珊瑚礁的未来前景。

## 为什么珊瑚保护具有全球性意义？

珊瑚之所以重要是因为它们是热带浅水珊瑚礁生态系统的构造者。珊瑚生长的位置和方式让它们成为生物多样性最为丰富的海洋生态系统之一。不仅如此，它们给人类带来的福利也是最大的，特别是给贫困国家，以及富裕国家带来的渔业、旅游业、海岸防护等方面的好处。所以，珊瑚有非常高的生态系统服务价值。

## 珊瑚的现状如何？

最新的科学研究显示，即使按照巴黎协定的规定，（将全球变暖）控制在1.5℃，我们也将失去70%到90%的珊瑚礁。如果是2℃，那么所有的珊瑚礁都将消失。这是一个相互关联的全球性生态系统。可能某些地方还会有珊瑚礁生存下来，但会非常罕见。少量

珊瑚可能会存活下来，生长在岩礁和礁石表面，但它们不会像以前那样构造珊瑚礁生态系统。

## 这对海洋而言意味着什么？

没有珊瑚礁，海洋就少了一个生物多样性最丰富的生态系统。25%的海洋物种一生中都会有部分时间是在珊瑚礁上度过的。对这些物种而言，失去珊瑚礁意味着什么，我们还不完全清楚。它们当然不会全部消失，但许多物种会失去生命周期中的一个关键部分。然后，热带沿海海域的生产力会大幅下降，而相关国家获得的益处也会大大减少。

## 我们正在采取哪些措施来对抗这一问题？

我们在拯救珊瑚礁方面做的还不够，现在主要是两方面的问题。一个是全球性的，也就是二氧化碳和温室气体排放。如果我们想拯救珊



© David Obura

大卫·奥布拉

瑚礁，那目前的状况很不利。其次就是珊瑚礁面临的区域性威胁，主要是人口带来的问题——人口数量和经济活动。这两方面的增长已经超出了上限，而且目前还没有什么真正能够控制它们的政策。所以，珊瑚礁的状况正在全面恶化。现在也有很多保护行动，比如建立海洋保护区，还有我们在这次会上讨论的措施。但我们并没有触及到问题的本质。

### 有没有什么新的技术解决方案？

现在有很多关于恢复改善珊瑚和珊瑚礁未来发展的研究，我是科学家，当然支持研究。但事实上现在的行动都没有真正起到恢复珊瑚礁生态功能的作用。你可以种下一株株的珊瑚，甚至可以种上万株，但它们不能真正地修复珊瑚礁的功能。所以打个比方，你不可能到渔业社区里去说可以通过修复珊瑚礁来让渔业恢复到过去的状态，因为我们做不到这点。

### 有没有哪些珊瑚礁比其他的更重要，更需要拯救？

有一个名为“50珊瑚”的项目，就是专注于确定最需要拯救的珊瑚礁区域。这个项目甚至还（因为这种缩小范围的做法）引发了很多争议。东南亚的珊瑚礁三角区，还有一些主要的太平洋岛屿地区都是关

“  
没有珊瑚礁，海洋就少了一个生物多样性最丰富的生态系统。  
”

键的珊瑚礁区域。我们已经确定印度洋的莫桑比克海峡北部，以及红海和南亚的一些地方是珊瑚礁连通性和多样性的关键地区。

### 那大堡礁呢？

大堡礁最大，所以一直被当做典型。但多样性最丰富的珊瑚礁实际上在印度尼西亚和菲律宾地区。就物种多样性和与其他珊瑚礁的连通性而言，那里确实是世界上最重要的珊瑚礁地区。

### 这次会议上有很多关于蓝色经济和提高海洋生产力的讨论，您觉得珊瑚在其中起到了什么作用？

珊瑚是蓝色经济内涵的核心部分，蓝色经济应该围绕可持续投资。会上有关于红树林、蓝碳、以及为红树林、海草和珊瑚礁提供的生态系统服务支付费用的讨论。如果我们这样做了，如果我们真的投入资金来保障这些服务，对于我来说，这才是蓝色经济的含义。珊瑚礁支撑着那么多国家和地区的经济，它们是蓝色经济的一部分，但

我们还没投入资金来确保它们的生产力得到保护。

### 请谈谈您的CORDIO东非项目

CORDIO是一个在肯尼亚注册的非营利性研究机构。我们在东非和西印度洋地区开展工作，大约涉及10个国家——属于相当明确的珊瑚礁区域。我们正在努力支持对所有国家进行统一监测，努力开展研究以了解珊瑚礁的气候脆弱性，以及了解保护可持续渔业所应采取的措施。所谓可持续渔业是指当地那些具有“气候智能型”的特点，能够在气候变化的压力下存活下来的小型渔业。我们还为珊瑚礁保护相关的政策和管理提供建议。

### 该地区保护珊瑚礁的政治意愿强吗？

在我们开展工作的地区，许多穷人生活在海边，靠捕鱼为生，所以保护珊瑚礁和海洋是有其政治意义的。此外，随着非洲的不断发展，我们也在寻求增长，所以海洋经济可以真正被视为未来的解决方案。但我们得把事情做对了，我们还没有以可持续的方式推动这一进程的政治意愿。☞

杰西卡·奥尔德雷德，中外对话项目编辑，专注于包括海洋和生物多样性在内的全球性环境议题



# David Obura: 'We are not doing enough to combat the decline of coral reefs'

Dealing with greenhouse gas emissions and overexploitation is key to sustainability

□ Jessica Aldred



*David Obura diving off the coast of Madagascar*

The Economist World Ocean Summit in Abu Dhabi this month brought together policymakers, business and tech leaders, scientists and civil society groups to discuss the threats to the world's oceans, and how to create a sustainable ocean economy.

One of the experts we interviewed was David Obura,

director of CORDIO East Africa (Coastal Oceans Research and Development – Indian Ocean), a non-profit research organisation based in Kenya. David is also chair of the coral specialist group at the International Union for the Conservation of Nature. We asked him about the outlook for coral reefs.



**Why does coral matter in global conservation terms?**

It matters because corals are the architects of coral reef ecosystems in shallow tropical waters. Because of their location and how they grow, they are one of the most biodiverse marine ecosystems. They also provide amongst the highest levels of benefit to people – in poor countries in particular, but in rich ones too – in terms of fisheries, tourism and coastal protection.

**What is the current status of coral?**

The latest science is that even with the Paris climate agreement [to hold global warming] to 1.5C, we will lose 70-90% of coral reefs, and at 2C we are likely to lose all coral reefs. That's as a globally connected ecosystem – there may be coral reefs that survive in some pockets but they will be quite rare. And there will be some places with a few corals surviving, growing on rocky reefs and reef surfaces, but they won't be constructing a reef ecosystem in the same way as we have been used to.

**What does this mean for our oceans?**

Twenty five per cent of all marine species are supposed to spend part of their life cycle on a coral reef. What it means for that 25% of species we don't entirely know. We won't lose all of them of course, but many will lose a key part of their life cycle. And the productivity of tropical coastlines will go down significantly, so the benefits received to those countries will be much reduced.

**What are we doing to combat decline?**

We're not doing enough. There are two main areas. One is global, and that's carbon dioxide and greenhouse gas emissions. We're still on the bad side of these scenarios if we want to save coral reefs. Second is all the local threats to reefs, basically based on population – the number of people and economic activity. Both of these are growing through the roof without any real policies about bringing

**"We don't yet have the political will in Africa to develop the ocean economy sustainably."**

them under control. So we're worsening the situation for reefs across the board. There is a lot of conservation action – marine protected areas, and things we are discussing here at this conference. But we're not really dealing with the fundamentals.

**Are there any emerging technology solutions?**

There is a lot of research currently on restoration and improving the prospects for corals and coral reefs, and I'm a scientist so I certainly support research. But the truth is at the moment none of the actions really restore ecological function on a reef. You can grow individual corals, and you can grow 10,000 corals, but they don't really restore the functions of the reef. So you can't go in and claim to a fishing community, for example, that you can restore the fisheries that they used to have by restoring their coral reef, because we can't do that.

**Are there some coral reefs that are more important than others to save?**

There is a project called the 50 reefs to identify the most in-need reef areas, and even [narrowing it down] created a lot of controversy. The key reef regions really are the Coral Triangle in Southeast Asia, some of the main Pacific island areas, in the Indian Ocean we have identified the northern Mozambique channel as a key area for connectivity and diversity of coral reefs, and some areas in the Red Sea and South Asia as well.

**What about the Great Barrier Reef?**

The Great Barrier Reef is the poster child for coral reefs because it's the biggest one. But really the most diverse

reefs are in the Indonesia and Philippine regions. For species diversity, and connectivity to other reef areas, that really is the most important reef area in the world.

**There has been a lot of talk at this conference about the blue economy and making our seas more productive.**

**How do you see coral fitting into that?**

Corals are a core part of what the blue economy should be about, and the blue economy should be about sustainable investments. A discussion has come up here on mangroves and blue carbon and paying for the ecosystem services that mangroves, sea grasses and coral reefs provide. If we do that, if we really invest the money to ensure those services are sustained then that's what the blue economy means to me. Coral reefs – because they support so much of national and local economies they are a central part of the blue economy – but we're not yet financing to make sure their productivity remains intact.

**Tell us about your CORDIO East Africa project**

CORDIO is a research organisation, we're a non-profit registered in Kenya. We work at the regional level in

eastern Africa and the western Indian Ocean, so it's about 10 countries. It's a coral reef region that's quite well defined. And we are trying to support consistent monitoring across all countries. We are trying to do research to help understand the climate vulnerability of coral reefs and also what needs to be done for sustainable fisheries – local, small-scale fisheries that are “climate-smart” and can survive the pressures of climate change as well, and advise on the policy and management necessary to sustain reefs.

**Is there a strong political will in this region for preserving reefs?**

In our region we have political interests in coral reefs and the ocean because a lot of poor people depend on fishing and live by the sea. Also, with the reality of African development we are looking for growth so the ocean economy is really being looked at as a solution for the future. But we have to do it right. We don't yet have the political will to do it sustainably. ↻

*Jessica Aldred is special projects editor for chinadialogue, focusing on globally important environment themes including the ocean and biodiversity.*

# 拉丁美洲“南锥体”国家 如何引领海洋保护

南锥体国家加紧保护海洋的举措将有利于保护生物多样性、增强渔业恢复力以及碳固存。

□ 费尔明·库普

**作** 为世界上生物多样性最丰富的地区之一，智利、阿根廷和乌拉圭正在加紧保护数百万平方公里的海洋。

此举是到 2020 年保护全球至少 10% 的海洋和沿海地区的目标的一部分。

海洋保护区（即受到管理和保护的海域）的面积正在增加，目前已经覆盖拉美 8.4% 的海域，这大部分

要归功于阿根廷、智利、乌拉圭和巴拉圭这几个南锥体国家。

海洋健康事关地球上的所有生命。几乎所有海洋的日光区都生活着浮游植物。这些微生物制造了全球约一半的氧气。但海洋面积正在缩小，主要原因是人类活动。海洋保护区被认为是保护海洋健康，应对过度捕捞、污染以及酸化影响的关键工具，能同时带来生态效益和经济收益。

“发展、人口膨胀和气候变化等因素影响了生物多样性及其所依赖的系统。这种影响一部分可以通过海洋保护区来解决。海洋保护区可以帮助恢复受影响区域的资源量，”巴塔哥尼亚海保护论坛负责人克劳迪奥·坎帕尼亚说。

海洋保育区是海洋保护区中管理等级最高的一种，禁止一切采矿、挖掘和捕捞活动。这种保护区可以通过保护生物多样性、增强生态系统复原力、支持渔业生产力以及保护海洋传统文化来让海洋恢复健康。

实际情况显示，规划得当的海洋

保护区有助于增加鱼类的生物量，并为鲨鱼等掠食性生物提供恢复的途径。例如在厄瓜多尔加拉帕戈斯群岛进行的一项研究发现，有一处海洋保护区周围水域的渔获量更高。

保护区可以促进旅游，从而带动经济增长。智利政府于 2014 年制定了一项计划，目的是促进保护区旅游业的可持续发展。当年智利全国游客人数达 300 万人次，较 2007 年增加了 88%，一部分要归功于政府的这些举措。

海洋保护区还有助于改善生物多样性、遗传多样性、碳固存，甚至还能增强二氧化碳的吸收。保护区能够增强生态系统的复原能力，对于那些靠海洋而生的社会来说，可以保障他们的福祉。

“和几十年前森林的情况一样，人类意识到海洋资源并不是取之不尽的，人类施加给海洋的压力造成的影响开始显现，”非政府组织野生生物（Vida Silvestre）海洋保护区项目协调员赫尔曼·帕勒说。“海洋保护区的增长是人类为子孙后代保护资源的一种方式。”

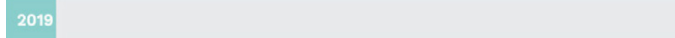




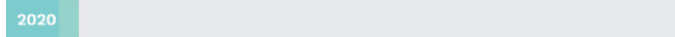
## 保护我们的海洋



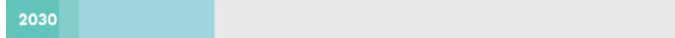
仅有7%出头的海洋得到正式的保护(当前)



联合国的目标是至少10%的沿海和海洋地区得到保护(到2020年)



科学家和保护组织提出了更高的目标,即30%的沿海和海洋地区得到保护(到2030年)



## 模范智利

智利在建立海洋保护区方面走在了世界的前列。目前智利共有25个海洋保护区,占其领海面积的44%。2010年以来,智利海洋保护面积已经从46.3万平方公里增至130多万平方公里。

当时,智利正开始感受到过度捕捞的压力,不受管制的捕鱼活动肆虐数十年,鱼类资源因此减少。政府将海洋保护区视为恢复鱼类种群的一种方式,并开始与科学家、社区以及非政府组织合作,快速扩大受保护海域的面积。

“这不是国家或某个组织的事,如果没有社区的参与,海洋保护区就会失败,”非政府组织 Oceana 执行董事莉斯贝斯·范德米尔说。

智利的海洋保护区主要分为四类:海洋公园、海洋保育区(这两种基本上是水生保护区)、自然庇护所和海洋及沿海地区(这里可以开展捕鱼、旅游等一些受管制的活动)。以上四种保护区由智利环境部管理,受智利海军保护。

最新也是最重要的措施之一是去年前总统米歇尔·巴切莱特签署的一项法律。该法将三个重要地区纳入保护范畴。

捕鱼仍可继续。这是世界上为数不多的由原住民投票确定范围和保护水平的海洋保护区之一。

第二个是超过26万平方公里的胡安·费尔南德斯群岛保护区,该保护区内禁止一切活动。

排名第三的是位于智利最南端的迭戈·拉米雷斯保护区。该保护区面积5.56万平方公里,拥有南极以外所剩无几的完整生态系统。

“几年前,智利人还认为海洋就是指海滩那一块,没有人会看得更远。现在情况已经变了,人们与海洋资源之间的关系也不同了,”《国家地理》原始海洋计划负责人亚历克斯·穆尼奥斯说。

其中最大的拉帕努伊海洋保护区面积超过72万平方公里。该保护区内禁止一切工业捕鱼和采矿活动,但传统

但挑战依然存在。大多数海洋保护区都位于离岸海域,海岸附近的仅占1%-2%。专家们一致认为,接下来的任务是确定有价值的区域,与社区开展合作,同时力求不影响传统个体渔民。

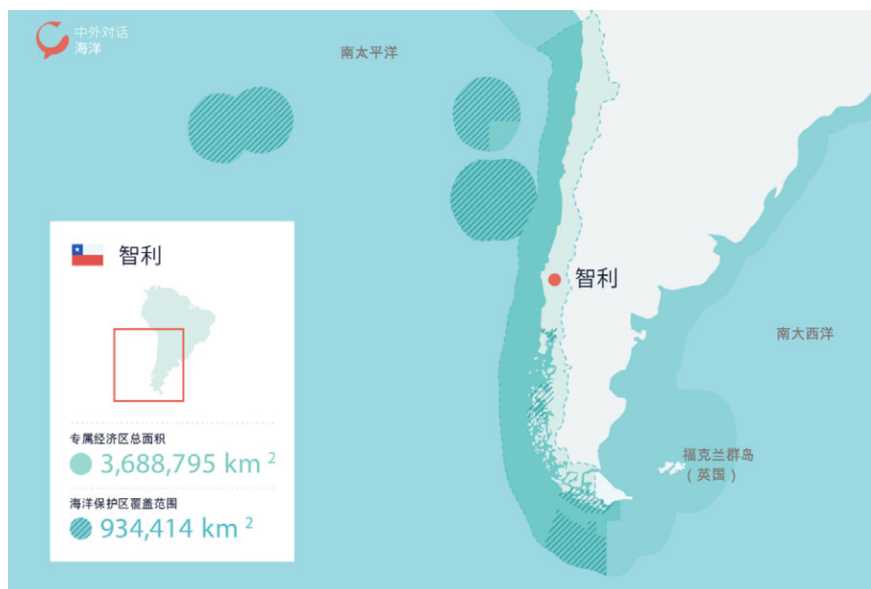
## 迎头赶上的阿根廷

阿根廷近来采取重大举措扩大海洋保护区网络。目前海洋保护区的面积占其领海面积的9.5%,并且即将实现联合国2020年的目标。

去年之前,该国受到保护的海洋面积还不到其领海面积的3%,不仅面积小,而且都位于沿海海域。唯一的离岸保护区是2013年建立的纳姆库拉-博尔伍德海滩一号保护区。

2018年12月,参议院通过一项法案,设立了两个新的海洋保护区,从而使受保护的海洋面积增加了两倍。这两个保护区分别是纳姆库拉-博尔伍德海滩二号保护区和亚加内斯保护区,二者都位于阿根廷的专属水域。

“保护区是与社会各方长期合作





后得出的结果。为了保障生态系统的功能性，我们确定了九处应受到保护的大区域。两个新的海洋保护区是其中的一部分，”帕勒说。

亚加内斯面积近 6.9 万平方公里，将分为三个区，禁止除海底科学研究外的所有活动，只允许在离陆地较近的区域捕鱼。

纳姆库拉面积超过 3.2 万平方公里，将分为两个区，西部允许以可持续的方式开展捕鱼活动，东部则禁止除科学研究外的一切活动。

这项法律不仅设立了新的海洋保护区，还规定由国家公园管理局负责保护区的管理，并由海军负责执法。之前阿根廷政府并未设立专门的管理机构，此举加强了国家对海洋保护区的控制和主权。

“我们现在有专门负责管理海洋保护区的机构，这确保了对非法捕鱼和采矿活动进行充分的控制，同时也为新建保护区提供了机会，”海洋养护专家米科·施茨曼说。

## 乌拉圭在追求更多保护

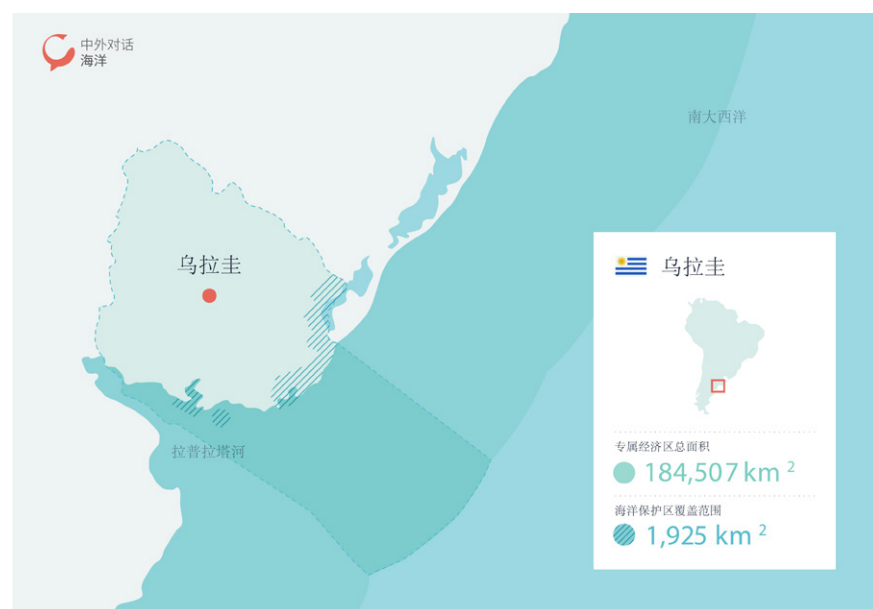
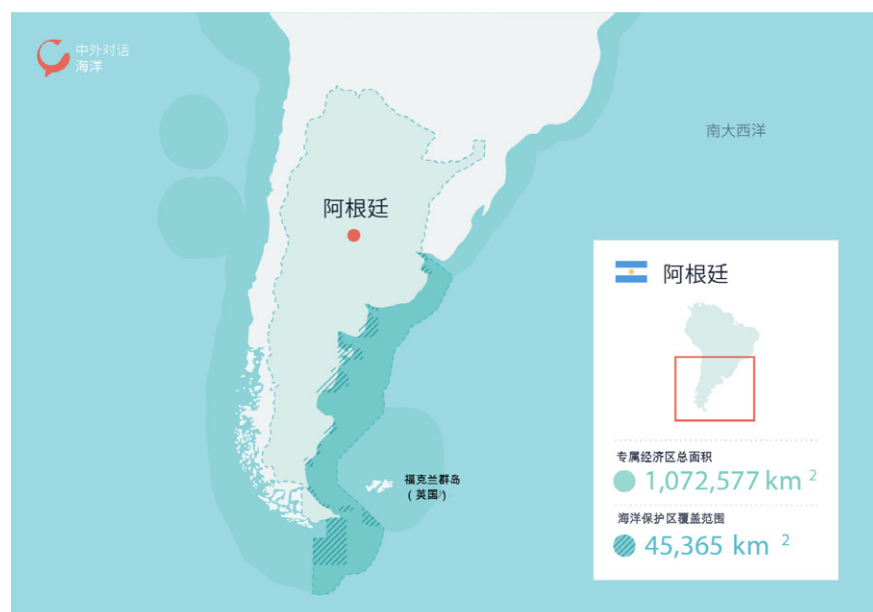
拉普拉塔河对岸的乌拉圭可能很快就能跟上阿根廷的步伐。在当地环境组织发起了一场运动之后，该国也开始扩大本国的海洋保护区网络。

乌拉圭目前有八个海洋保护区，不到全国海域面积的 1%。这些保护区由住房、领土和环境部下属的国家保护区系统负责管理。

包括罗查泻湖在内的所有海洋保护区都位于沿海或内陆。非政府组织称这些保护区不能代表该国的海洋生态系统，并提议设立一系列离岸海洋保护区。

“目前的保护区甚至没有一个统一的工作规划，而且没有社区的参与，”非政府组织 Oceanosanos 创始人罗德里格·加西亚·平加罗说，“如果我们推进新的离岸保护区，就将覆盖乌拉圭 18% 的专属经济区。”

费尔明·库普，阿根廷记者，致力于环境报道



## 海洋保护区 (MPA) 的数量



# How Latin America's 'Southern Cone' is leading the way for marine protection

The move will benefit biodiversity, fisheries resilience and carbon sequestration

□ Fermín Koop

Home to some of the world's most biodiverse areas, Chile, Argentina and Uruguay are stepping up the protection of millions of square kilometres of ocean.

The move is part of a global target to safeguard at least 10% of the world's marine and coastal areas by 2020.

Marine protected areas (MPAs) – stretches of water managed for conservation – are rising and now cover 8.4% of Latin America's oceanic territory. Argentina, Chile, Uruguay, which along with Paraguay comprise the Southern Cone, are largely responsible for the increase.

Ocean health is critical to all life on the planet. Phytoplankton, the microscopic plants found in the sunlit area of almost all oceans, generates about half of the Earth's oxygen. But the oceans are in decline, largely because of human activity. MPAs are seen as a key tool to safeguarding the health of the oceans and tackling the impacts of overfishing, pollution and acidification. They can bring both ecological benefits and economic gains.

"Development, population expansion and climate change, among other factors, affect biodiversity and the systems



## Protecting our oceans

Just **over 7%** of the oceans are formally protected

2019

The UN aims to protect **at least 10%** of coastal and marine areas by 2020

2020

Scientists and conservation groups want a more ambitious goal of **30%** by 2030

2030

Main ocean threats:



## Overfishing



## Pollution



## Acidification



on which biodiversity relies. Part of the impact is solved with MPAs, which help to restock the affected areas,” said Claudio Campagna, head of the Forum for the Conservation of the Patagonian Sea.

Marine reserves – the strictest form of MPA – in which all mining, dredging and fishing is prohibited, can restore ocean health by protecting biodiversity, enhancing ecosystem resilience, supporting fisheries productivity and safeguarding cultural traditions tied to the seas.

Effectively placed MPAs have been shown to increase fish biomass and offer a path to recovery for predatory species such as sharks. A study in Ecuador’s Galapagos Islands, for example, found that waters surrounding an MPA supported higher catches.

MPAs can lead to economic growth through tourism. In Chile, the government created a plan in 2014 to promote sustainable tourism in them. conservation list Partly thanks to these efforts, the number of visitors nationwide reached three million, an 88% increase compared to 2007.

MPAs also help improve biodiversity, genetic diversity, carbon sequestration and even enhance the absorption of carbon dioxide. They can lead to more

resilient ecosystems and in turn help secure the wellbeing of societies that depend on healthy oceans.

“As was the case with forests decades ago, people have realised that the oceans aren’t a never-ending source of resources and that the pressure put on them are starting to show its effects,” said Germán Pale, coordinator of the MPAs programme at Vida Silvestre NGO. “MPAs expanded as a way to conserve resources for future generations.”

### Chile, the poster child

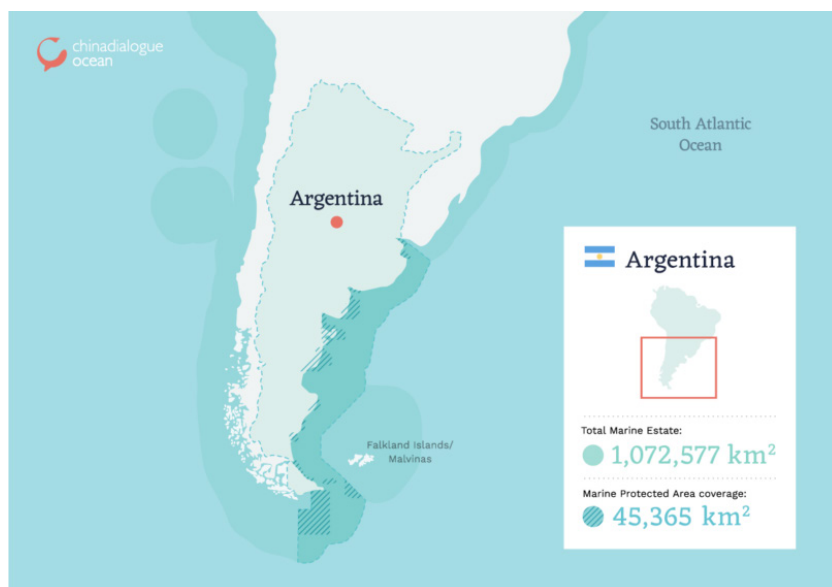
One of the world leaders in MPAs, 44% of Chile’s territorial waters is covered by 25 protection sites. Since 2010, the country has moved from having 463,000 square kilometres of protected marine territory to more than 1.3 million.

At that time, Chile was starting to feel the pressure of overfishing, with diminished resources following decades of unregulated activity. The government saw MPAs as a way to recover fish stocks and started working with scientists, communities and NGOs to quickly expand the protected territories.

“This isn’t something that was done from a specific organisation or from the state. Without the involvement of the communities, the marine protected areas would have failed,” said Liesbeth van der Meer, executive director of Oceana.

The country has various types of MPAs, most of which





agree the upcoming task will be to identify valuable areas and to work with communities, while seeking not to affect artisanal fishermen.

### Argentina, catching up

Argentina has recently taken significant steps to expand its network of MPAs, now representing 9.5% of its marine territory and on the verge of fulfilling the UN's 2020 goal.

Until last year, less than 3% of the country's marine territory was protected. These MPAs were small and coastal.

ban all activities except scientific research. Only one allows sustainable forms of tourism and fishing. All are managed by the environment ministry and protected by Chile's navy.

A significant event occurred last year when former president Michelle Bachelet signed laws to protect three main regions.

The largest, of more than 720,000 square kilometres, is the Rapa Nui MPA, around Easter Island, where industrial fishing and mining is prohibited but traditional fishing continues. It is one of the few MPAs in the world in which indigenous people voted to establish the boundaries and level of protection.

The Juan Fernández Islands rank second, at 261,598 square kilometres, and with complete protection from all activities.

The Diego Ramírez Island reserve, home to some of the last intact ecosystems outside the Antarctic region, follows in third place, with an area of 55,600 square kilometres at Chile's southernmost point.

"A few years back, Chileans considered the sea just a synonym for the beach. Nobody looked beyond that. This has now changed, and people relate differently with the marine resources," said Alex Muñoz, head of National Geographic's Pristine Seas initiative.

Nevertheless, challenges remain. Most of the MPAs are offshore, with only 1-2% located near the coast. Experts

The only protected oceanic area was Namuncurá/Banco Burdwood, created in 2013.

In December 2018, the Senate passed a bill to triple the safeguarded marine territory by creating two new MPAs: Namuncurá/Banco Burdwood II and Yaganes, both located in Argentina's exclusive waters.

"The protected areas came after long-term work with many actors of society. We identified nine large zones that should be protected to guarantee the functioning of the ecosystems. The new MPAs are part of that area," said Pale.

Yaganes covers almost 69,000 square kilometres and will be divided into three zones, prohibiting all activities except scientific research on the seabed and allowing fishing only in the area closer to the land.

Namuncurá covers over 32,000 square kilometres and will be divided into two zones. In the west, sustainable fishing will be allowed, while in the east, all activities will be banned except scientific research.

The law that created the new MPAs also put them under the authority of the National Parks Administration, where

**In December 2018, the Argentine Senate passed a bill to triple the safeguarded marine territory.**



previously they had not been managed by a dedicated body. The move gave the state more control and sovereignty over the MPAs, with enforcement carried out by the navy.

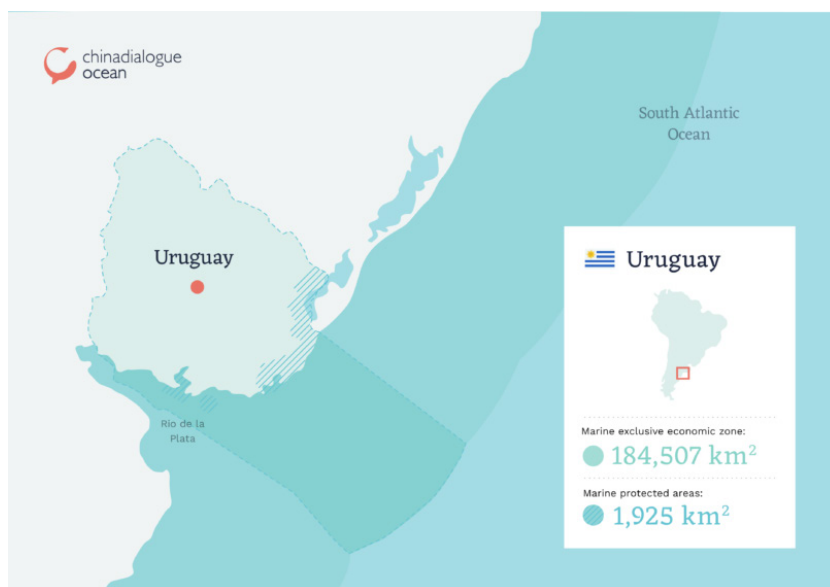
“The fact that we now have a body in charge of managing MPAs ensures that proper controls will be done to avoid illegal fishing and extractive activities, while opening the door to creating new protected areas,” Milko Schwartzman, a marine conservation expert, said.

## Uruguay, pushing for more protection

Just across the Río de la Plata, Uruguay could soon follow Argentina in expanding its network of MPAs after a campaign by local environmental organisations.

The country now has eight marine protected territories, representing less than 1% of its waters. They are managed by a National System of Protected Areas, which is part of the housing, territory and environment ministry.

All its MPAs are either coastal or inland. NGOs argue that they are not representative of the country’s marine ecosystem and are proposing the creation of a set of offshore marine reserves.



## Number of Marine Protected Areas



“The current areas don’t even have a consolidated work plan, with no involvement from communities,” said Rodrigo García Pingaro, founder of the NGO Océanosanos. “If we move forward with the new offshore MPAs, we would be covering 18% of Uruguay’s exclusive economic zone.”

*Fermin Koop is an Argentine journalist, specialising in the environment with experience across diverse publications such as the Buenos Aires Herald, Clarín, Ambito Financiero, Buena Salud and Notio Noticias.*

# 大型保护区：拯救还是瓜分海洋？

海洋保护区背后的驱动力究竟是地缘政治，还是保护意愿？

□ 弗雷德·皮尔斯

**我**们该如何保护海洋？它们占地球表面的三分之二，但却没有一处能逃过渔船和矿产勘探者的骚扰，也逃不过全球变暖和海洋酸化的潜在影响。

过去十年中，一直有人力推建立巨大的新海洋保护区。如今其总面积已经达到 970 万平方英里（2512 万平方公里），比北美大陆还要大。联合国环境署《生物多样性公约》执行秘书克里斯蒂亚娜·帕斯卡·帕尔默说，世界正在逐步达成 2020 年将 10% 海洋面积纳入保护的目标。

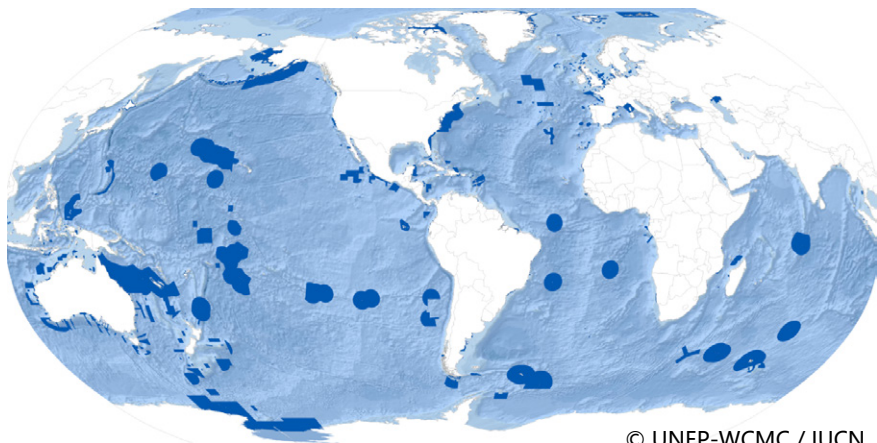
但问题也随之而来。保护面积的增加主要是因为建立了比很多国家还大的巨型海洋保护区，而且常常是在生物多样性威胁较低的偏远区域。因此，批评家们诘问道，建立这些又大又偏的海洋保护区是不是为了转移注意力，掩盖靠近本土的退化沿海生态系统的保护难题？又或者是不是一种出于地缘政治的考量，出于政治目的，采取秘密行动抢占海洋控制权？这是不是可以解释为何被划为海洋保护区的海域有半数都掌握在美国和英法这两个前欧洲殖民强国手中？

在多数海洋科学家看来，建立大面积的海洋保护区是海洋保护的一大福音。英国约克大学海洋科学家贝珊·奥里瑞说，这些海洋保护区成本效益很高，它们将不同的海洋生态系统联在一起，将鲸鱼和金枪鱼等洄游物种的活动范围更多地纳入了保护，并且“以较小海洋保护区无法做到的方式保护了联系各栖息地的走廊”。

但是，除了生态意义，这些新的大型海洋保护区的地理分布也反映出背后的政治意图。最大的美国海洋保护区都在阿拉斯加沿岸和夏威夷群岛周边国际公认的 200 海里

（370 公里）专属经济区（EEZ）之内。法国和英国则忙于主张其对一些小岛周围巨大的专属经济区的控制权，而这些小岛都是他们在欧洲殖民时期占据的。

英国国内水域的完全保护区域只有 2.9 平方英里（7.5 平方公里），但却承诺要在 2020 年之前对其偏远的领海周边 150 万平方英里（388 万平方公里）的海域实施“强化的海洋保护”。这个面积相当于英国本土面积的 16 倍多，圈定的海域包括迄今宣布的 12 个最大的海洋保护区中的 3 个，即：印度洋中的查戈斯群岛、太平洋中的皮特凯恩群岛和南



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目前，全球7.59%的海洋面积已划为海洋保护区

大洋中的南乔治亚岛,然后还将在南大西洋中的阿松森岛、圣赫勒拿岛和特里斯坦-达库尼亚群岛建立保护区。

法国紧随其后,承诺将在2020年之前建立85万平方英里(220万平方公里)的海洋保护区,包括新喀里多尼亚和法属波利尼西亚以及印度洋中的留尼汪岛和马约特岛周边的海域。

这些巨大的海洋保护区是一个相对较新的现象,其中大多数是在2010年《生物多样性公约》提出“10%的保护目标”后建立的。在此之前,大多数保护区都很小,目前全世界1.5万个海洋保护区中有一半左右仍然只有几平方公里。

但海洋保护区“变大”的趋势日益增强。海洋生态学家们认为,尽管小型的自然安全空间可以保护珊瑚礁、海草等特定的栖息地,但他们对更广泛的海洋生态系统和洄游鱼类种群的影响注定很小。部分出于这一原因,部分由于设计不良和执法不力,澳大利亚塔斯马尼亚大学最近的研究发现“研究范围内的大多数海洋保护区……的生态表现与渔场并无二致”。

一些科学家也指出沿岸海洋保护区往往让当地渔民损失惨重。由于捕鱼活动被列为非法,他们的生计中断,而大型商业渔船则只是走得更远,去破坏别的地方。有人呼吁制定行为准则来保护这些渔业社区。不列颠哥伦比亚大学的海洋地理学家内森·贝内特两年前在接受《耶鲁环境360》采访时说,保护沿海社区的利益是“海洋保护成败的分水岭”。

那么大型海洋保护区有用吗?大多数保护区位于偏僻、近乎原始的海

但是,除了生态意义,这些新的大型海洋保护区的地理分布也反映出背后的政治意图。

域,有大量的海洋生物可以保护。例如,美国夏威夷群岛的帕帕哈瑙莫夸基亚国家海洋保护区比两个得克萨斯州还大,栖息着7000个物种,其中四分之一是当地特有种。英国在印度洋的查戈斯群岛周围建立的海洋保护区有25万平方英里(65万平方公里),据该保护区的前任首席科学顾问、华威大学的查尔斯·谢泼德说,这里是“世界最大的未受到破坏的连片珊瑚礁区域”。这个保护区包括了世界最大的环礁——查戈斯大环礁,拥有310种珊瑚、821种鱼类(包括50种鲨鱼)和355种贝类。这个海洋保护区建立了世界最大的“禁捕”区,禁止所有商业捕捞。

但一些人说海洋保护的这些进展是夸大其词。美国国家地理学会的海洋生态学家恩里克·萨拉最近称,世界海洋10%的保护目标已接近完成的说法“不仅是错误的,而且会适得其反”。尽管7%的海洋已经在某种意义上被划为保护区,但实际得到保护的只有5%,禁止商业捕捞的只有2%。

萨拉指出,在承诺尚未落实的海洋保护区中,最大的两个分别是新西兰的克马德克海洋保护区和法国新喀里多尼亚的珊瑚海自然公园。此外,2009年行将离任的小布什政府在其位于西太平洋的关岛附近建立了马里亚纳海沟国家海洋保护区,但迫于来自北马里亚纳群岛渔民的压力,允许他们继续在该区域活动。

不过奥里瑞说,大部分划定的大型海洋保护区的管理计划已经到位或者正在准备中,而且无人机、雷达和卫星技术的发展使得执法活动要比过去更加容易。批评家们的第二个关切是大面积的海洋保护区对于保护海洋物种和生态系统免受切实威胁来说可能是“远水不解近渴”。

大多数大型海洋保护区都在偏远海域。根据奥里瑞最近参与撰写的一项研究报告,美国本土周边近海实施有力或完全保护的海洋面积不到1%,而偏远水域的这一比率则高达43%。

“珊瑚礁的希望”是加州科学院发起的一项倡议,其工作人员路易斯·罗查说,偏远的大型海洋保护区“总是将唯一能从空间保护中受益的区域,即那些靠近海岸的地方排除在外。它们保护的都是没有人使用的地区,这毫无意义”。实际上,他认为这比啥都不做还要糟糕,因为这让各国都能达到联合国的保护目标,减少了这些国家需要为真正有需求的地区提供保护的壓力。

罗查反驳说,就连这些海洋保护区的“大”也没有什么实际好处。“媒体和公众喜欢听到建立了‘有比利时那么大’的保护区,但对于金枪鱼之类的物种来说,比利时只不过就像你家的后院那么大。”

但奥里瑞和其他大型海洋保护区的拥护者辩称,大型保护区能为洄游物种提供比小型保护区更多的





一名潜水员在法国新喀里多尼亚的珊瑚海自然公园游泳，该公园是属于南太平洋的海洋保护区

保护。奥里瑞还说，即便它们无法应对迫切的眼前威胁，也能“主动为海洋原始区域提供防护以防未来开发”，就和保护陆地旷野一样。

一些批评家指出，很多大型海洋保护区的地缘政治意义和保护意义一样深厚。前者尤其适用于英法这两个前殖民国家的海洋保护区。它们圈定的保护区常常位于那些无人定居、孤悬大洋的小岛周围，这些小岛曾经是海军舰艇的燃料补给点，在 21 世纪则成了一些人所说的“海洋掠夺”的基地。英国宣布在与阿根廷有主权争议的南乔治亚岛建立一个海洋保护区，而其此前在印度洋腹地的查戈斯群岛建立的海洋保护区同样充满争议。

殖民时代，英国通过查戈斯群岛附近的毛里求斯对查戈斯群岛实

施管辖。但是，1965 年，也就是毛里求斯获得独立前的三年，英国人将查戈斯群岛从毛里求斯分离出去，并与美国签署了一项协议，允许后者在 60 个岛中最大的迪戈加西亚岛上建立大型美军基地。作为协议的一部分，英国人强行将 1500 名查戈斯人迁离家园。这些被放逐到毛里求斯和英国的居民一直在奔走，要求返回故乡并重操捕鱼等旧业。

这个诉求在 2010 年之后变得更加困难。这一年英国人在群岛周围建立了一个巨大的“禁捕”海洋保护区，只是将迪戈加西亚岛排除在外。维基解密公开披露的一条来自美国使馆的消息说，英国官员曾称“建立一个海洋公园实际上将终结重新定居的要求”。英国政府多次否认存在类似动机。

上个月，事情发展到了最紧要的关头。经历了数十年的法律争议后，联合国的最高法律机构——海牙国际法院裁定英国对查戈斯群岛的控制是“不合法行为”。法院判决说，应将包括海洋保护区在内的该群岛“尽快”返还给毛里求斯。

目前还远不清楚英国是否会接受这一判决。毛里求斯驻英使馆也没有回应公布其对海洋保护区计划的要求。但过去该国曾说过，尽管保有一个海洋保护区对它来说不是问题，但毛里求斯的诉求是让查戈斯人回归故园，并有权开发海洋资源，而这与“禁捕区”并不相容。

无论这些争议性海域的未来如何，保护海洋的更大效益依然存在。科学家们认为世界应该把保护目标从海洋面积的 10% 增加到 30%。这需



要国际社会通力合作来保护国家专属经济区之外三分之二的海洋。

目前海洋保护区只覆盖了0.5%的“公海”，而且都位于区域或国际条约覆盖下的海域。其中最大的是南极沿岸的罗斯海海洋保护区，面积几乎有阿拉斯加那么大，尽管因南极条约允许在这里捕捞磷虾而让人忧虑重重，这片海域仍是全世界最富生机的海洋生态系统之一。此外，还有查尔利-吉布斯海洋保护区。这一生物多样性热点保护区位于中北大西洋的极地和热带洋流交汇处，处于《东北太平洋环境公约》的管理之下。

但如果联合国能如期在2020年签订新的《公海公约》，将有更多的海洋保护区建立。按照日程，关于这个公约的谈判于3月在纽约继续进行。几乎可以肯定其条款中将包括在国际海域建立海洋保护区的内容。可能新加入的保护区之一是北大西洋英属百慕大附近的马尾藻海，这里是一片水流缓慢的区域，长满了漂浮的海藻，美洲和欧洲鳗鲡都在其中繁衍。

接下来问题就变成谁来为公海的海洋保护区提供资金并进行管理。这背后的推动力是私人慈善家们支持下的美国和其他保护团体，而这个团体近年来同样推动大型国家海洋保护区像井喷一样到处成立。

“保护国际”为法国在新喀里多尼亚周围设立海洋保护区出谋划策。设在瑞士的贝尔塔雷利基金会帮助建立了法属波利尼西亚和智利东岛周围的海洋保护区。在塞舌尔，大自然保护协会从包括演员莱昂纳多·迪卡普里奥在内的美国慈善家那里筹款，购买该国国债以建立两个大型海洋保护区。由美国一位对冲基金经理建立的路易斯·培根基金会则出资对英国阿森松岛周围的海洋保护区进行执法。

其中规模最大的是皮尤慈善信托基金会，它宣称已经“帮助保护了520万平方公里的海洋，相当于10个中美洲”。皮尤基金会最早提出并参与资助的是位于查戈斯群岛和皮特凯恩群岛的两个英国海洋保护区。另外，它还推动了美国马里亚纳

海沟国家海洋保护区等动议的实施。最近，它还与贝尔塔雷利基金会联合发起一项倡议，任命美国前国务卿约翰·克里和英国前首相戴维·卡梅隆为“海洋大使”。

皮尤基金会高级经理伊丽莎白·卡兰在一次电子邮件采访中说，她的组织正在帮助“确定公海中重要的生物多样性区域，并与各国政府合作制订计划”。这些非国家海洋保护区的监管将由条约签署国负责对其产业进行管理。

一些人将这些慈善组织视为地球的救世主，另一些人则将它们看作是将最后的全球共同财富之一逐渐私有化的代理人。无论是哪一种，都是个巨大问题。<sup>⑤</sup>

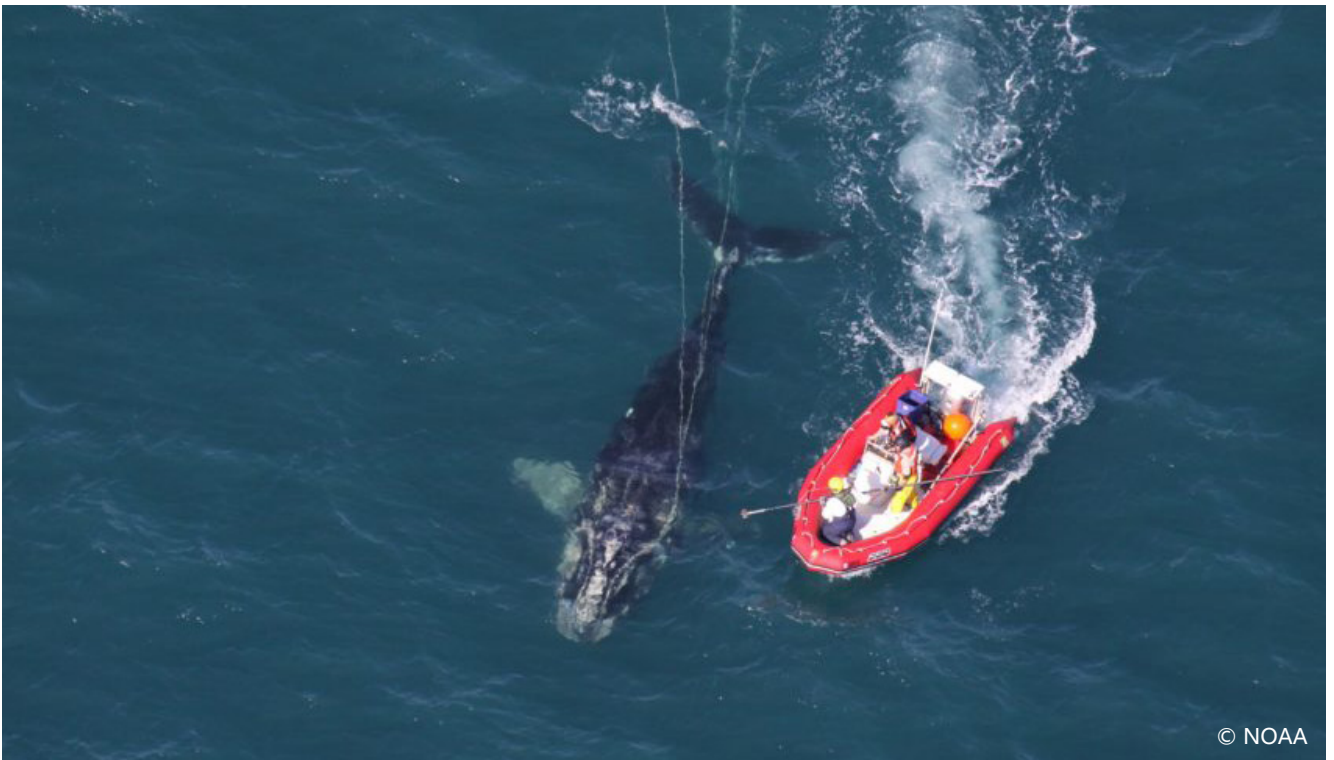
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弗雷德·皮尔斯，英国自由记者、自由撰稿人，同时也是耶鲁360的常驻作者

# Will large protected areas save the oceans or politicise them?

Are marine parks driven more by geopolitics than conservation?

□ Fred Pearce



*NOAA scientists approaching a young North Atlantic right whale they disentangled off Cape Canaveral, Florida.*

How can we save the oceans? They cover two-thirds of the planet, but none are safe from fishing fleets, minerals prospectors or the insidious influences of global warming and ocean acidification.

In the past decade, there has been a push to create giant new Marine Protected Areas (MPAs). They now

cover nearly 9.7 million square miles (25 million square kilometres), equivalent to more than the land area of North America. Cristiana Paşca Palmer, executive secretary of the United Nations Convention on Biological Diversity, says the world is on course to reach the convention's target of having a tenth of the oceans protected by next year.

But questions are being raised. The growth has been driven by the formation of giant MPAs bigger than many countries, often in remote regions where the threat to biodiversity is lower. So, critics are asking, are countries creating big distant MPAs to distract attention from the harder task of protecting trashed coastal ecosystems closer to home? And is there a geopolitical game afoot, a stealth rush to control the oceans for political ends? And does that explain why half of the ocean waters covered by MPAs are in the hands of the United States and two former European colonial powers, Britain and France?

Most ocean scientists see the rush to create vast MPAs as a boon to marine conservation. They are cost effective, connect different marine ecosystems and encompass larger parts of the ranges of migrating species such as whales and tuna, protecting “corridors of connectivity among habitats in ways not afforded by smaller MPAs” says Bethan O’Leary, a marine scientist at the University of York in the United Kingdom.

But the geography of the new large MPAs seems to reflect politics as well as ecology. The biggest American MPAs are in the 200 nautical mile (370 kilometre) internationally recognised exclusive economic zones (EEZs) off Alaska and around the Hawaiian archipelago. And France and Britain are busy asserting their control over wide stretches of oceans in EEZs around tiny islands that they hung onto at the close of the European colonial era.

Britain has fully protected less than only 2.9 square miles (7.5 square kilometres) of its domestic waters, but has promised 1.5 million square miles (3.88 million square kilometres) of “enhanced marine protection” around its territories in remote oceans by 2020. That is more than 16 times the size of the UK itself. The waters earmarked include three of the 12 largest MPAs declared to date: around the Chagos Archipelago in the Indian Ocean, Pitcairn Island in the Pacific and South Georgia in the Southern Ocean, to be followed by Ascension Island, St. Helena and Tristan da Cunha, all in the South Atlantic.

France is not far behind, promising 850,000 square miles (2.2 million square kilometres) by 2020, including waters

**Some scientists say that with coastal MPAs, local fishers often lose out.**

around New Caledonia and French Polynesia, as well as Reunion and Mayotte in the Indian Ocean.

These giant MPAs are a relatively new phenomenon. Most have been created since 2010, when the Convention on Biological Diversity adopted its 10% target. Until then most were small, and about half of the world’s 15,000 MPAs still measure only a few square kilometres.

But the case to go big has been growing. While small safe spaces for nature may protect particular habitats like coral reefs and sea grasses, their impact on wider marine ecosystems and migrating fish stocks is bound to be small, marine ecologists argue. Partly because of this, and partly through bad design and poor enforcement, a recent meta-analysis of the impacts of existing MPAs by Graham Edgar, a senior research scientist at the University of Tasmania, found that “most of the MPAs studied... were not ecologically distinguishable from fished sites”.

Some scientists also say that with coastal MPAs, local fishers often lose out. Their livelihoods are disrupted as their fishing activities are declared illegal, while big commercial fishers just move on and damage somewhere else. There have been calls for codes of conduct to protect such communities. Nathan Bennett, an ocean geographer at the University of British Columbia, said in a Yale Environment 360 interview two years ago that protecting the interests of coastal communities could “make the difference between the success and failure of marine conservation”.

So will large MPAs do better? Most are in remote, near-pristine areas with lots of marine life to save. The US’s Papahānaumokuākea Marine National Monument in the Hawaiian archipelago, for instance, is more than twice the size of Texas and supports 7,000 species, a quarter of them endemic. The 250,000 square mile (647,497 square kilometre) MPA declared by the British around the Chagos archipelago in the Indian Ocean is “the world’s largest

contiguous undamaged [coral] reef area”, according to the former chief scientific advisor for the area, Charles Sheppard of Warwick University. It includes the largest atoll in the world, the Great Chagos Bank, and has 310 species of coral, 821 of fish (including 50 shark species) and 355 of molluscs. The MPA there has created the world’s largest “no-take” zone, where all commercial fishing is banned.

But some say the progress on protecting the oceans this way has been hyped. Enric Sala, a marine ecologist at the National Geographic Society, recently called the claim to be close to achieving protection for 10% of the world’s oceans “false and counterproductive”. While 7% of the oceans have so far been earmarked for some protection, only 5% have actually had plans implemented and only 2% ban commercial fishing.

Among MPAs where commitments remain unimplemented, Sala notes, two of the biggest are New Zealand’s Kermadec Ocean Sanctuary and French New Caledonia’s Coral Sea Nature Park. And when the departing Bush administration in 2009 created the Marianas Trench National Marine Monument near the US territory of Guam in the western Pacific, it ceded to pressure from the Northern Mariana Islands to allow fishers to continue their activities there.

But O’Leary says most designated large MPAs have management plans either in place or in preparation, and the development of drone, radar and satellite technology will make them easier to police than in the past.

A second concern of critics is that the massive coverage of MPAs may not be addressing the urgent task of protecting marine species and ecosystems from real and current threats.

Most large MPAs are in remote areas. The US, for instance, has instituted strong or full protections in less than 1% of seas in its waters around the continental US,

compared with 43% in remote waters, according to a recent study that O’Leary co-authored.

Luiz Rocha of Hope for Reefs, a campaigning initiative of the California Academy of Sciences, says large remote MPAs “invariably exclude the only areas that would benefit from spatial protection, those close to the shore. They protect areas that nobody uses, and that changes nothing.” In fact, it is worse than nothing, he argues, because by allowing countries to hit UN targets, these remote MPA’s reduce the pressure to provide real protection where it is needed.

Even bigness provides few benefits, Rocha contends. “The media and the public love announcement of reserves ‘the size of Belgium’, but for species like tuna, the size of Belgium is like the size of your backyard.”

But O’Leary and other advocates for large MPAs counter that big protected areas provide more protection for migrating species than small areas. And even if they don’t counter urgent current threats, O’Leary says, they do provide “proactive protection of ocean wilderness areas against future exploitation” in the same way as protected terrestrial wildernesses.

Some critics charge that many big MPAs are as much about geopolitics as conservation. This particularly applies to the post-colonial MPAs of Britain and France, in which tiny, sometimes unpopulated, mid-ocean islands once occupied as refuelling stops for naval vessels, become the twenty-first century basis for what some are calling “ocean grab”. Britain has declared an MPA around South Georgia, which is claimed by Argentina, and, just as controversially, has also done so around the Chagos archipelago in the mid-Indian Ocean.

In colonial times, the archipelago was administered by Britain from adjacent Mauritius. However, in 1965, three years before granting independence to Mauritius, the British separated it off and signed a deal with the US for a major American military base on the largest of its 60 islands, Diego Garcia. As part of the deal, the British subsequently forcibly removed some 1,500 Chagossians. Living in exile in Mauritius and the UK, they have been campaigning to be allowed to return and resume economic activities such as fishing.

**Some critics charge that many big MPAs are as much about geopolitics as conservation.**





© Scott Godwin/NOAA

*Reef assessment and monitoring in Papahānaumokuākea Marine National Monument*

That was made more difficult when in 2010, Britain created a giant “no-take” MPA around the archipelago, excluding only Diego Garcia. A message from the US Embassy unearthed and published by Wikileaks, said British officials had said that “establishing a marine park would, in effect, put paid to resettlement claims”. The British government has repeatedly denied any such motive.

Things came to a head last month when, after decades of legal dispute, the International Court of Justice in The Hague, the UN’s highest court, declared British control of the Chagos to be a “wrongful act”. The islands, including the MPA, should be handed back to Mauritius “as rapidly as possible”, the court ruled.

It is far from clear if the British government will accede to this demand. Mauritius’ London embassy did not respond to requests to clarify its plans for the MPA. But in the past it has said that while it had no problem maintaining an MPA, a no-take zone would “not be compatible” with its plans for returning Chagossians and exploiting marine resources.

Whatever the future for such contested waters, the bigger prize of saving oceans remains. Scientists have argued that the world should aim to protect not 10%, but 30% of the oceans. That would require concerted international efforts to protect the two-thirds of the oceans that lie outside national EEZs.

Just 0.5% of these “high seas” are currently covered by MPAs. These are in areas covered by regional or international treaties. The largest is the Ross Sea MPA off the coast of Antarctica, which covers an area almost the size of Alaska and is one of the world’s most productive marine ecosystems, though concerns have mounted because of a krill fishery allowed there under the terms of the Antarctica Treaty. Others include the Charlie-Gibbs MPA, a biodiversity hotspot in the mid-north Atlantic where polar and tropical waters meet. It is managed by the Ospar Convention on the north-east Atlantic marine environment.

But many more may be established if the UN finalises a new High Sea Treaty on schedule in 2020. Talks on the

treaty were scheduled to resume in New York in March. Its provisions will almost certainly include creating MPAs in international waters. Candidates include the Sargasso Sea, a zone of sluggish waters in the north Atlantic off the British territory of Bermuda that is full of floating seaweed among which both American and European eels breed.

The question then becomes who will fund and manage MPAs on the high seas. The moving forces behind them will likely be the same as those that helped trigger the recent spurt of large national MPAs: American and other conservation groups backed by private philanthropists.

Conservation International helped mastermind the French MPA around New Caledonia. The Switzerland based Bertarelli Foundation helped establish those around French Polynesia and Chile's Easter Island. In the Seychelles, The Nature Conservancy raised money from US philanthropists, including actor Leonardo DiCaprio, to buy up national debt in return for the creation of two large marine reserves. The Louis Bacon Foundation, established by a US hedge fund manager, is to pay for policing a British MPA around Ascension Island.

Biggest of all is the Pew Charitable Trusts, which says it has already "helped safeguard 5.2 million square

kilometres – an area 10 times the size of Central America". Pew first proposed and helped fund British MPAs at Chagos and Pitcairn, as well as pushing for US initiatives such as the Marianas Trench Marine National Monument. In a joint initiative with the Bertarelli Foundation, Pew recently appointed former US Secretary of State John Kerry and former British Prime Minister David Cameron as "ocean ambassadors".

Elizabeth Karan, a senior manager at Pew, said in an email interview that her organisation is helping "identify important areas for biodiversity on the high seas, and work[ing] with governments [to] develop proposals". Policing of these non-national MPAs would be done by treaty signatories regulating their industries.

Some see such philanthropists as planetary saviours; others as agents of a creeping privatisation of one of the last great global commons. Either way, it is a big task. ☺

*This article was first published in Yale E360*

*Fred Pearce is a freelance author and journalist based in the U.K.*



# 改写海岸线： 转型中的近海水产养殖

## China's coastline in transition



山东省烟台市莱州区三山岛村，密集的养殖户大棚  
*These closely packed sheds are in the village of Sanshandao on Laizhou Bay.*



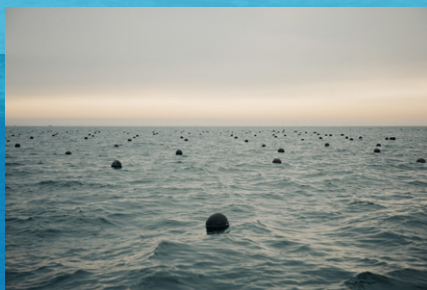
山东省烟台市牟平区的滨海海参养殖区，养殖废水会直接排入海洋/At this coastal sea cucumber farm in Muping, effluent is discharged directly into the ocean.



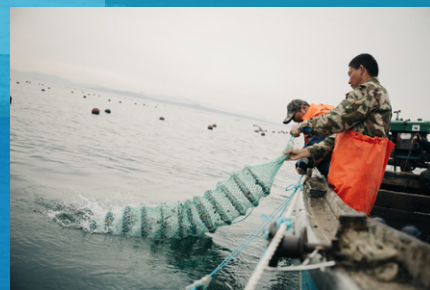
金仓湿地公园边，仍在运营的水产养殖池产生大量带有白色泡沫的废水/Next to the site of the park, a farm continues to discharge foamy wastewater.



海洋牧场的工人正在整理深海养殖需要用到的大量浮球  
*A marine ranch worker and the huge number of floats needed.*



海洋牧场的养殖模式成本高了不少，收益也更不确定  
*Compared to coastal aquaculture, the costs of marine ranching are higher, and the income less stable.*



“海洋牧场”模式扩大了养殖的范围，需要大量的体力工人 /Marine ranching operations cover a wider area than coastal aquaculture farms, necessitating more labour.



游客正在快艇码头浮桥上拍照留念，原先的近海养殖区已经改为快艇旅游项目/Tourists snap photos on a pontoon while they wait for a speedboat ride to view the “scenic aquaculture”.



转型也让一些人离开了这个曾经熟悉的行当，曾经的养殖户孔福春站在自己的出租车旁/The recent changes have forced some farmers out of the aquaculture industry. Kong Fuchun now works as a taxi driver.



山东渤海水产有限公司将虾养殖过程中的盐水进行循环利用，产出硫酸钾、氯化镁、氯化钾等作为副产品  
*Rather than discharging wastewater from its shrimp ponds into the ocean, the company recycles it to produce chemicals such as potassium sulphate, magnesium chloride and potassium chloride.*



# 人类世时代的 环保纪录片

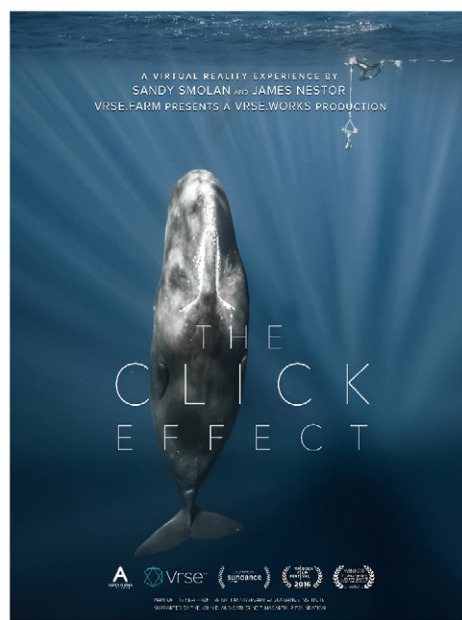
ENVIRONMENTAL DOCUMENTARY IN THE ANTHROPOCENE



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Blue Planet II



《难以忽视的真相》  
An Inconvenient Sequel: Truth to Power



The Click Effect



《何以为食》  
What's For Dinner



Pangolins - The World's Most Wanted Animal

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