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总编　伊莎贝尔·希尔顿

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2018 年，气候谈判有什么特别之处?

新一轮联合国气候会议已在波恩展开，2018 年气候谈判中的这些关键时刻和事件值得关注。

□ 白莉莉 姚 喆

假如有一面专为气候变化议题设置的新年倒数时钟，那么指针正在快速走向 2020 年。到那时，世界各国需要就控制温室气体排放设定新的目标，即更新向联合国提交的国家自主贡献（NDC）。然而，在新年钟声敲响之前还有很多工作要做。

2015 年气候变化大会（COP21）上通过了《巴黎协定》，这是全球气候行动的历史性时刻。《巴黎协定》为应对气候变化设定了宏伟目标，明确指出要将全球气温升幅限制在 1.5℃至 2℃之间。《巴黎协定》是多年来国际气候谈判取得的巨大成就，但这并不意味着所有的工作都已完成。与此相反，虽然在《协定》框架下，各国政府已提交了国家自主贡献，但具体如何执行、如何实现目标等细则仍需要在今后的谈判中明确。

2018 年可谓是“后巴黎”时代的第一个关键年份，因为参与联合国气候谈判的国家必须在两个关键问题上取得具体进展：规则手册和塔拉诺阿对话（Talanoa Dialogue）。

规则手册

规则手册将为《巴黎协定》的实施提供操作性指导。如果我们把《巴黎协定》中设定的目标视为目的地，那么规则手册将阐明各国如何能共同抵达终点，以及在过程中各国政府该做什么、怎么做。

具体来说，首先，规则手册应提供一套通用的衡量指标和标准，以便能够横向比较各国的气候承诺，即国家自主贡献（目前各国提交国家自主贡献时并无固定形式，各国往往选用不同指标从而难以相互比较，见下表 1 中的例子）；第二，规则手册中应包含一套规则以监督各国的行动，确保各国政府言行一致；最后，规则手册还应建立起一个盘点机制，即定期评估各国的气候行动进展并推动更有力措施的出台。

表1. 对比中国、欧盟和不丹的气候承诺

	中国	欧盟	不丹
国家自主贡献的关键要素	- 二氧化碳排放在 2030 年左右达到峰值并争取尽早达峰 - 非化石能源占一次能源消费比重达到 20%左右 - 到 2030 年，单位国内生产总值二氧化碳排放比 2005 年下降 60%-65%	到 2030 年，境内温室气体排放量较 1990 年至少减少 40%	保持碳中性，即确保排放不会超过境内森林碳汇容量

若没有统一的衡量指标和标准，对比不同国家的承诺就非常困难。
数据来源：Climate Action Tracker

《巴黎协定》于2016年11月正式生效，在随后举行的马拉喀什气候大会（COP22）上，谈判各国同意将在2018年完成规则手册的编制工作。因为《巴黎协定》协调各国在2020年以后的气候行动，这些被确立的规则将从2020年起实施。

考虑到有限的工作时间，克服技术挑战和按时完成编制本身已是一项艰巨的任务，更别提各国还需要在某些争议性问题上通过谈判达成一致。比如，目前一个棘手的问题就是如何将发达国家和发展中国家不同的执行能力考虑在内，确保手册既能提供一套共同的、严格的规则，但又拥有一定的灵活性。

让人欣慰的是，自马拉喀什气候大会以来，在技术专家开展了多轮协商之后，技术谈判本周在波恩的非正式谈判会上顺利重启，这也表明目前的挑战不再是各国在今年能否推出一个规则手册，而是要确保协商确立的规则是强有力的。为此，讨论需要从技术层面转向更高的政治层面，各国需要表现出进行更广泛合作的政治意愿。

塔拉诺阿对话

在2015年巴黎气候大会上，尽管各国已依据《巴黎协定》提交了2025年或2030年的气候目标，但易受气候影响的脆弱国家联合呼吁各国尽快增强雄心和行动。认识到这一必要性，各国同意在2018年对各自行动的总体进展进行评估，并利用评估结果以判断如何在2020年提升国家自主贡献（依据《巴黎协定》，各国的内部目标应每五年增加一次）。

上述过程最初称为促进性对话（Facilitative Dialogue），其后在斐济担任COP23主席国时改称为塔拉诺阿对话。在斐济语中，塔拉诺阿指的是讲故事或交谈。塔拉诺对话于今年初正式启动，各国政府以及相关组织、机构和企业皆可通过公开的在线平台提交材料。

在非正式谈判会上，塔拉诺阿对话为各国政府和其他利益攸关方提供了一个相互学习和激励的机会，一方面可以展示不同国家和机构在向低碳经济转型方面取得的进展，同时也可展示不采取气候行动的风险。大多数国家在波恩会议的开幕词中提到了塔拉诺阿对话，目前已有130多个国家通过网络平台提交了材料。

正如塔拉诺阿对话的名字所暗示的，目前的进程有高度的包容性，并且强调用讲故事的方法，但是缺乏对产出的明确定义。参与各国需要确保目前的讨论是有前瞻性的、是针对性解决方案的讨论，以保证这些“对话”能够真正有助于提高气候雄心。

走向2020年

塔拉诺阿对话的作用要到2020年才能充分显现，届时所有国家都提交更新后目标。目前各国提交的气候承诺远不能达到温升控制1.5-2℃的要求。

除了规则手册和塔拉诺阿之外，未来两年内还有一系列关键事件将为提升气候雄心奠定基础。目前各国正在波恩进行技术性磋商，以确保规则手册编制工作的顺利推进，并推动如“损失和损害”等其他棘手问题的解决。今年的气候变化大会（COP24，即第24次联合国气候变化框架公约缔约方大会）将于12月在波兰举行，这是规则手册编制和塔拉诺阿对话进程的最后期限。

与此同时，各国政界人士和官员也会在联合国平台之外开展气候外交。今年6月，各国代表和部长将在德国匹兹堡举行对话；同样在6月，欧盟、中国和加拿大将在布鲁塞尔牵头召开气候行动部长级会议。最近几年来，这些会议为气候合

加拿大、中国和欧盟在去年表示三国间将加强气候合作。图中自左向右分别为加拿大环境与气候变化部长Catherine McKenna、中国气候变化事务特别代表解振华、欧盟气候与能源专员Miguel Arias Cañete

作提供了重要平台，比如在去年美国总统特朗普宣布退出《巴黎协定》之后，加拿大、欧盟和中国就在气候行动部长级会议上重申了各自的气候承诺。

新的国际平台，如今年9月由加州州长布朗主持的全球气候行动峰会（Global Climate Action Summit），将为在气候议题上的各类参与者（国家政府、地方政府或民间行动者）提供聚集一堂的机会。这次峰会将有力回应特朗普撤出《巴黎协定》的威胁：采取气候行动的主体已不仅仅是国家政府，更多的参与者如地方政府和企业也已经行动起来。

今年12月在阿根廷举行的二十国集团峰会（G20）同样值得关注。尽管峰会的议程远远超出了气候变化的范畴，但G20已成为讨论绿色金融的重要平台，尤其是在中国于2016年发起并成立了绿色金融工作组之后。G20峰会同样提供了一个观察其他国家如果看待和适应特朗普政府气候政策的机会。

这些会议的进展将会影响联合国谈判的结果，并最终决定各国的气候雄心水平。上文中提到的高级别峰会，也将为各国暗示或宣布其新的气候承诺提供平台。随着2020年的临近，人们将密切观察碳排放大国是否会为缩小排放差距做进一步的努力。

白莉莉，中外对话气候问题专员，北京能源网络（Beijing Energy Network）执行董事，
姚喆，中外对话气候战略传播项目官员

What's special about climate negotiations in 2018?

These are the key moments and milestones to look out for this year

□ Lili Pike Yao Zhe

Countries are hammering out a rulebook in Bonn to guide implementation of the Paris Agreement

If the climate community had a New Year's clock hanging in Times Square, it would currently be counting down to 2020. That is when countries worldwide will set new "resolutions", or nationally determined contributions (NDC) in climate-speak, for curtailing greenhouse gas emissions. But much work remains before the disco ball drops.

The adoption of the Paris Agreement during Conference of Parties (COP) 21 in 2015 marked a historic moment for global climate efforts. The agreement sets ambitious goals to combat climate change and to the limit global temperature increase to 1.5-2 degrees Celsius above pre-industrial levels. While a great achievement, it is a new beginning

rather than the end of the United Nations (UN) climate process. The agreement compelled governments to submit their own NDCs but left the details of implementation to future negotiations.

This year countries have to roll up their sleeves and hammer out a "rulebook" for climate action. This makes 2018 the first critical year in the post-Paris era, as countries under the UN framework are required to deliver concrete progress on two key issues: the rulebook and Talanoa Dialogue.

The rulebook

This will provide the operational guidance for the implementation of the Paris Agreement. If we see the ambitious goals set in the Paris Agreement as the destination, then the rulebook will clarify how countries can arrive at their goals collectively, and how each government will fulfil its requirements.

More specifically, the rulebook is expected to provide common metrics so that commitments from different countries can be compared side-by-side. This is necessary because governments submit their NDCs in various formats under the Paris Agreement (see examples in the chart below). The rulebook must also be able to hold all countries accountable and make sure governments' actions are in line with their words. Finally, it must establish a mechanism that reviews collective efforts and leads to governments scaling-up their actions over time.

At COP22 in Marrakech, the first COP after the Paris Agreement entered into force in November 2016, negotiators set 2018 as the deadline to finalise the guidelines. The rules will be applied from 2020 (since the Paris Agreement covers the period from 2020 onwards).

Under such a tight deadline, overcoming technical challenges and delivering the rules on time is already a huge task, not to mention the political sensitivities around certain issues. For example, as developed and developing countries' administrative capacities differ, the rulebook must allow for some flexibility while still providing a single set of rules with sufficient rigour.

However, after several rounds of negotiations between technical experts since Marrakech, negotiations opened smoothly at the Bonn intersessional this week, signalling that the challenge now is not whether countries will agree on a rulebook, but to make sure the rules are strong. To achieve this, the discussions need to move from the technical level to the higher, political level, and countries need to show real political will for broader cooperation.

Talanoa Dialogue

Although countries submitted targets for 2025 or 2030 under the Paris Agreement, vulnerable nations are calling for an increase in ambition and actions now. At COP21, countries agreed to take stock of the overall progress on their actions in 2018 for the first time, and to use the assessment to identify how they can scale up their NDCs by 2020 (countries are expected to ratchet up their internal targets every five years under the Paris framework).

Such a process was initially called the Facilitative Dialogue but it was renamed the Talanoa Dialogue at COP23 when Fiji held

Comparing commitments by China, the EU and Bhutan

	China	EU	Bhutan
Key elements of NDC	- Peak CO2 emissions by 2030, or earlier if possible - Increase the share of non-fossil energy sources in the total primary energy supply to around 20% by 2030 - Lower the carbon intensity of GDP by 60% to 65% below 2005 levels by 2030	At least 40% reduction in domestic emissions by 2030 in comparison to 1990	Remain carbon neutral, by ensuring that emissions will not exceed the sink capacity of its forests

Climate apples and oranges. Measuring commitments is a challenge without common metrics. Source: Climate Action Tracker

the presidency. Talanoa is a term in Fijian that means to tell a story or have a conversation. The Talanoa Dialogue process was launched at the beginning of this year, and countries submit their actions via an online public portal.

At the Bonn intersessional, the Talanoa Dialogue will offer a platform for countries and non-party stakeholders to showcase their progress towards a low carbon economy in all kinds of sectors and inspire each other while at the same time demonstrating the risks of inaction. Most countries referenced the dialogue in their opening statements, and over 130 countries have made submissions to the Talanoa Dialogue.

As the name suggests, the current process is inclusive and emphasises the storytelling approach, but it lacks clarity in terms of outcomes. Countries need to make sure their discussions are solution- and future-oriented so that dialogues can be useful in increasing ambition.

The march to 2020

The impact of Talanoa Dialogue will only be fully revealed in 2020 when all countries are supposed to submit their updated targets under the Paris Agreement. As the graphic below shows, current country commitments are still far too unambitious to remain within the safe temperature boundaries set under the Paris Agreement.

Alongside the rulebook and Talanoa Dialogue, a series of key events over the next two years will lay the groundwork for countries to increase ambition by 2020. Technical negotiations to secure the rulebook and sort out thorny issues, such as how to compensate countries for losses and damages that result from climate impacts, are underway at the Bonn intersessional. The annual UNFCCC COP negotiations will take place in Poland in December, marking the deadline for the rulebook and Talanoa Dialogue.

Meanwhile, politicians and officials will engage in climate diplomacy outside of the UN cycle. In June, country representatives and ministers will gather in Petersberg, Germany for discussions, and Brussels, Belgium, for a "MoCA" (Ministerial Meeting for Climate Action). In recent years, these meetings have served as key moments for more ambitious countries to form alliances, such as when Canada, the EU, and China together reaffirmed their commitment to climate action in the wake of President Trump's attack on climate action last year.

New summits, such as this September's Global Climate Action Summit hosted by Governor Brown in California, will provide opportunities for national, sub-national, and non-state actors to come together. This summit reflects an upside of Trump's threat to withdraw the US from the Paris Agreement: climate action has become more inclusive of a broader array of parties such as businesses and states rather than just national governments.

Another notable moment will be the G20 held in Argentina just before this year's COP in December. While the G20 agenda extends far beyond climate change, it has become an important platform to discuss green finance issues in particular after China launched a working group on the topic in 2016. The G20 also serves as an important moment of reckoning for how other top nations treat the US, including the degree to which they accommodate the Trump administration's climate stance.

The jockeying that occurs at these meetings will influence the outcome of the UN negotiations and ultimately determine the level of ambition countries bring to the table. These summits, especially heading into 2019, will also provide opportunities for countries to signal or announce their new commitments. All eyes will be on the world's top emitters to close the ambition gap as 2020 nears.

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1.5℃温控目标：中国专家怎么看?

IPCC 将于今年发布首个对 1.5℃温控目标实现可能性的评估，
参与评估的中国专家向中外对话表达了看法。

□ 冯 灏

2015年，当各国领袖史无前例地在巴黎气候峰会上将气候行动的目标设定为“努力将全球温度上升控制在（工业革命前的）1.5℃以内”时，人们既欢欣鼓舞，又不禁感到一丝疑惑。

太多的研究已经在警告人类，如果不扭转生产生活方式，地球温度有极大可能上升超过 2℃。很多人还记得，在 2009 年的哥本哈根气候峰会上，温控 2℃的愿景都差点通不过。

1.5℃，到底是太过美好的愿望，还是可以达到的目标？十月，政府间气候变化专门委员会 (IPCC) 将发布对全球温控 1.5℃情景的分析，这将是巴黎气候峰会提出这一宏愿后，政治家们第一次直面这一问题的现实可能性。

一份近期泄露的报告草稿指出，以目前世界各国的减排力度，实现这一目标的难度极大。

当然，这份草稿还在评审之中，到 2018 年五月之前发表的新科研成果都有可能被纳入其中，并影响到其最终结论。IPCC 报告发表前需要经过广泛的评审，草稿泄露并非首次，2012 年就发生过同样的泄露事件。

为什么是 1.5℃?

气候变化议题之所以长期处于国际争端之中，一个原因是，最直接遭受气候变化影响的并非那些主要的温室气体排放者，而小岛国和自然条件恶劣的最不发达国家，一方面自身碳排放低，一方面却最大限度承受着气候变化带来的干旱、洪涝灾害、海平面上升等灾难。

而另一个现实则是，自从温控 2℃的目标提出后，各国的自主减排行动从来没有达到过实现这一目标所需的力度。2017 年就有气候智库估计，全球的减排行动只够控制升温在 2.7℃，而这样的温升程度，足以给一些小岛国带来毁灭性的打击，如果单纯从气候谈判的历史判断，恐怕只有把目标定得更高，人们才有可能实现 2℃的温控水平。从这个

百座低碳试点城市之一的广州提出了“决战2050，打造世界环境城市”的目标

意义上来说，冲击 1.5℃不仅不是好高骛远，反而是最保险的打算。

在巴黎气候大会的最后阶段，小岛国“我们会失去一个民族、一种身份、一段文化史、一种语言与文字”的急迫诉求得到了欧盟、美国等发达国家的支持。100 多个国家组成了松散的“雄心联盟”，试图用更高的目标来刺激各国重新审视此前令人失望的减排行动，中国、印度等新兴经济体则未加入这一阵营。

最终，2015 年 12 月，《巴黎协定》中写入了这么一句话，“在温度上升控制在 2℃的基础上向 1.5℃努力”。

值得注意的是，在全球领导人许下这一愿景之后，作为全球政府气候政策智囊团的 IPCC 才开始编写特别报告，系统地考虑这一目标要如何实现。

升温 1.5℃的世界

按照目前流出的报告草稿，升温 1.5℃的地球，将比升温 2℃的地球的确具有更强的抵御气候灾难的能力，不过，任何有可能将地球温升控制在 1.5℃以内的减排路径，都必须仰赖于人类生产生活方式的巨大变革。换句话说，走寻常路是不可能实现 1.5℃的。

按照报告草稿的政策推荐，目前已经在进行的能源革命必须大规模加速和推广，从而实现在本世纪中期二氧化碳零排放。到 2100 年，三分之二的能源生产和消费都必须采取电力形式；到 2050 年，可再生能源必须取代今天煤炭的地位，成为压倒性的主要能源形式；又比如，全球煤炭消费必须以每年 4% 到 5% 的速度下降。

就算这样，地球升温还是有很大可能要突破 1.5℃的门槛，还需要额外从大气中消减温室气体或是人为降温，才能实现 1.5℃的目标。也就是说，目前还在小规模应用阶段，甚至还存在于实验室甚至科幻电影中的大规模“地球工程”，真的要排上用场了。

“地球工程”主要是两种思路：一是太阳辐射管理 (Solar Radiation Management) 技术，简单地说就是人为额外地将太阳辐射中的一小部分反射回太空，进而达到减缓全球变暖的目的。这只能通过改变大气层的组成，甚至在太空中放入反射阳光的装置来实现，难度可想而知。

另一种是二氧化碳去除 (Carbon Dioxide Removal) 技术，通过人为手段直接消除大气中的二氧化碳，从而解决温室效应问题，其中生物质

加上碳捕捉和储存 (Biomass +carbon capture and storage) 相对而言可行性比较高。这一套方案利用植物光合作用，大量种植“能量作物”，最终通过复杂的过程获取清洁的燃料，并且将作物中的碳元素注入地下。

中国专家怎么看?

地球每新增四吨二氧化碳就有大约一吨来自中国，中国的气候行动对于全球能否实现目标举足轻重。中外对话联系了几位参与特别报告撰写和评审的中国专家，了解他们对于报告草稿的看法，而三位专家不约而同对其表示了一定的保留态度。

国家发展和改革委员会能源研究所研究员姜克隽是参与特别报告编写的四位中国科学家之一，他坦言这份报告的编写时间很紧张，而现在的结论有些模棱两可。

姜克隽告诉中外对话，这份报告的编写从 2017 年 3 月才开始，“当年 10 月就要出版（草稿），2018 年 10 月就要（将最终版）交由各国政府正式评审。”而 IPCC 完成一份常规评估报告要四年左右的时间。

而两位正在参与特别报告评审工作的中国专家，国家应对气候变化战略研究和国际合作中心助理研究员傅莎以及环保部智库环境与经济政策研究中心气候变化政策研究部副主任冯相昭，对报告结论的权威性也表达了与姜克隽基本相同的看法。

其中，傅莎就指出，从第五次评估报告（2013 年出版）到现在，也没过多长时间，目前的研究周期并不足以支撑新的研究出来，整体来看，研究基础还是比较薄弱的。她告诉中外对话，不同气候模型之间本身的不确定性就超过 0.5℃，所以评估 0.5℃的影响其实很难。

而即使草稿的结论成立，对于其描绘的 1.5℃情景所需的超前技术，中国专家也表达了担忧。

傅莎表示，太阳辐射管理的不确定性和负面影响顾虑比较大。而用大量土地种植生物质来减少二氧化碳，环境影响争议还是比较大。“尤其在中国这种人均土地资源相当有限的国家，土地用于种植生物质一定程度上会影响到粮食安全”，她表示。而即使是在非耕种土地上，也会对水资源造成额外的负担。

冯相昭则认为，生物质加上碳捕捉和储存（BCCS）虽然被寄予了很高的期望，但全球现有的碳捕捉和储存多数是示范项目，距离完全商业化还远得很。

实现从 2℃到 1.5℃目标转换额外支付的代价是否在社会承受的范围内也是一个问题。国务院发展研究中心发展战略和区域经济研究部研究室副主任何建武表示，对于处于增长期的国家而言，“支付不起清洁能源使用的低收入人群”也是需要考虑的。

去年冬天，中国过于激进的煤改气、煤改电运动就造成了一些农村家庭难以支付高昂的天然气或电力供暖费用。

不过，这份特别报告的作者之一姜克隽还是认为，1.5℃是非常有挑战的目标，但从城市的角度来看，也不是完全没有可能。

他透露，有越来越多的中国城市认识到环境质量的改善是吸引人才，打造城市竞争力的关键指标。在制定城市达峰目标的时候，特大城市雄心不小，比如广州，就提出“决战 2050，打造世界环境城市”。

中国自 2010 年开始启动低碳城市（省）试点的工作，目前已有近百座低碳城市试点，而绝大部分试点提出的碳排放峰值目标都比中国 2030 年的达峰目标提前。姜克隽认为，这表明很多城市很积极，也有雄心来开展低碳发展的工作。

这些城市在制定五年规划的时候，会把减碳、应对气候变化与节能的工作一并考虑，以广州市为例，单位地区生产总值能耗下降、能源消费总量、单位地区生产总值碳排放下降，都被列为广州市政府和各区政府的评价考核指标。

此外，在近期公布的中国国务院机构改革方案中，国家发改委应对气候变化和减排的职责被划入新组建的生态环境部。鉴于中国过去五年大刀阔斧的大气雾霾治理，姜克隽认为这也是一个积极的信号，“生态环境部激进一些，会带着气候变化的目标也激进一些”。

冯灏，中外对话研究员

The IPCC leak: What do Chinese experts think?

How scientists' stark warnings of global warming have been seen in China

□ Feng Hao

The breakthrough commitment from world leaders at the United Nations Paris climate talks in 2015 to contain global warming to 2 degrees Celsius above pre-industrial levels sparked immediate celebrations, and doubts. Was it politically achievable? Was it enough?

For smaller and poorer nations, the answer to "was it enough?", was always "no". They demanded faster progress (and more funds) to counter rising sea levels that threaten to submerge island nations, and limit damage from storms and droughts to farmers, food supplies and social stability.

A group of smaller nations with support from the European Union and United States (subsequently withdrawn by the Trump Administration) extracted a further, more ambitious pledge, to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.

An official report by the Intergovernmental Panel on Climate Change (IPCC) assessing the likely impacts of 1.5°C of warming was promised by October 2018.

Warnings published

Expert reviewers nominated by governments and organisations gain access to IPCC drafts under confidentiality rules. It is not a public process. However, the leaked document, and its stark warnings, was leaked last month, prompting a deluge of comment.

Yet little of it focused on the opinions of China's expert reviewers, even though China, which is currently responsible for producing 25% of carbon dioxide emissions entering the atmosphere, is key to implementation.

> To reach zero emissions by 2050, low-carbon energy sources need to replace coal-fired power as the dominant energy source.

chinadialogue contacted several Chinese experts involved in either contributing to the draft report or reviewing it to ask what they think of its recommendations, the leak, and the 1.5℃ goal.

Tough goal

The draft report warns that avoiding a 1.5℃ temperature rise is technically possible but only with a vastly accelerated switch from fossil fuels, implying drastic lifestyle changes.

To reach zero emissions by 2050, low-carbon energy sources need to replace coal-fired power as the dominant energy source by mid-century. Coal consumption needs to drop 4-5% annually, and two-thirds of all energy production and consumption must be in the form of electricity by 2100.

Even so, the report predicts that warming will breach 1.5℃ by 2050 but can then be reduced again by 2100, provided there is sufficient political will and the widespread adoption of some technologies that are largely untested.

The 1.5℃ target would still require geoengineering to either remove greenhouse gases from the atmosphere, or artificially reduce the earth's temperature.

However, current geoengineering schemes such as deflecting solar radiation or storing carbon dioxide emissions underground, are untested at scale and may do more harm than good.

What Chinese experts think

Jiang Kejun, a researcher with the National Development and Reform Commission's Energy Research Institute, was one of four Chinese scientists who contributed to the report.

Like others around the world, he stresses that the IPCC report remains a draft, subject to alterations.

Several experts have pointed out that the report has been produced in a hurry, compressing the usual four-year timeframe for Assessment Reports into just two years. The report was commissioned in April 2016 at the IPCC's meeting in Nairobi, to be submitted for formal review by governments in October 2018.

Fu Sha, an assistant researcher at the National Centre for Climate Change Strategy and International Cooperation, who is reviewing the report, said the tight timeframe means there has been scant time to complete new research since the publication of the IPCC's 5th Assessment Report in 2013. This means there is little new evidence to base the new report on.

Furthermore, Fu Sha pointed out, it is difficult for existing climate models to precisely determine the difference between global average warming of 2℃ target and that of 1.5℃

Risks to land use

Like others, Fu Sha has concerns about the feasibility of achieving the 1.5℃ scenario, and about the unintended consequences that might arise from the use of new technologies.

For example, the use of bioenergy with carbon capture and storage (BECCS), in which biomass is burned and the carbon emissions captured, could be used to remove carbon dioxide from the atmosphere. However, BECCS poses a number of risks to biodiversity, the water cycle and land use, especially in poor and developing countries short of arable land.

"Particularly in countries like China that don't have much land per person, growing biomass could impact on food security," she said. Even if land that is unsuitable for growing food crops is used, there will still be extra pressure on water resources. The experience of bio-diesel serves as a warning of the complexities.

Prototypes not ready

Most carbon capture and storage projects around the world today are pilot projects, with full commercial viability still

> "The 1.5℃ target would still require geoengineering."

a distant prospect, cautioned Feng Xiangzhao, another Chinese reviewer, and deputy head of the climate change policy department at the Policy Research Centre for Environment and Economy, a thinktank linked to China's Ministry of Environmental Protection.

The extra cost of switching to the challenging 1.5℃ target are also a concern. Indeed, the 35 nations forming the High Ambition Coalition, which is pressing for the 1.5℃ target, came together out of the pre-Paris campaign for richer countries to pay more towards the conversion costs faced by poorer ones. It includes the EU and formerly the US, but not India and China.

He Jianwu, deputy director of the development strategy and regional economy research office at the State Council's Development Research Centre said that growing nations need to consider, "low income populations who can't afford to pay for clean energy."

China's rushed replacement of coal with natural gas and electricity left some rural households shivering through below zero winter temperatures in northern China in recent months.

However, Jiang Kejun, believes that though the 1.5℃ target is extremely challenging, it isn't entirely out of reach if cities respond quickly by adopting measures to reduce greenhouse gas emissions.

Major Chinese cities have already set themselves ambitious carbon targets. For example, Guangzhou aims to become a world-class environmental city by 2050, he said.

Whatever happens, the report is set to be one of the most talked about climate change documents of 2018, sparking another round of speculation and reflection on the fate of the planet.

Feng Hao is a researcher at chinadialogue.

机构重组后的气候变化工作能否继续强势?

从强大的发改委转入新成立的生态环境部后，
气候变化工作在中国政治结构中是否能维持其重要地位？

□ 李 婧

大部制改革扩大了部门的职能，传统污染物的管理和控制温室气体的排放都不落下

中国国务院高层领导正式为新组建的生态环境部揭牌。

据该部门相关人士透露，新组建的这个大部门整合了多个部门的职能，人员编制从300人增加到500人左右。据说该部正准备搬入更大的办公区，以容纳增加的人员。

前环保部部长周生贤曾形容他所在的部门——环境保护部是世界上最“尴尬”的部门。

在2013年的一个新闻发布会上，他曾表示：“水里和陆地的[污染]不是一个部门管，一氧化碳和二氧化碳不是一个部门管。”

虽然尚未公布详尽的部门改革计划，但新组建的生态环境部旨在通过新增以下职能来解决上述问题：

- 目前由国家发展和改革委员会（NDRC）负责的气候变化和减排政策
- 目前由国土资源部负责的地下水污染治理职能

• 目前由水利部负责的流域水环境保护职能

• 目前由农业部负责的农业污染管控职能

• 目前由国家海洋局负责的海洋保护职能

• 目前由国务院南水北调工程建设委员会负责的该项目实施过程中的环境保护职能

该部门的高层官员表示，这次改革是为了应对中国长期存在的环境治理职能分散和机构交叉重叠的痼疾。中国一氧化碳和二氧化碳的排放问题终于首次归在了一个部门的职能范围之内。

然而，这对应对全球变暖的国际行动又意味着什么？目前全球气候变化行动已经因美国总统唐纳德·特朗普宣布要退出《巴黎协定》而遭受冲击。

一些环保团体对此次大部制改革表示欢迎，主要是由于它扩大了该部门的职能，能够加强对影响许多城市人口日常生活的传统污染物的管理，以及温室气体排放的控制。

美国环保协会中国项目部在一份声明中表示，“整合气候和环境管理职能将有助于降低不同机构间的协调成本，提高行政效率…同时还可以降低企业遵守 [排放法规] 的成本。”

能源基金会（美国）中国区总裁邹骥表示，中国目前的能源结构严重依赖燃煤发电，这意味着可以同时应对污染和气候挑战，而“大部制”正是协调监管机构所需要的。

然而也有人对此不那么乐观，他们担心的是，气候决策权从原来强大的经济规划部门——国家发改委，转移到在国务院中权力等级较低的环境部门。

在此次机构改革之前，国家发改委是国务院下设的最强大的机构之一，覆盖了从工业项目审批到水电定价的职能。2009 年联合国哥本哈根气候大会召开的前一年，也就是 2008 年，发改委成立了负责碳政策制定和国际谈判的气候变化司。

当时，包括高级气候官员解振华在内的中国高层官员解释说：“气候变化是环境问题，但最终还是发展问题”。国家发改委有能力对地方政府和电力部门——国家能源局（隶属于国家发改委）施加影响，这也为解决气候变化问题增加了砝码。

“绿色和平”东亚分部高级气候政策专家李硕表示：“气候行动来之不易的势头可能会因为这场机构调整而受到意外损伤，这取决于新组建的生态环境部的领导方式。”

目前尚不清楚改制后新部门的组织架构如何。但中国环境规划研究院（CAEP）在 2015 年发表的关于环境治理改革建议的论文，可能会对此有一些启示。

隶属于生态环境部的该院列出了四种改革方案，第二种方案——建立生态环境部——中的大部分建议在这次改组中得到了采纳，只是没有采纳新组建部门同时吸收林业和气象局职能的提议。

中国环境规划研究院认为，应赋予新的部委更多的权力，协调生态保护与自然资源开发和经济发展之间的关系。此外，它还表示，应赋予新的部门协调所有环境相关的国际条约的权力，如气候变化、生物多样性、臭氧和沙漠化等条约，以避免“部门间冲突”。

原环境部和国家发改委在制定监管碳排放最优政策上存在明显分歧。众所周知，前者长期以来一直主张征收碳税，而发改委则一直在负责去年全国碳排放总量控制和交易计划的启动。

到目前为止，政策方向没有任何变化的迹象。根据中央政府命令，新的生态环境部将在 6 月底之前完成其内部机构设置和人员确定。

但值得注意的是，此次改组是中国国家主席习近平第二任期开始后，国务院机构大规模改组的一部分，旨在“加强党（对国家）的全面领导”，并使各部门能够更加紧密地围绕在习主席的周围。

“欧洲气候基金会”首席执行官劳伦斯·图比娅娜表示，虽然改组带来的影响仍不明朗，但习近平此前关于气候变化的论述非常重要。“如果缺少最高领导层的政治承诺，中国是不可能实现低碳经济增长和《巴黎协定》中的目标的……”她最近在北京向记者们表示。“因此，只看部级行动是不够的，还要看国家层面的决策。”

李婧，自由撰稿人，关注环境与气候议题

China's new environment ministry unveiled

New offices required to house mega-department, but will climate change survive as a priority after being shifted out of the powerful development commission

□ Li Jing

Senior cabinet cadres have officially unveiled the nameplate of China's newly-created Ministry of Ecology and Environment (MEE).

The mega-department, after absorbing functions originally under other ministries, will see its staff increase from around 300 to 500, according to a source close to the ministry. The ministry is said to be moving into a bigger building to house the expanded workforce.

China's retired environment minister Zhou Shengxian once described his own department – the Ministry of Environmental Protection – as being among the world's most "embarrassing".

He told a press conference in 2013: "Two different ministries are tasked to regulate [water] pollution in the river and on the land, and similarly, two different ministries are tasked to regulate carbon monoxide and carbon dioxide separately."

Although a more detailed overhaul plan is yet to be announced, the new MEE is designed to fix those problems by taking on the following new functions:

• Climate change and emissions reduction policies, currently under the National Development and Reform Commission (NDRC)

• Underground water pollution regulation, currently under the Ministry of National Land and Resources

• Watershed environmental protection, currently under the Ministry of Water Resources

• Agricultural pollution control, currently under the Ministry of Agriculture

• Marine conservation, currently under the State Oceanic Administration

• Environmental protection during project implementation, currently under the State Council's South-to-North Water Diversion Project Construction Committee

The ministry's senior officials hailed the reform as a remedy for the fragmented and overlapping structure that has long plagued China's environmental governance. For the first time in China, emissions of CO and CO2 will be regulated by a single supervisor.

Yet what does it mean for the international efforts to fight global warming – already battered by the US threat to pull out of Paris Agreement under president Donald Trump?

Some green groups have cheered the change, mainly citing the extra political power of managing conventional

pollutants, which affect people's daily lives in many cities, together with greenhouse gas emissions.

"The merging of climate and environment functions will help to reduce cost for coordination among different agencies and improve administrative efficiency… as well as cut enterprises' cost for [emission regulation] compliance," said the Environmental Defense Fund's China programme in a statement.

Energy Foundation China president Zou Ji said China's current energy structure – a heavy reliance on coal power – meant it could tackle its pollution crisis and climate challenge at the same time and a mega ministry was just what was needed for concerted regulatory design.

Yet those who are less optimistic are worried about moving climate policymaking from the once powerful economic planning body – the NDRC – to an environment ministry, which has a lower ranking in China's cabinet power hierarchy.

Before the latest revamp, NDRC was one of the most powerful cabinet agencies, with a portfolio ranging from industrial project approval to water and electricity pricing. Its climate change division was created in 2008 to oversee carbon policymaking and international negotiations, ahead of the key United Nations conference in Copenhagen in 2009.

Senior Chinese officials, including top climate officer Xie Zhenhua, explained at the time that "climate change is an environmental problem, but eventually it is a development problem". NDRC's capacity to leverage cooperation from local governments as well as the power sector – the National Energy Administrations is affiliated with the NDRC – also helped throw weight behind climate change issues.

"The hard-fought momentum of climate action could become the unintended casualty of this reshuffle, depending on the leadership approach of the new MEE," said Li Shuo, a senior climate policy expert at Greenpeace East Asia.

It is not clear at the moment how the transition will finally take shape. But a paper published by the Chinese Academy for Environmental Planning (CAEP) in 2015 proposing environmental governance reforms might shed some light.

The environment ministry-affiliated academy listed four options for revamp, and the second scenario – to build a Ministry of Ecology and the Environment – has been mostly adopted in this reshuffle, barring a proposal that the new MEE also absorb functions of forestry and meteorological bureaus.

CAEP argued the new ministry should be given more power to coordinate ecological protection with natural resources exploration and economic development. It also suggested the new ministry should be given the power to coordinate all environment-related international treaties – such as on climate change, biodiversity, ozone and desertification – so as to avoid "inter-departmental conflicts".

The old environment ministry and NDRC notably differed on the best policy to regulate carbon emissions. It is no secret that the former has long been a champion of a carbon tax, while NDRC has oversaw the kick-start of the national cap-and-trade scheme for carbon emissions last year.

So far there have been no signs of any change of course in the policy direction. And the new MEE will have until the end of June to finalise its internal institutional set-up and personnel lineup, according to central government orders.

Yet it is worth noting that the reshuffle, part of a massive cabinet shake-up as Chinese president Xi Jinping starts his second term, is aimed at "strengthening the Communist Party's overall leadership" of the state, and making the ministries better answer to Xi.

Laurence Tubiana, CEO of the European Climate Foundation, said while the consequences of the reshuffle are still unclear, Xi's previous personal statements on climate change were very important. "It is impossible for China to fulfil its goal to decarbonise economic growth and targets in Paris Agreement … without political commitment from top leadership," she told a group of journalists in Beijing recently. "So, it is not only about what ministerial level is doing, but also about the national decisions."

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

国际海事组织成员国达成航运减排协议

各国就全球航运业排放所达成的减排目标，远远没有满足气候变化脆弱国家的诉求。

□ 凯瑟琳·厄尔利

2015年签订的《巴黎气候协定》并未将船运和航空运输业纳入减排范畴

4月13日，国际海事组织（IMO）173个成员国签署协议，同意到2050年将海运二氧化碳排放量降至2008年水平的一半，并逐步朝着零排放的目标迈进。

各国还同意到2030年将国际航运业的碳排放强度（每吨英里二氧化碳排放量）相对于2008年减少至少40%，并且力争到2050年减少70%。该协议还重点强调了若有可能，到2050年将减排目标提高到100%。

2015年签订的《巴黎气候协定》并未将船运和航空运输业纳入减排范畴，但条件是，这两个部门需在《巴黎协定》签订后尽快出台自己的

减排计划。2016 年 10 月，国际民航组织（ICAO）达成减排协议后，唯一没有出台气候变化减缓计划的就只剩下船运行业了。

由于一直未能就减排目标作出承诺，国际海事组织承受着来自国际社会越来越大的压力。其中欧盟的最大。去年 11 月份，欧洲议会通过一项议案，自 2023 年起，船运行业将被纳入欧盟碳排放交易体系（EU ETS），除非国际海事组织能够通过一项雄心勃勃的减排计划。

据国际海事组织 2014 年的一份报告，海事部门的温室气体排放占全球总排放的 2%-3%，但随着全球贸易的增长，预计到 2050 年，这一数字将增长 50%-250%。由于包括中国、巴西、日本在内的一些国家认为，收紧排放限制将损害他们的经济，因此有关减少该部门环境影响的谈判一拖再拖。

然而，近期的研究列举了一些该部门实现脱碳的机会。经济合作与发展组织（OECD）3 月发表的一份研究认为，利用现有技术，到 2035 年该部门“几乎可以完全实现脱碳”。

劳氏船级社和海事资讯服务研究院的分析师们在另一份报告中指出，从竞争力上来说，2030 年之前，零排放船只可能无法与传统航运相抗衡。然而，报告表示，随着技术的迅猛发展，未来十年，二者之间差距缩小的速度要远远超过预期。

激烈的谈判

在经历了两周激烈的谈判之后，成员国终于在上周五达成了协议。包括马绍尔群岛在内的小岛屿国家在海平面上升面前尤为脆弱。他们力主到 2035 年前实现彻底脱碳，而欧盟成员国建议到 2050 年将温室气体排放消减 70%-100%。

巴西和阿根廷一直反对制定绝对减排目标的提议，认为自己国家所处的地理位置远离其他市场，这就意味着降低船速等措施会使他们处于不利的竞争地位，尤其是对生鲜产品的出口而言。

中国尽管自己没有提出任何减排议案，但之前也一直反对绝对减排目标。可这一次，中国和阿根廷并没有对协议提出异议。只有美国和沙特阿拉伯发表正式声明，对协议草案表示反对，而巴西只对协议草案中的绝对减排目标提出了异议。

环保组织“运输与环境”（T&E）负责海运事务的官员费格 · 阿巴索夫指出，事实上，有 65 个国家在此次 IMO 会议最后的闭幕致辞环节中表达了对该减排战略的支持，只有 3 个国家表示反对或部分反对。

“可能中国不想看起来太孤立，毕竟三分之一和六十五分之一的差距还蛮大的。所以，中国在致辞中对该战略表示了欢迎。”

一位与会的观察人士说，会议主席斋藤秀明宣布大会通过减排战略后，中国是第一个发表意见的代表团。中国代表团对大会通过航运业减少温室气体排放的初步战略表示欢迎，并形容其是一项体察入微、兼容并蓄的协议。中方还表示，该协议传达出船运行业必将走向零排放未来的强有力的信号。

“或将改写潮流”

尽管与一些主张达成更高减排目标的国家所希望的相比，这份协议明显要弱很多，但活动人士仍对其表示一致欢迎，称其是一项“有可能改写潮流”的协议，并且会向整个行业传达出强有力的信号。

伦敦大学学院能源研究所能源及航运专业讲师特里斯坦 • 史密斯博士表示，航运业需要加快零排放船只生产技术的革新，从以化石燃料为动力，转向以混合电力（电池）、氢能源、以及生物能等可再生能源为动力。

“这种革新对一个拥有超过 5 万艘船、足迹遍布世界各个角落的全球性产业来说意义重大。英国主导的研究表明，通过加大投资和加强监管，这些减排目标是可以实现的，”他说道。

“运输与环境”（T&E）航运部门主任比尔 · 海明斯说：“这一决定让航运业走上了正轨。如今，‘脱碳’的概念，以及航运部门的减排需要都被正式写入了协议，这对于落实《巴黎协

“据国际海事组织2014年的一份报告，海事部门的温室气体排放占全球总排放的2%-3%，但随着全球贸易的增长，预计到2050年，这一数字将增长50%-250%。”

定》的减排目标至关重要。”

“国际航运协会”（ICS）称该协定是一项“突破”。协会秘书长彼得·欣奇利夫说：“这次达成的行业减排目标的确很有魄力。不光是到2050年要将行业温室气体排放总量消减至少50%，而且还要在此基础上继续加大减排力度。在未来全球贸易和人口增长、以及经济持续向好的预期下，能够达成这一目标尤为不易。”

他认可一些国家政府想要达成更加积极的目标的想法，但是他说，只有零排放燃料得到广泛应用的前提下才能落实到2050年消减50%温室气体排放的目标。

“ICS认为，如果能够顺利完成50%的消减目标，那么之后整个航运业的零排放燃料转型就会非常顺利。”

缺少行动计划

可是，“清洁航运联盟”（CSC）下属的一些组织指出，目前还没有清晰的行动计划来确保上述目标的实现，而且也亟需采取一些短期措施。

CSC总裁及“海上风险”（Seas At Risk）高级政策顾问约翰·迈格斯说：“下一步的进展才是关键。IMO必须立刻采取措施在短期内大幅、快速地消减温室气体排放。如果不采取措施，《巴黎协定》的目标就无法实现。”

伦敦大学学院称，单是这项减排战略并不能确保船运部门在实现全球1.5摄氏度温升控制目标的过程中发挥作用，但却的确可以增加实现这一目标的可能性，只要各国达成一致意见，立刻采取措施在2023年前落实这项战略，并大幅消减温室气体排放。

今年晚些时候，政府间气候变化专门委员会（IPCC）将根据一份报告对这项战略进行评议。IPCC正在考虑采取何种措施才能实现《巴黎协定》中将全球气温升高控制在1.5摄氏度以内的目标。

阿巴索夫说：“这项协议并不是具有约束力的决议，只不过是一份承诺。重要的是要有具有约束力的监管措施和强制性措施。具体的行动计划将在12月举行的IMO环境会议上讨论。我们本来希望能在这周的会议上就讨论这个问题，但不幸的是，这个问题与战略问题的讨论分开了。”

这个观点也得到了荷兰绿党成员巴斯·艾克浩特的支持，他一直呼吁IMO能够拿出更大的魄力减排。他在推特中写道：“虽不足以兑现《巴黎协定》中的目标，但对国际航运业来说是向前迈出的一大步。下一步要做的是：尽快采取切实行动，我们等不起了。”

凯瑟琳·厄尔利，自由撰稿记者，《 环境学家》前副主编

Compromise climate deal agreed for shipping

Countries have agreed to halve emissions from global shipping, but the ambition falls far short of vulnerable nations' demands

□ Catherine Early

A deal to cut shipping emissions by at least 50% on 2008 levels by 2050, with a strong emphasis on scaling up action to 100% by mid-century, was agreed by 173 nations at the International Maritime Organization (IMO) this spring.

Countries also agreed to reduce the carbon intensity of international shipping (CO2 emissions per tonne mile) by at least 40% by 2030, and to pursue efforts towards 70% by 2050, compared to 2008. The deal contains a strong emphasis on increasing the cut towards 100% by 2050, if this can be shown to be possible.

Shipping and aviation were not included in the 2015 Paris Agreement on climate change, on the understanding that these sectors would come up with their own emissions reduction plan soon afterwards. Members of the International Civil Aviation Organization (ICAO) agreed a deal on emissions in October 2016, leaving shipping as the only sector with no plan to mitigate climate change.

> The maritime sector represents 2-3% of global emissions but this is predicted to rise by 50-250% by 2050.

The IMO had been coming under increasing pressure internationally over its failure to commit to GHG reduction targets. The EU was particularly vocal, and in November, the European Parliament approved a proposal to include shipping in the EU Emissions Trading System (EU ETS) from 2023, unless the IMO approved an ambitious emissions reduction plan.

The maritime sector is responsible for 2-3% of global emissions, but this is predicted to rise by 50-250% by 2050 as global trade grows, according to a report by the IMO in 2014. Talks on reducing the sector's impact have repeatedly stalled as countries including China, Brazil and Japan have argued that tighter restrictions on emissions would damage their economies.

However, recent research has flagged up opportunities for the sector to decarbonise. A study by the Organisation

The Global Maritime Technology Cooperation Centre Network (GMN) meets at IMO headquarters, London, 12 April 2018

for Economic Co-operation and Development (OECD) published in March concluded that the sector could reach "almost complete decarbonisation" by 2035 using known technologies.

Conversely, a report by analysts at Lloyd's Register and University Maritime Advisory Services found that no zero-emission vessels (ZEVs) were likely to be more competitive than conventional shipping by 2030. However, it did state that the technology was evolving rapidly and that, over the next decade, the gap could be reduced faster than it had estimated.

Intense negotiations

Friday's agreement was struck following two weeks of intense negotiations. Small island states such as the Marshall Islands, which are particularly vulnerable to sea level rise, had been pushing for complete decarbonisation by 2035, while EU member states were suggesting cuts of 70-100% by 2050.

Brazil and Argentina had been pushing against absolute reduction targets, arguing that their geographic location, far from other markets, meant that they would be disadvantaged by measures such as reducing speed on ships, which would especially hit exports of fresh produce.

China had also been opposed to absolute emissions reductions, though it had not put forward any proposed targets of its own. However, China and Argentina did not in the end oppose the deal. Only the US and Saudi Arabia made an official objection to the draft text, with Brazil opposing the absolute carbon target.

Faig Abbasov, shipping officer at campaign group Transport and Environment (T&E), noted that, during closing speeches at the final session of the IMO's meeting, sixty-five countries supported the strategy as it was. Only three opposed it, in whole or in part.

"Probably China didn't want to be seen as isolated, one of the three compared to 65. In its speech, China welcomed the strategy," he said.

One observer present at the talks reported that China was the first delegation to comment on the deal, after it was approved by chairman Hideako Saito. China welcomed the adoption of the initial strategy, which they described as a sensible compromise taking into account the views of all countries. It also said the deal sent a strong signal on the commitment of the shipping industry to a zero-carbon future.

'Potential game changer'

The agreement, though significantly weaker than the most ambitious countries had been hoping for, was hailed by campaigners as a "potential game changer" that would send a significant signal to industry.

Dr Tristan Smith, reader in energy and shipping, from the University College London Energy Institute, said that the shipping industry would require rapid technological changes to produce zero-emission ships, moving from fossil fuels to a combination of electricity (batteries), renewable fuels derived from hydrogen, and potentially bioenergy.

"While such changes are massive for a global industry, which has a fleet of over 50,000 ships trading internationally, UK-led research has shown that with the correct level of investment and better regulation, these reductions can be achieved," he said.

Bill Hemmings, shipping director at T&E, said: "This decision puts shipping on a promising track. It has now officially bought into the concept of decarbonisation and the need to deliver in-sector emission reductions, which is central to fulfilling the Paris Agreement."

Trade association for the global shipping industry the International Chamber of Shipping (ICS) called the deal "groundbreaking". ICS secretary general Peter Hinchliffe said: "The agreed IMO objective of cutting the sector's total GHG emissions by at least 50% before 2050, as part of a continuing pathway for further reduction, is very ambitious indeed, especially when account is taken of current projections for trade growth as the world's population and levels of prosperity continue to increase."

He acknowledged that some governments wanted more aggressive targets, but said that a 50% cut in GHGs by 2050 could only realistically be achieved with the very widespread use of zero CO_2 fuels.

"ICS believes that if this 50% goal is successfully met, the wholesale switch by the industry to zero CO_2 fuels should therefore follow very swiftly afterwards," he added.

Action plan missing

Campaign groups under the umbrella of the Clean Shipping Coalition (CSC), however, highlighted the lack of a clear plan for ensuring the target is met, and urgently needed short-term measures.

John Maggs, president of the CSC and senior policy advisor at Seas At Risk, said: "What happens next is crucial. The IMO must move swiftly to introduce measures that will cut emissions deeply and quickly in the short term. Without these, the goals of the Paris Agreement will remain out of reach," he said.

According to UCL, the strategy does not alone secure the shipping sector's contribution to keeping global temperature rise below 1.5C. But it does increase the possibility that this can be achieved, providing countries agree immediate measures to implement the strategy and significantly reduce GHG emissions by 2023.

The strategy is due to be reviewed in the light of a report by the Intergovernmental Panel on Climate Change (IPCC) later this year, which is considering what measures are needed to achieve the 1.5C goal of the Paris Agreement.

Abbasov said: "The deal is a non-binding resolution, it's just a commitment. The important thing is binding, regulatory and enforceable measures. The action plan will be discussed at the next IMO environment meeting in December. We were hoping it would be discussed this week, but unfortunately it was separated from the strategy."

This view was supported by Dutch Green MEP Bas Eickhout, who has long been pressuring the IMO to raise its ambition. In a tweet, Eickhout said: "Not enough for Paris implementation but a big step for international shipping. Next: concrete actions on the short term; we can't afford years of waiting."

Catherine Early is a freelance journalist and the former deputy editor of The Environmentalist.

中国核电会继续特立独行吗?

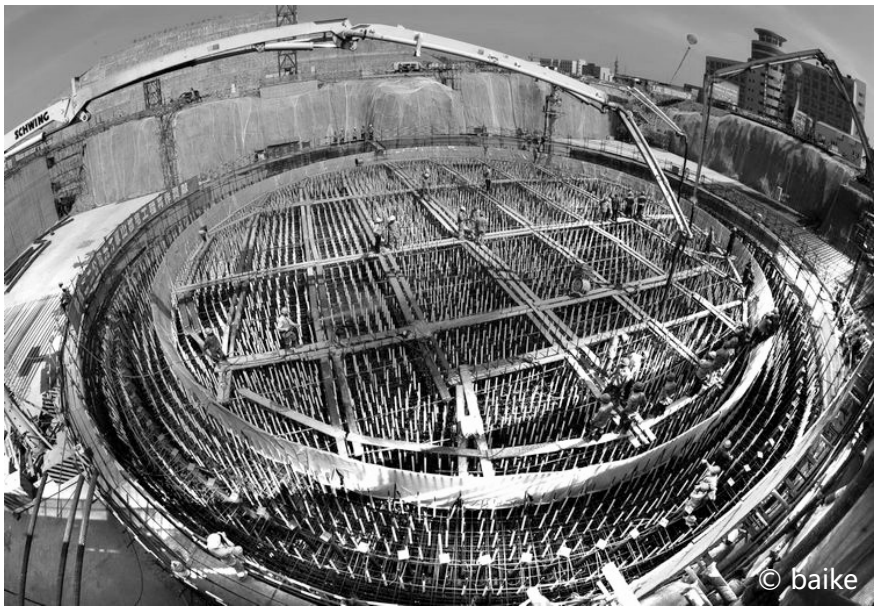
核电对于中国有其独特的战略意义，但未来电力格局留给核电的空间却不容乐观。

□ 冯 灏

在一场席卷中国南方的寒潮中，东南沿海小镇福清的核电站依然在紧锣密鼓地赶工——1月11日，高达70米的中核集团“华龙一号”五号反应堆顺利完成封顶。

不过，在世界范围内，核电行业依然处于一个只能用凋敝来形容的冬天之中。

在一次能源消费高度依赖核能的法国，电力巨头EDF宣布将投资250亿欧元(约310亿美元）建设光伏发电厂，此举被认为是这一老牌核电大国逐渐向可再生能源转型的信号；在核能装机大国韩国，文在寅政府在能源政策上“大转向”，承诺新政府将终止所有建设新核电站的计划，也不再批准现有核电站延期运行；而在核反应堆最多、核能发电量最多的美国，加州日前也以全票通过的方式通过决定，在2024年将对加州境内的最后一座核电站Diablo Canyon核电站开启退役程序。



地处浙江省嘉兴市海盐县的秦山核电站

近年来，核能在发电量尤其是新增装机容量上，都远远不及风能和太阳能。（来源：《世界核能产业发展报告》）

全球的核电增长乏力是不争的事实，新建核反应堆的速度已经比不上核电站关闭的速度。在这样的惨淡大局中，中国核电的相对强势格外扎眼：国际能源署最新发布的《世界能源展望2017》认为，全球核电发展的前景依然暗淡，不过中国会继续引领核电生产的渐进发展。《展望》甚至预测，到2030年时中国会超越美国，成为最大的核电生产国。

从数据来看，中国的确雄心勃勃。据《全球核能产业发展报告》估算，全球在建核电总装机容量中有40%

在中国，而 2018 年中国预计将有 5 台新的核电机组投入商业运行。

对核电不离不弃

在世界各国纷纷对核电采取保守态度的当下，中国为何却对这一争议缠身的能源形式不离不弃、步步为营？

中海油研究总院规划研究院战略研究员许江风告诉中外对话，单纯支持一种而反对其他，对中国这种量级的电力市场来说，是不可行的。从能源结构上看，各类能源均衡发展，才能更好地保障能源安全。

从价格角度来看，根据国家能源局最新公布的 2016 年度全国电力价格情况，核电的上网电价仅高于燃煤机组，仍然大大低于燃气、光伏和风电。中国工程院院士叶奇蓁对于中国核电的经济性态度颇为乐观。他对《中国能源报》表示，中国目前投产的二代改进核电机组，在规模化建设之后，在东南沿海的电价与当地煤电标杆电价相当，有些机组甚至更低。

也有不少中国专家认为核电是更可靠、安全、清洁的能源形式，对于减轻中国的煤电污染至关重要。姜克隽就认为，从全生命周期的分析来说，核电是最清洁的发电方式，减碳的角度更是如此。至于核电站事故的风险，他认为，核电的危害至少远低于煤电，“就像飞机和火车的对比，飞机的死亡率远远低于火车，但飞机出一次事故却引起广泛关注。”

狭窄的现实空间：两年零审批

但是，尽管政策制定者始终坚持核电发展具有各种战略意义，在现实中，中国核电发展的增长空间却存在巨大的问号。

尽管中国目前仍拥有近 2000 万千瓦的在建核电装机规模，但其建设计划已经面临延迟，恐无法达到 2020 年 5800 万千瓦的目标。据界面新闻报道，2016 和 2017 年，国家能源局已经连续两年没有批准新的核电项目。2017 年，中国仅有两座此前已经在建的核电机组并网发电。

对此，国家能源局核电司副司长史立山也坦承：“过去设想的规模目标的实现存在一些变数，在建机组，该投产、能装料的现在也在等待状态”。究其原因，史立山认为，一方面，“上上下下”对于核电的认识还不统一；另外，就是市场难以消纳。

来自可再生能源的激烈竞争

“只需要算一下电力供给侧和需求侧的账，就知道市场上已经容纳不下核电了，”东电万维科技（北京）有限公司总工程师康俊杰告诉中外对话。

他所指的是，随着中国经济增速逐渐放缓，电力需求和电力消费增速也明显下降，2015 年甚至出现了五十多年以来首次发电量下降。

而这狭窄的增长空间，面临着核电、光伏、风电、水电的激烈争夺。从全球范围来看，太阳能和风能正逐渐取代核电成为新建电厂的首选，中国也是如此。

成本是一个重要的因素，较早建成的核电站正在纷纷进入生命周期中晚期，运行和维护成本升高，而方兴未艾的可再生能源价格还在持续降低，市场竞争的天平逐渐向可再生能源倾斜。彭博新能源财经 (BNEF) 分析认为，中国的陆上风电和光伏电价将分别于 2019 年和 2021 年降到煤电之下。也就是说，核电相对于可再生能源的成本优势几年后可能就会消失。

根据 BNEF 的预测，2040 年核电装机仅占全球发电装机的 3%。（来源：BNEF 新能源展望 2017 ）

不过，发改委姜克隽认为，电力成本要放在更大的系统中去衡量。假设电力系统完全由分布式发电组成，成本会很高，因为需要燃煤机组作为备用机组，而这些低产量的机组会增加电力成本。

他举例，德国在去核之后，燃煤机组的发电利用小时数在 1900 小时，和风能的发电利用小时数基本相当（编者注：远低于中国 2016 年的 4165 小时），导致德国的电价已经上升了 6-7 个欧分。

但能源与核电政策国际独立咨询顾问 Mycle Schneider 则不这么看，他认为人类社会未来的用电模式就是会趋于灵活和分布式，而核电为降低成本需要不断增加规模，这令核能反而难以适应未来的电力格局。

不论怎样，面对世界和国内能源格局的变化，也许当前的用电低谷反而给中国提供了反思和重新选择的契机。能源政策专家，国际清洁能源论坛（澳门）秘书长周杰就认为，现在中国的能源需求趋缓，正好有时间可以平心静气地探寻规律。

冯灏，中外对话研究员

Is China losing interest in nuclear power?

Slowing demand for electricity and competition from renewables have halted new reactor approvals

□ Feng Hao

Globally, the outlook for new, large nuclear reactors is gloomy, according to the International Energy Agency's (IEA) World Energy Outlook. A lot of countries have backed away from nuclear power in recent years due to concerns over public safety, cost and the complex challenge of getting plants built.

But not China, whose state-backed nuclear industry has been steadily rolling out new reactors since the mid-2000s. The country has dominated growth in the sector over the past decade, and accounts for 40% of new reactors currently under construction.

This year, five reactors are expected to come online in China, with the IEA predicting that by 2030 the country will overtake the United States as the world's biggest generator of nuclear power.

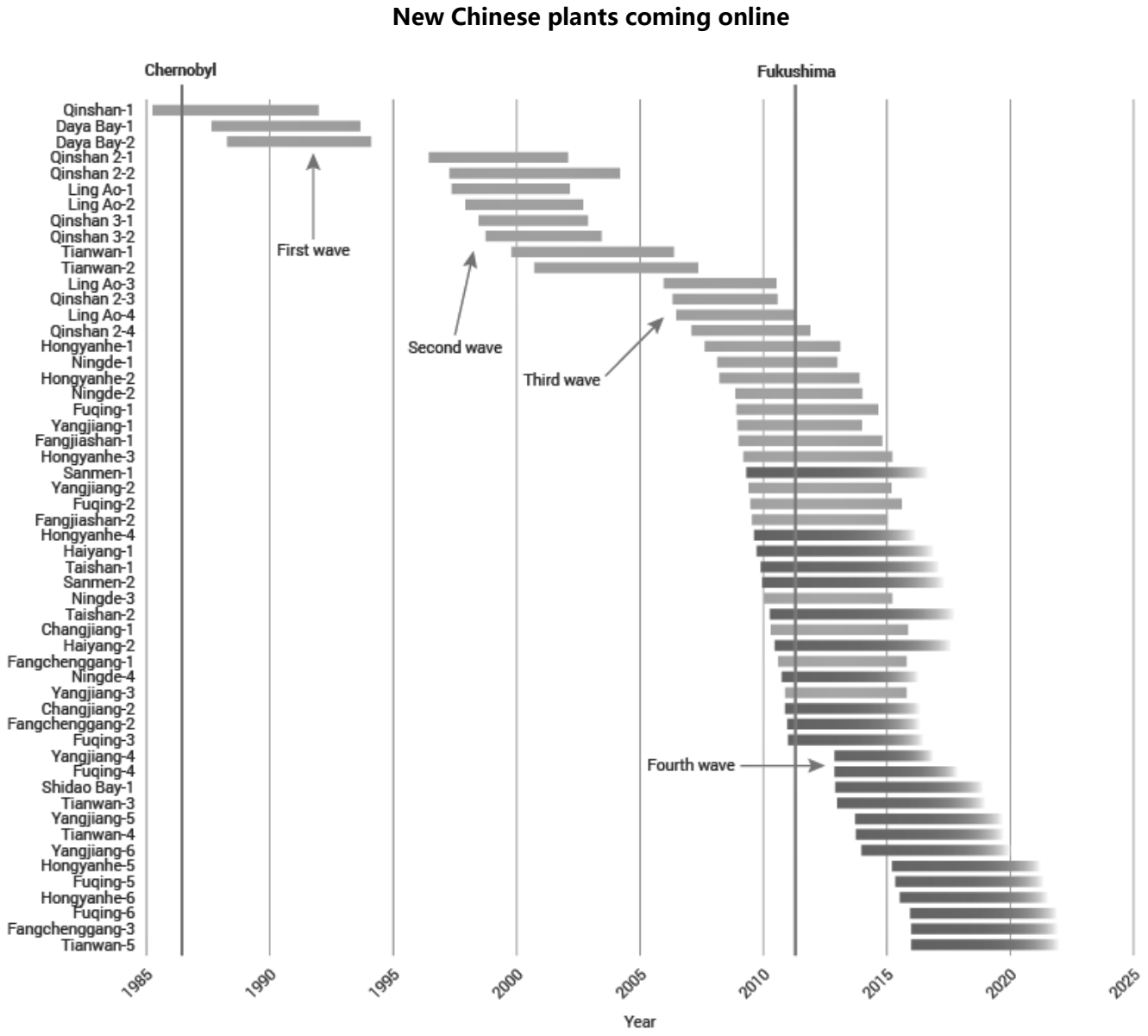
Pushing nuclear

Increasingly, China's decision to move ahead with new nuclear seems at odds with other countries that are abandoning the technology in favour of other low carbon options, such as wind and solar.

Xu Jiangfeng is a researcher at the Planning Research Centre of the China National Offshore Oil Corporation's Research Institute. He told chinadialogue that the government's concern with energy security has resulted in a diverse mix of energy resources and technologies being pursued, including nuclear.

In price terms, the National Energy Administration's National Electricity Pricing report, published in 2016, ranks nuclear power second only to coal on cost, and says it is much cheaper than electricity generated from natural gas, wind and solar.

In an interview last year, Ye Qizhen of the Chinese Academy of Engineering Sciences, was also upbeat about the economics of nuclear power in China. He told China Energy News that power costs from China's Generation II+ reactor designs, which are now entering operation on the south-east coast, will be on a par with those from coal-fired power, and some may even be cheaper.



Source: Jesper Antonsson (data from PRIS) 2016. Purple represents estimated plant completion.

Many Chinese experts don't just regard nuclear power as reliable and safe, they also point to its role in helping China to reduce air pollution from coal-fired power. Jiang Kejun of the National Development and Reform Commission also argues that nuclear power produces lower carbon dioxide emissions than other technologies over the lifetime of a plant.

Approvals freeze

Policymakers may cite various strategic reasons for backing nuclear power but there is a question mark hanging over the sector's future growth.

China has 20 gigawatts of nuclear power capacity under construction but plans for additional capacity are being delayed. A 2020 target of 58 gigawatts of installed nuclear capacity now looks out of reach.

The National Energy Administration did not approve any new nuclear plants between 2016 and 2017. In 2017, only three new reactors started operating.

Shi Lishan, head of the nuclear power office at the National Energy Administration, admitted at a meeting of the Chinese Society for Electrical Engineering last year that, "achieving targets set in the past now looks uncertain, with reactors that have been built and that are ready for fuelling and going into operation also on hold."

Reasons for the shift, according to Shi, include mixed attitudes towards new nuclear power within government, and the over-supply that's affecting China's power generation sector.

Competition from renewables

As China's economic growth has eased, so too has the growth in electricity demand. In 2015, electricity consumption rose just 0.5%, the lowest in 40 years.

"Work out supply and demand and you can see that the market is unable to absorb any more nuclear power," Kang Junjie, chief engineer with Dongdian Wanwei Technology (Beijing) told chinadialogue.

This leaves little room for expansion of electricity generation, meaning fierce competition between nuclear, solar, wind and hydropower. Globally, solar and wind are replacing nuclear power as the first choice for new power generation. This is true in China, too.

Cost is a key factor: the earlier nuclear power plants are now in the mid-to-late stages of their lifecycle, with operational and maintenance costs rising, according to Kang Junjie. Meanwhile, renewables are in the ascendant, with costs continuing to fall.

Analysis by Bloomberg New Energy Finance predicts that the cost of power from China's onshore wind and solar will drop below that of coal in 2019 and 2021, respectively, suggesting that the cost advantage of nuclear power over renewables will only last a few more years.

But Jiang Kejun says electricity costs are just one factor to be considered. Relying exclusively on distributed generation sources like wind and solar would be expensive because coal-fired power would have to be retained as a back-up source, pushing up the cost of electricity.

Mycle Schneider, an independent energy and nuclear power consultant, told chinadialogue that he thinks future power generation will tend instead toward more flexible and distributed models, and nuclear power will struggle to fit in with this as it relies on scale to reduce costs.

Speaking at a roundtable discussion last year organised by the Natural Resources Defense Council, Zhou Jie, an energy policy expert and secretary-general of the International Forum for Clean Energy (Macau), said that slowing demand for electricity will at least give China time to make adjustments to its power sector, including reassessing the future technology mix.

Feng Hao is a researcher at chinadialogue.

海洋问题从陆地开始

中外对话启动海洋项目之际，总编伊莎贝尔·希尔顿讲述海洋保护为什么比以往任何时候都更为重要。

□ 伊莎贝尔·希尔顿

2006年，伦敦和北京的几个友人一起创办了中外对话网站。当时，它是世界上唯一一个真正的中英文双语环境网站，致力于突破语言、文化和地理的障碍，促进气候变化和环境领域的思想交流。

依托伦敦和北京的小团队，我们着眼于全球范围内的危机。我们究竟是为了什么要做这件事，从对话中又学到了什么呢？

起初我们的想法是，我们的星球属于居住在这里的每位公民，而且每位公民都有权就其发展方式持有和表达他或她的观点。

但在真正的对话中，与表达同等重要的是倾听。通过倾听，我们相互学习，并从中发现改进的方式。

> 帮助世界海洋恢复健康是一项全球性挑战，需要来自包括商业、政府、民间组织、学界以及普通消费者在内的很多部门的努力。

我们采取完全双语的模式，是因为我们认为，对话应秉承相互尊重和公平的原则。为此，就要求一种语言不该有超越另一种语言的特权：我们尽可能做到，每位读者，无论其使用何种语言，都能在网站获得同样的体验。

这种方式为何如此重要？这是因为，当时中国即将成为世界最大的温室气体排放国，但却仍在走高碳排放的发展道路，产生大量垃圾和污染。如果继续下去，灾难性的气候变化将无法避免。

但站在北京的人们不一定这么看，他们看到的是发达国家的高人均排放量和更久远的污染排放史，并将自己的发展道路视作自己的权利。

另一方面，不论是在纽约还是伦敦，人们关注的是中国的总体排

放规模，认为如果中国不采取行动，那么他们所采取的或说服他人采取的减排措施都是徒劳的。那些气候变化怀疑论者借机指出，英国全年的排放量仅仅是中国的一小部分，这成为他们不作为的理由。

事实上，这两种观点都有一定的道理，但这样的对话无法为任何人带来宜居的未来。我们只有一个地球，这是我们生存之本。改变行为的第一步是改变我们的观点。

只有通过对话，我们才能对面临的挑战达成共识。这些挑战依然严峻，但我们在过去 12 年取得的进展也非常可观。中外对话成立时，中国还停留在“先发展后治理”的发展思路上。而现如今，生态文明和循环经济则成为了发展纲领。这要归功于那些具有远见卓识和坚韧不拔毅力的人们。他们看到可持续的未来需要一条不同的发展路径，并利用自身的影响力去尽力说服他人。虽然前路漫漫，但如今中国已经可以帮助他国，共同迈向更美好、更清洁和更加可持续的未来。

今天，中外对话开启了一个全新、但同样艰巨的项目，即“中外对话海洋”项目。

海洋所处的状况与我们初创时气候的状况惊人地相似：地球上的生命依赖于海洋的健康，而海洋正处于危机之中。它占地球表面积的 70%，我们传统上认为海洋不仅是浩瀚的，还是取之不尽用之不竭的。因此我们心安理得地攫取海洋带来的好处，却忘记了它对陆地上的生命是多么重要：我们呼吸的空气有一半都是海洋提供的；它吸收了大部分多余的热量，以及人类排放的三分之一的二氧化碳（CO_2）；在错综复杂的生态系统中，海洋中蕴藏着全球 80%的生物多样性；它为我们提供了食物和交通网络，并决定着地球的气候和天气系统。

然而，我们却仍对海洋进行过度开发，把它当成一个巨大的垃圾桶。如今，我们比以往更有能力探索和发现海洋的状况。但获得的信息却令人担忧。水体温度逐渐升高，全球海洋中普遍存在的塑料污染问题，富营养化导致大量无生命迹象的“死亡区域”，水体酸化威胁着贝类生物的生存，珊瑚礁、以及它们所提供的重要的产卵和育苗区都遭到了破坏，过度捕捞和沿海水域的退化。这些都是人类活动对海洋的破坏，它们正威胁着陆上生物赖以生存的生态系统的完整性。

随着中国成为世界上最大的温室气体排放国，它也是影响海洋环境最重要的因素之一：中国拥有世界上最大的海洋捕捞船队，中国是世界上最大的鱼类消费、加工和出口国。同时，中国也是海洋污染物的主要来源之一——从化肥排污到塑料和化学污染。缺少中国，问题将无法解决；但这也不是仅属于中国一国的责任。

海洋是我们共同的资源：我们共同利用它，也都有责任来保护它。我们如何保护海洋及海洋生物，将决定海洋能否继续维持我们的生存——或者渐渐的，它将无法赐予我们赖以生存的氧气、食物和气候。

自 2006 年成立以来，中外对话一直用中英文发布有关人类面临的重大环境和气候挑战的文章。我们认为对复杂问题的共识是为了解决这些问题而展开合作的重要基础。我们关注中国和全球海洋问题，都基于同样的精神和一个不可否认的前提，即如果没有中国，全球海洋危机的诸多方面都不能得到有效解决。

帮助世界海洋恢复健康是一项全球性挑战，需要来自包括商业、政府、民间组织、学界以及普通消费者在内的很多部门的努力。我们将发布有关污染、捕捞、气候变化、海洋治理和保护等关键问题的文章，探讨全球海洋危机的影响，当然其中包括对中国的影响。

海洋问题的源头在于陆地。我们需要从这里出发探寻解决之道。真诚期盼您能加入我们的行列！

伊莎贝尔·希尔顿，中外对话首席执行官及总编。

The ocean's troubles have their origins on land

As *chinadialogue* launches its marine project, we explains why protection of the global ocean matters

□ Isabel Hilton

In 2006, a handful of people in London and Beijing launched chinadialogue.net. At the time, it was the world's only completely bilingual Chinese-English website, and it sought to promote the exchange of ideas on climate change and the environment across the formidable barriers of language, culture and geography.

With only small teams in London and Beijing, we were taking on a planetary scale crisis. What did we think we were doing, and what did we learn from the process of dialogue?

We began with the understanding that our planet belongs to every citizen who lives on it and every citizen of the planet has the right to hold and express his or her view on how we treat it.

But in a real dialogue, the equally important counterpart to speaking is listening. It is through listening that we learn from each other and can come to see how we can move forward.

We made our website completely bilingual because we felt that embedding the principles of respect and even-handedness that dialogue required dictated that neither language should be privileged above the other: as far as possible, each reader of the site should have the same experience, regardless of language.

Why was this approach so important? Because, at the time, China was approaching its current status as the world's biggest emitter of greenhouse gases by volume, and was still heading down a path of high carbon development, with all its accompanying waste and pollution. If this continued, catastrophic climate change could not be avoided.

But from Beijing, people looked at the much higher per capita emissions of more developed countries, and their long history of pollution, and claimed the right, as they saw it, to follow that path to development.

In New York or London, on the other hand, people looked at the sheer scale of Chinese emissions and felt that any action they might take, or persuade others to take, to reduce their own emissions would be futile if China did not also act. Those who resisted the whole idea of human induced climate change justified inaction by pointing out

that the United Kingdom's entire annual emissions were a tiny fraction of China's.

Both perspectives had some basis in fact, but that conversation was not leading to a liveable future for anybody. There is no other planet, and we must all live on it. The first step towards changing our behaviour is to change our viewpoint.

It is only through dialogue that we can come to a shared understanding of the challenges that we face. Those challenges remain truly immense, but the progress we have made in the last 12 years is also impressive. In China, when chinadialogue launched, "develop first, clean up later," was a common view. Today, ecological civilization and the circular economy are guiding principles. This is a tribute to the tenacity and persistence of the far-sighted men and women who could see that a sustainable future demanded a different approach and used their powers of persuasion to convince others. There is still a long way to go, but China is now in a position to help others to power a better, cleaner and more sustainable future.

Today, chinadialogue embarks on a new, and equally daunting project called chinadialogue ocean.

The parallels with our beginnings in the climate dialogue are striking: the life of the planet depends on the health of the ocean and the ocean is in crisis. It covers 70% of the planet's surface and we see it as both vast and inexhaustible. We take its benefits for granted and forget how vital it is to the survival of life on land: every second breath we take is provided by the ocean; it has absorbed most of the excess heat and one third of the carbon dioxide we have produced; it contains 80% of global biodiversity in complex and interdependent ecosystems; it supplies food and transport networks and determines our planetary climate and weather systems.

Yet we continue to abuse it, treating it like a giant garbage dump. Today we have the capacity to explore and discover more about the ocean than ever. The news is not good.

The ocean depths are warming; plastic pollution is everywhere; vast dead zones where eutrophication ensures no life survives; acidification threatens the survival of shell-forming creatures; the destruction of coral reefs, with their essential breeding grounds and nurseries; overfishing and the degradation of coastal waters — all the ills of the ocean that human activities have produced — are now threatening the integrity of an ecosystem on which terrestrial life depends.

And just as China became the world's biggest emitter of greenhouse gases, China today stands as the world's most significant single source of ocean impacts: China has the world's largest fishing fleet; China consumes, processes and exports more fish than any other nation on the planet. China is also a major source of ocean pollution, from fertiliser run-off to plastics and chemical contamination. Without China, there is no solution, but nor is the task China's alone.

The ocean is a common resource: we have all exploited it and we have a shared responsibility to protect it. How we approach the preservation and protection of ocean life will determine whether the ocean will continue to support life – or will progressively fail to give us the oxygen we breathe, the food we rely on and the climate that we need.

Since 2006, chinadialogue has continued to publish in Chinese and English on the major environmental and climate challenges that humanity faces, in the belief that a common understanding of complex issues is the essential basis for the cooperation required to resolve them. Our focus on China and the global ocean is in that same spirit and starts from the undeniable premise that, without China, none of the separate aspects of the global ocean crisis can be effectively addressed.

Restoring the health of the world's ocean is a global challenge that will require effort, ideas and goodwill from many sectors, including business, government, civil society, science and everyday consumers. We shall be publishing on the key issues of pollution, fishing, climate change, ocean governance and conservation, exploring the impacts of the ocean crisis around the world, as well as in China.

The ocean's troubles have their origins on land. That is where the solutions also have to begin, and they begin with dialogue. We hope you will accompany us on this journey.

Isabel Hilton is CEO and Editor of chinadialogue.

收放之间：中国近海渔业的三十年

从改革开放初期的“放”，到近年来的“收”，
中国近海渔业的兴衰起伏留下了诸多宝贵的经验和教训。

□ 唐大旻

在中国东海岸最繁忙的渔港舟山、象山，渔民谈论最多的话题除了“出海”之外，现在还有“上岸”。上岸搞旅游、上岸经营冷库，这些跟海打了一辈子交道的人越来越多地把目光投向了陆地，他们的未来在那里。仅浙江象山一地，从2015年开始的五年内，就有近400艘渔船要被拆解，向海洋无节制索取的时代似在落幕。

在越来越无法回避的渔业资源危机中，中国农业部终于在2016年12月推出了史上力度最大的捕捞业减产方案：要求全国海洋捕捞业在五年内减产近四分之一，从每年超过1300万吨退到1000万吨以下。

然而，时间往回倒退30年，中国还是一个捕捞能力低下的渔业小国，正在踌躇满志，满怀憧憬地准备打破经济体制桎梏，向大海进发。

中国近海渔业走过的这些年，似乎完美印证了英国渔业学家迈克尔·格雷厄姆（Michael Graham）早在1943年提出的“渔业终极定律”（The Great Law of Fishing），即：不受限制的渔业必不能盈利。

开放海洋，摆脱饥饿

中国近海渔业的大发展源自上世纪70年代末邓小平主持的改革开放。

在引入市场经济机制前，渔业生产和农业一样完全按照政府的计划进行。浙江象山的退休渔民沈祥根回忆，60年代出海打鱼用的都是木船，渔船归村集体的公社所有，一个公社也就几艘。个人不允许投资渔船，捕捞的时间和计划，也由公社统一安排。

那时，中国近海的捕捞业规模完全无法和现在相比。据联合国粮农组织（UN Food and Agriculture Organization）统计，到70年代中期，中国的近海捕捞年产量还只有约300万吨，远低于农业部后来估算的800万到1000万吨的最大可捕捞量。

从渔业生产规律的角度看，适当“移除”食物链顶端的大型食肉鱼类，会刺激和提高总体海洋生物

量（biomass）的更新速度。处于僵化的公社经济体制中的中国，一方面处于食物短缺之中，一方面却年复一年白白流失大量的食物资源。

突飞猛进

据斯坦福大学粮食安全和环境中心研究员曹玲等人对中国渔业管理政策变迁的回顾，1985 年国务院发布的五号文件和 1986 年颁布的《渔业法》成为中国海洋捕捞业的转折点。

其中，五号文件要求加快本国海域内的海洋渔业发展，鼓励渔船私有化，促进水产品的市场流通；而《渔业法》则以法律的形式明确，“国家鼓励、扶持外海和远洋捕捞业的发展，合理安排内水和近海捕捞力量。”

在法律和行政力量的鼓励之下，中国海洋渔船的产能（总功率数）和产量双双经历了一段为期约 12 年的连续增长。

但好景不长，1999 年后，中国的海洋捕捞产能和产量逐渐分道扬镳，前者依旧保持着几乎一致的增长速度，而后者进入一个明显的平台期。换句话说，为了维持海洋捕捞量不下降，中国投入了越来越多的捕捞能力，而单位投入获得的产出则日渐下跌。

值得注意的是，据曹玲等人对渔获结构的观察，中国海洋渔获的质量和经济价值也在大幅下滑，从主要包含大型经济鱼类，变为 80% 都是小型低值鱼类，比如凤尾鱼、鲭鱼和竹荚鱼等。绿色和平的一份报告更是指出，海洋渔获中约三分之一甚至不具备人类食用的价值，只能勉强用于生产养殖饲料。

通过加大投入来保障产出，从某种意义上一直是中国解决粮食安全问题的基本思路。在陆地上，为了用地球 7% 的耕地养活 20% 的人口，中国成为了全球第一大农药和化肥生产和使用国。

但海洋捕捞与种植业不同，渔业投入的增加非但没有令海洋中的动物数量增加，反而导致了不少鱼种陷入过度开发的境地。

事实上，在 1995 年左右，也就是鼓励渔业私有化的五号文件出台后的第十个年头，中国的海洋捕捞量就超过了农业部估算的 1000 万吨最大可捕量，向着不可持续的方向一发不可收拾。

监管近海捕捞

几乎是在中国近海捕捞到达临界点的同时，中国政府也意识到了渔业资源过度开发的问题。从 90 年代中期开始，一系列渔业管理措施出台，并逐渐构成了迄今为止的中国近海渔业管理体系。

一，伏季休渔

从 1995 年起，渤海、黄海和东海渔区开始实行伏季休渔制度，在

2014年12月23日，中国浙江省象山县，渔船在停泊了三个半月后缓缓驶离石浦渔港

鱼类的关键生长和繁殖期，关停渔业生产，使鱼类等有足够的生长和繁殖时间。1999 年南海渔区也开始实行该制度。

各地的休渔期也经历了从短到长的过程。2017 年前，北纬 12° 以北的海区，休渔期一般从每年 6 月 15 日或 7 月 1 日开始，到 9 月中旬结束，历时 2-3 个月，具体长度根据区域和作业类型略有不同。2017 年后，中国开始实行“史上最严休渔期”，休渔期的起始日期被提前到 5 月 1 日，使得一些渔区的休渔期长达四个半月。

二，渔具管理

从 1979 年就开始执行的对破坏性作业方式（炸鱼，毒鱼，电鱼等）的禁止性条例在 2013 年得到了加强。当年，农业部发布“关于实施海洋捕捞准用渔具和过渡渔具最小网目尺寸制度的通告”，对渔网尺寸进行监管，规定 自 2014 年 6 月 1 日起，黄渤海、东海、南海三个海区全面实施该制度，并对十三种破坏性渔具（包括一些类型的拖网）进行禁止。

三，渔船管理

中国从 1987 年起就开始着手控制渔船数量以及控制主机功率（“双控”），重点压减老旧、木质渔船，禁止新造、进口将在中国管辖水域进行渔业生产的渔船。按渔业法规定，渔船均需要有效渔业船舶检验证书、渔业船舶登记证书和渔业捕捞许可证。2000 年，农业部就曾在政令中提出海洋捕捞业“负增长”的愿景。

根据曹玲等人的论文，2002 年中国进一步控制捕捞业的投入规模，实施了渔船报废制度和回购计划，用补贴的方式鼓励渔民报废自己的年久渔船。此外，中国自 2003 年也开始实施渔民转产转业政策。

矛盾的燃油补贴

但不幸的是，这些政策的效力很快就被另一项威力更大的政策所掩盖。同样在 2006 年，中国开始对农业等各个民生生产领域实行燃油补贴，渔业捕捞也被涵盖其中。补贴依据的是渔船的功率大小和燃油使用量，并且在此后的 10 年里不断提高补贴额度。

燃油补贴意在解决这一问题，但却导致了其他后果。

到了今天，一些渔民已经形成了“补贴依赖症”，燃油补贴成为了其收益的大头。一次性的渔船报废补贴无法与动辄每年数十万的燃油补贴相比，于是，燃油费用占成本大头的海洋捕捞业非但没有受到打压，反而顺势继续扩张。

生态文明拯救海洋？

不过，随着习近平的“生态文明”理念从陆地延展至海洋，这种扩张态势很可能终将受到遏制。如果说邓小平将经济发展变成了整个中国的重心，那么习近平正在试图把生态环境的重要性拔到同样的高度。

建设生态文明的宗旨甚至动摇了实施多年的渔业燃油补贴政策。2015 年，财政部、农业部承认，自 2006 年以来的渔业油价补贴政策覆盖面广、规模大、持续时间长，扭曲了价格信号，与渔民“减船转产”的政策不相适应。中央政府宣布开始逐年减少燃油补贴，其目标是争取到 2019 年将补贴降低到高峰 2014 年的 40%，并推动更多的渔民逐步退出捕捞业。

在渔业管理的技术层面，中国也在试图实现突破，向着更为科学、精细的渔业管理体系发展。例如，在渔业发达的浙江，2014 年发布了全国首个《重要海洋渔业资源可捕规格及幼鱼比例》省级地方标准，对 18 种主要鱼类的最小可捕捞规格做出了规定。浙江和山东也已开始试点分别针对三疣梭子蟹和海蜇的限额捕捞。而渔业十三五规划中更是提出，中国沿海的 11 个省份到 2020 年都必须开展至少一个限额捕捞试点。尽管来得有点晚，但这些项目将积累宝贵的数据，为实施早在 2000 年《渔业法》修正案就提出的“捕捞限额制度”迈出第一步。

中国近海渔业的可持续性对于其远洋渔业产业的全球足迹也将带来深远影响。这两者的关系就像跷跷板一样，近海资源的衰退在很大程度上催生了远洋渔业的快速扩张。因此，如果近海过度捕捞状况得到改善，也将有助于疏解远洋渔业产能过剩的问题。目前中国拥有全球最庞大的远洋船队，渔船数量约 2600 艘。

如果说中国近海渔业三十年的起伏留下了什么教训，那很可能就是：粗放的、缺乏执行力的政策必定无法阻止渔业资源的衰退。知易行难，中国只有把所有曾经想做但没有做到的工作都一一践行，才有可能扭转局面。

而如今，拥有全世界最大水产养殖业的中国，是否有能力在不影响粮食安全的前提下，实现渔业的再一次转型？

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唐大旻，中外对话北京办公室资深编辑

Restoring China's coastal fisheries

An analysis of the policies that have shaped the country's fishing sector over the last 30 years

□ Tang Damin

Whether it's to work in tourism or to run a cold store, more and more Chinese fishermen are returning to dry land. Most don't have a choice.

China's coastal waters used to provide rich fishing grounds, but those days have long since passed, and with them many of the jobs. In Xiangshan, once a prosperous fishing town in the south-eastern province of Zhejiang, almost 400 fishing vessels out of about 3000 will need to be scrapped by 2019.

The crisis affecting China's coastal fisheries has become impossible to ignore. In December 2016, the Ministry of Agriculture published its toughest plan yet to reduce the annual catch size by almost a quarter within three years; from over 13 million tonnes a year to under 10 million. (The ministry calculates that a sustainable catch is 8-10 million tonnes a year.)

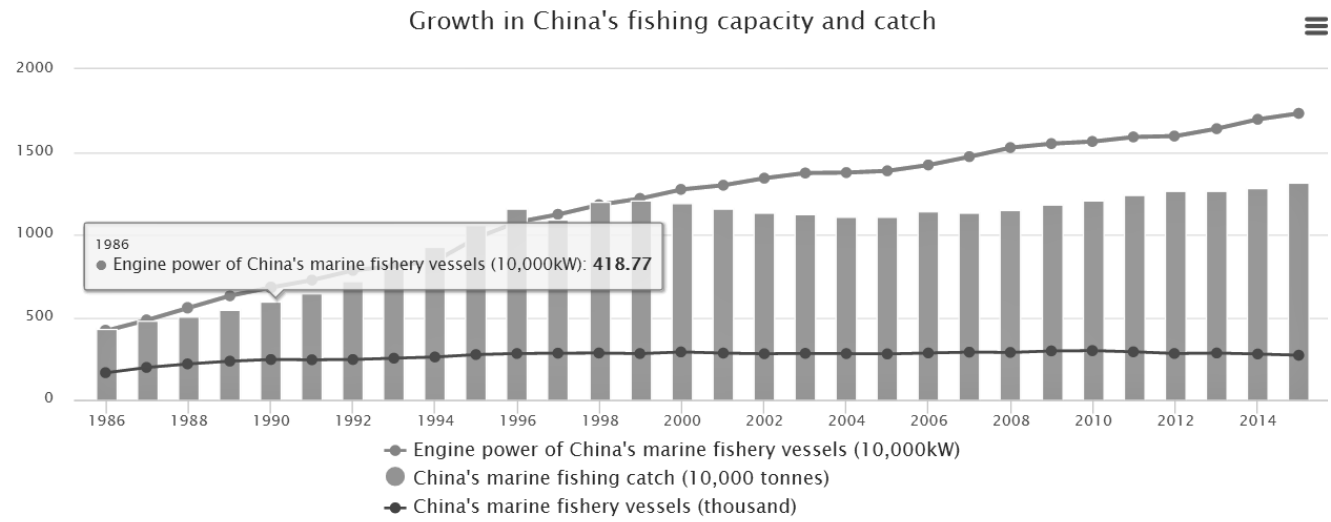
China barely ranked as a fishing nation 30 years ago, but it is now the world's largest producer and consumer of seafood products. Yet the rapid growth in coastal fishing, and the pressure this has put on fish stocks, has proved the adage expressed by Britain's chief fisheries scientist Michael Graham, who in 1943 declared that, "fisheries that are unlimited become unprofitable".

Early limits

The boom in China's coastal fishing dates back to Deng Xiaoping's economic reforms in the late 1970s.

Prior to China adopting market mechanisms, the country's fishing sector was governed according to central government strategy. In the 1960s, fishing boats were limited in number and made of wood. They belonged to

> "China is also looking for breakthroughs in fishing technology and working towards a more scientific and detailed management system."



Data from the Ministry of Agriculture and compiled by Greenpeace show the catch size increased almost 200% between 1986 and 1995.

village communes, which decided where and when the boats fished. Individuals were not permitted to invest.

China's ossified commune system effectively limited the amount of fish caught. Despite widespread food shortages, China's coastal fishing catch by the mid-1970s was only three million tonnes, according to data from the United Nations Food and Agriculture Organisation (FAO).

Deng era reforms

In a review of China's fishing policy, Cao Ling, a researcher at Stanford University's Centre on Food Security and the Environment, traced the turning point for the industry to the Fisheries Law of 1986.

The Fisheries Law called for the rapid development of fishing in Chinese waters through the privatisation of fishing vessels and growth of seafood markets.

It stated that, "The state shall encourage and support the development of offshore and deep sea fisheries and make rational arrangements for fishing capacity for inland and inshore fisheries".

The reforms were effective but the good times did not last. By 1999, additional fishing capacity was failing to deliver an increase in overall catch, which plateaued at around 12 million tonnes a year. In other words, China's coastal fleet was having to expend more effort just to maintain its existing catch level.

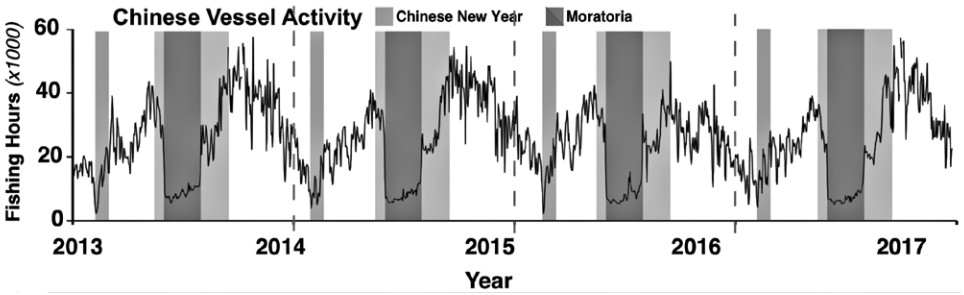
According to Cao Ling's review, the quality and value of China's catch has plummeted, too. The large commercial species, such as yellow croaker and large head hairtail that used to be the bulk of the catch, have declined. Nowadays, 80% of the catch is composed of small, low-value fish, such as anchovy and mackerel. In fact, one third of the catch is not deemed sufficiently nutritious for human consumption and is used to produce fodder, according to Greenpeace.

Investing more resources to maintain output is not a sustainable way to deliver long-term food security.

China has 20% of the world's population but only 7% of its arable land. The pressure to produce food had led it to become the biggest maker and user of pesticides and fertiliser. But fishing isn't like farming. More investment in fishing has not led to more fish in the sea, but instead to many species being over-exploited.

Regulating coastal fishing

By 1995, a decade after the State Council document encouraging privatisation of fishing, China's catch passed the 10 million tonnes a year mark, marking a turning point in the sustainability of the coastal fisheries, as calculated by



Chinese vessel activity showing the effect of summer closures (Chart: Global Fishing Watch)

the Ministry of Agriculture.

As China's coastal catch reached that critical point, the government realised the risk of over-exploitation and put in measures from the mid-90s that form the current system of coastal fisheries management. These include:

1. Summer closures

Since 1995, fisheries in the Bohai, Yellow and East China seas are closed during the summer to allow fish populations respite to breed and grow. A summer closure has been in effect in the South China Sea since 1999.

In recent years, the summer closures have been extended. Until 2017 they ran for two or three months above a latitude of 12° from June 15 or July 1 to mid-September, with variations according to the location and type of fishing. From 2017, China has ended fishing from May 1, meaning a closure of four and half months in some places.

2. Gear regulation

Rules banning damaging fishing methods such as the use of explosives, poison or electrocution, date back to 1979 but were toughened up in 2013 by the Ministry of Agriculture. Rules on net sizes came into force on June 1, 2014, in the Yellow and Bohai seas, the East China Sea and the South China Sea. Three types of fishing gear that cause damage, including some types of trawling, were also banned.

3. Vessel management

China started to exert control over the number of fishing vessels and their engine power in 1987. The number of old and wooden vessels was reduced. The import of fishing vessels for use in Chinese waters was banned. Fishing industry law and regulations require vessels to have test certificates, registration documents and a fishing license. A document issued by the Ministry of Agriculture in 2000 called for "negative growth" in the fishing industry.

In 2002 China started controlling inputs to the industry, with scrappage and buyback schemes offering subsidies to persuade fishermen to give up older boats. In 2003 a policy of encouraging fishermen to change career came into effect.

Unfortunately, China's efforts to regulate coastal fishing have been undermined by its provision of fuel subsidies, which began in 2006 across a number of sectors, including agriculture and fishing. Fishing vessels receive subsidies based on their engine size and fuel use.

The fishing industry's fuel subsidy originated to protect vulnerable groups during fuel price reforms, said Professor Wang Yamin of Shandong University's Marine College. Highway maintenance fees were folded into fuel prices, so fishing vessels got a subsidy to compensate them for the additional cost. Unfortunately, the subsidies, which have continually increased in the ten years since launch, had unintended consequences.

Some fishing vessels are now reliant on them, which accounts for the larger part of their income. One-off subsidies for scrapping a vessel can't compete with the fuel subsidy, which can easily be worth tens of thousands of yuan annually. Fuel accounts for the major part of costs in the fishing industry, and the subsidy has allowed the sector to continue expanding.

Will 'ecological civilisation' save the sea?

But that expansion may be halted if the concept of an ecological civilisation, can spread from land-based action to the ocean. If Deng Xiaoping made economic development the focus for all of China, then Xi Jinping is attempting to do the same for the environment.

Constructing an ecological civilisation has even shaken up the long-standing fuel subsidy policy. In 2015, the ministries of finance and agriculture admitted that the large and sustained subsidies paid since 2006 had distorted price signals and were inconsistent with policies to reduce the vessel numbers and transition fishermen into other jobs.

The central government announced that the subsidy will be cut annually, with the aim of bringing payments down to 40% of the 2014 subsidy level by 2019. This reduction in subsidy is expected to push fishermen (which number between one and four million) to quit the industry.

China is also looking for breakthroughs in fishing technology and working towards a more scientific and detailed management system. In 2014 Zhejiang, a major fishing province, issued China's first provincial standard on the size of fish caught and the proportion of young fish in catches, setting a minimum size for 18 species of fish. Zhejiang and Shandong are also experimenting with catch quotas for horse crab and flame jellyfish, respectively.

The 13th Five-Year Plan for the fishing industry states that each of China's 11 coastal provinces must have at least one trial of catch quotas by 2020. It may be a little late, but these initiatives will gather valuable data to be used in the implementation of a "fishing quota system", mentioned in the 2000 revision of the Fisheries Law.

The sustainability of China's coastal fisheries has an impact on the global footprint of the country's distant water fleets. The depletion of coastal fisheries has spurred rapid growth in fishing from more distant waters. China has the world's largest distant water fishing fleet, of 2,600 vessels. If coastal over-fishing can be resolved then work can be found nearer home for the fishing sector's excess capacity.

So what lesson has been learned from these last 30 years? Perhaps that overly-broad and unenforced policies cannot prevent the depletion of fisheries. Talk is easier than action; China must do everything it has said it wants to do if the situation is to be turned around.

The author thanks Liu Lijun for contributions to research for this article.

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过度捕捞下的海参危机

海参贸易的故事考问，当某种产品的需求远超其供应时会发生什么？

□ 迈克尔·法宾依　凯特·巴克雷

海参在中国已经有数百年的食用历史。活海参发挥着重要的生态作用，包括重新分配海底的沉积物。

海参在传统中医典籍中早有记载，被当作治疗肾亏和阳痿的药材。如今，它们仍被普遍用作养生品，有时也以“海参酒”或香皂等新的产品形态出现。海参还经常与鲍鱼、鱼肚、龙虾和石斑等其他海味一起出现在豪华宴会上。

日本刺参在中国北方地区备受青睐。这种海参在山东和辽宁两省大量养殖，但在中国以及日本、俄罗斯、朝鲜和韩国等邻国也能捕获野生的。

海参价格因质量而异，在一些市场上可以卖到每公斤 600 美元（3765 元人民币）。而在中国南方，海参的种类更加广泛，包括五花八门的热带品种，如沙参、白乳参和黑乳参。

消费量猛增

1978 年中国改革开放之后，海鲜消费量和贸易量不断增加。据估计，到 2030 年，中国的食用鱼消费量将占世界总量的约 38%。

尽管中国的人均海鲜消费量仍然比某些国家（如日本）低，但中国的人口规模决定了这样的增长将产生广泛的环境、经济和社会影响。

尽管对华海鲜贸易增长给低收入地区生产者的生计带来重要助益，但很多海鲜种类已经遭到过量捕捞，而在这些复杂的供应链上也很难保证可追溯性。

海参就是一个典型例子，体现了中国迅速增长的海鲜贸易和消费所带来的挑战。

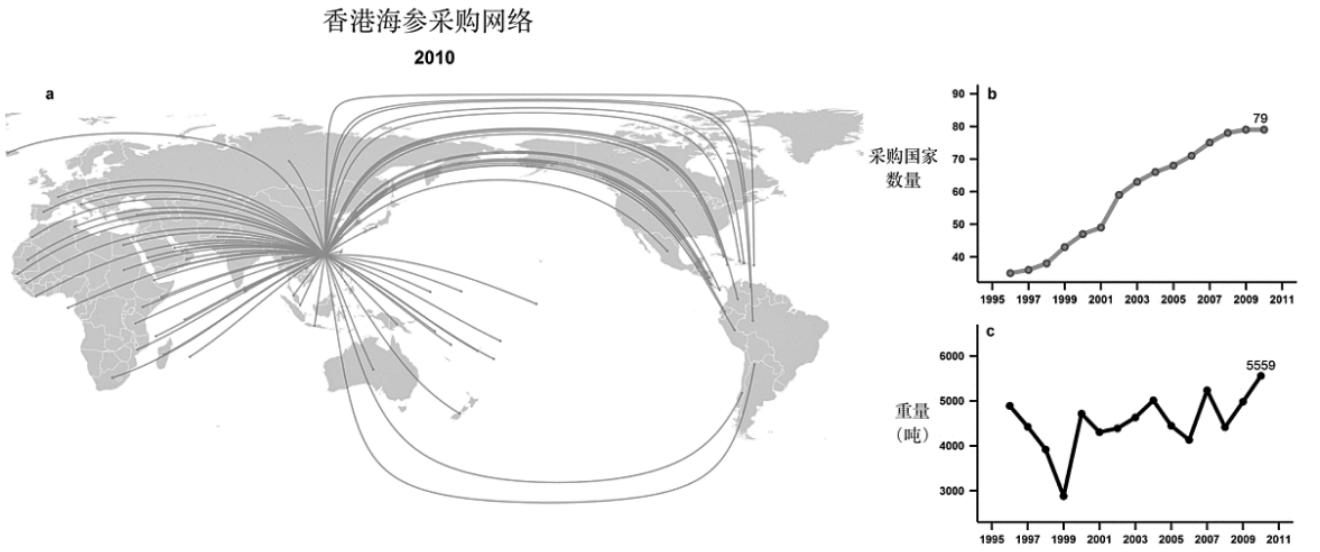
濒危的底栖者

中国海鲜消费的快速增长直接反映为海鲜贸易的剧增。

埃里克森及其同事的研究表明，从 1996 年到 2011 年，中国海参进口的供应国从 35 个增加到 83 个。香港的海参进口来源国如今覆盖了世界 90% 的热带海岸线，而其中很大一部分都卖到了中国大陆。资金流通过整个供应链将中国进口商与每个捕捞者联系在一起。

迅速增长的海参贸易对海参的生存状况产生了负面影响。

全球至少 38% 的海参渔场被过度捕捞。在世界自然保护联盟的红色



出口至香港的海参数量增长 （1995年至2011年） 资料来源：Frontiers in Ecology and the Environment；埃里克森

名录中，7 种海参被列为濒危，另外 9 种被列为易危。由于过度捕捞，21 个国家已经或计划禁止海参捕捞。

比如，为了满足中国不断增长的需求，上世纪八十年代以来巴布亚新几内亚的海参捕捞业迅速扩张。在上世纪九十年代和二十一世纪头十年的高潮期，巴布亚新几内亚一度成为世界最大的海参生产国之一。尽管该国设置了捕捞配额，但不幸的是并未对海参业起到有效的规范，从而导致过度捕捞现象普遍。

2009 年，该国下令暂停海参出口，直到 2017 年才取消这项禁令。

尽管海参贸易给当地人带来了显著的经济效益，但在很多情况下这些效益都是暂时的，当地人的生计并未因此而得到普遍改善。由于大多数收入都到了年轻人手中，大量的钱被用于享乐和买酒。只有很少的巴布亚新几内亚人能够通过参与海参贸易和销售，提升自己在“价值链”上的位置。

亟待解决

要完善海参和其他高价值海鲜的对华出口的治理，有很多挑战。

传统渔业管理方式通常都是在生产现场进行管制，但对于海参捕捞，巨大的市场需求可以压倒任何旨在保护可持续性的当地制度。

而在需求端，已经有了认证和生态标签等以市场为基础的工具，旨在通过施加市场压力，促进“有利于环境可持续性”的海鲜生产，让消费者和贸易商等市场主体参与贸易治理。

然而，目前中国对“有利于环境可持续性”的海鲜的需求并不广泛。有一种强烈的观念认为，环境监管是政府的事情，与市场无关。最重要的是，要想提升中国所消费的海鲜的环境可持续性，这些海鲜就应该具有“可追溯性”。

所谓可追溯性，指的是能够追踪海鲜来自何处。这是大多数可持续性行动的一个基本前提。但是，尤其值得一提的是，目前存在的“灰色贸易”使得中国海鲜的可追溯性低下。所谓灰色贸易，就是通过香港和越南等附近的贸易中心将海鲜产品暗地里运到中国大陆，以逃避进口关税。

尽管中国的自贸协议越签越多，但灰色贸易仍然是很多海参和其他高级海鲜进入中国的一个普遍途径，这大大降低了海鲜的可追溯性。

但是，中国政府针对灰色进口贸易的执法行动正日益趋紧，高调查处了几批海鲜并惩处了海鲜贸易商。此举可能与中国公众和政府都极其关心的食品安全有关，而提升可追溯性是食品安全管理的核心。

从更大的背景来看，这也可能是习近平政府的宏伟反腐计划的一部分。宴请费用的压缩已经让高级海鲜产业受到打击。长远来看，要想更好地管理海参等具有经济和生态重要性的海鲜的对华贸易，这样的广泛治理行动可能是最为关键的。

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凯特·巴克雷，悉尼科技大学副教授，主要研究领域为渔业的社会影响

Sea cucumber trade threatens several species

From Indonesia to Papua New Guinea, demand is pushing fisheries to collapse and driving production to new areas

□ Michael Fabinyi Kate Barclay

In the 1990s, global trade in sea cucumber boomed with Papua New Guinea becoming one of the biggest producers

Sea cucumbers, widely known by the name for their dried form, bêche-de-mer, are animals that have been harvested for consumption in China for centuries. They play important ecological roles including redistributing sediments on the ocean floor.

They have been documented in handbooks of traditional Chinese medicine, and are regarded as treatments for kidney problems and for impotence. They are still commonly consumed for health reasons, sometimes featuring in new product forms such as "Holothurian wine" or soap.

They are also commonly eaten as a luxury food item at banquets alongside other seafood delicacies including abalone, fish maw, lobster and reef fish.

In northern China, the Japanese spiky sea cucumber

(Apostichopus japonicus) is preferred. This species is farmed heavily in Shandong and Liaoning provinces in the northeast, but is also wild-caught in China and neighbouring countries such as Japan, Russia and the Koreas.

Depending on the quality, this species can sell for more than US$600 per kilogramme (3,765 yuan) in some markets. While in southern China, a greater diversity of sea cucumbers are consumed, including a wide range of tropical species such as sandfish, white teatfish and black teatfish.

Growing appetite

Since China's economic reforms began in 1978, seafood consumption and trade have expanded accordingly. By 2030, it is estimated that China will account for approximately 38% of all global consumption of fish.

Although Chinese per capita consumption remains lower than in some other countries (e.g. Japan), the size of China's population means that the environmental, economic and social implications of such an increase in consumption are wide-reaching.

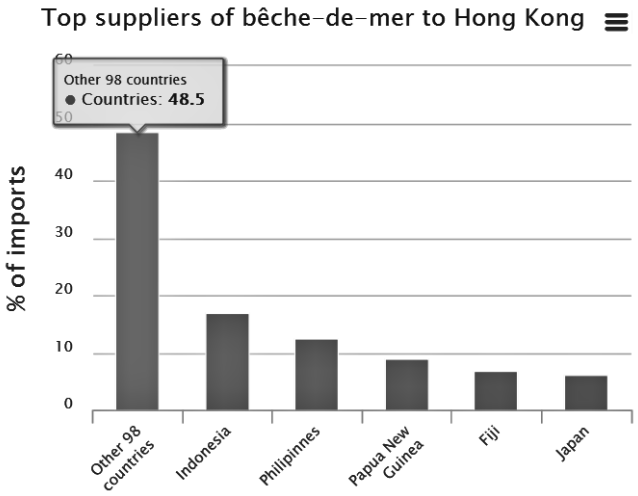
While increased seafood trade to China has provided important livelihood benefits for producers in low-income contexts, overfishing of many species has taken place. Ensuring traceability of these complex supply chains is difficult.

The case of sea cucumbers provides an illustrative example of the challenges posed by rapidly growing seafood trade and consumption in China.

Endangered species

The rapid expansion of seafood consumption in China is reflected in the significant increase in trade to China.

Between 1996 and 2011, the number of countries supplying the Chinese sea cucumber market expanded from 35 to 83. Over 90% of the world's tropical coastline now lies within countries that export sea cucumbers to Hong Kong, a large proportion of which are traded on to mainland China.



Source: Dr Allen To, WWF Hong Kong

In many cases, finance extends from importers in China all the way through the supply chain to individual catchers.

This rapid increase in trade has had negative impacts for the status of sea cucumbers.

Globally, at least 38% of sea cucumber fisheries are overfished.

Under the International Union for Conservation of Nature's Red List, seven species of sea cucumbers are listed as Endangered, while a further nine are listed as Vulnerable. Twenty-four countries have closed, or attempted to close their sea cucumber fisheries due to overfishing.

In Papua New Guinea, for example, the sea cucumber fishery expanded rapidly in response to growing Chinese demand in the 1980s. Throughout the 1990s and early 2000s it boomed, and Papua New Guinea became one of the biggest producers of sea cucumbers in the world.

Catch quotas were instituted, but unfortunately these were unable to successfully regulate the fishery, and widespread overfishing took place.

> "Over 90% of the world's tropical coastline now lies within countries that export sea cucumbers to Hong Kong."

A moratorium on exports was implemented in 2009, lifted only in 2017.

While the trade had provided significant economic benefits to local households, in many cases these economic benefits were short-lived and did not translate into more broad-based forms of livelihood improvement.

Because most of the earnings went to young men, there were accounts of money being spent on entertainment and alcohol, and few Papua New Guineans were able to participate in business and trading further up the "value chain".

Solutions needed

There are many challenges to improving the governance of sea cucumber fisheries and other high-value seafood exports to China.

Conventional forms of fisheries management have typically implemented regulations at the site of production. Yet in cases such as sea cucumber fisheries, the strength of market demand simply overwhelms any local institutions working to promote sustainability.

At the demand end, market-based tools such as certification and eco-labels have been developed as a way for consumers and traders to participate in governing the trade through exerting market pressure for environmentally sustainable seafood.

Yet in China, demand for environmentally sustainable seafood is not currently widespread, and there is a strong perception that environmental regulation is the business of government, not markets.

Most importantly, any initiatives to improve the environmental sustainability of seafood consumed within China will suffer from the widespread problems of traceability.

Traceability, being able to track where seafood has come from, is a fundamental precondition for most sustainability initiatives.

In particular, the so-called "grey trade" has contributed much to the problems of poor seafood traceability within China. This involves the clandestine transportation of seafood products into mainland China via nearby trading hubs, chiefly Hong Kong and Vietnam, in order to avoid paying import tariffs.

While China is signing up to greater numbers of free trade deals, the grey trade remains a common route for sea cucumbers and other luxury seafood imported into China, which dramatically reduces traceability.

However, the appetite for the government to strictly enforce import laws on the grey trade appears to be increasing, with several high-profile seizures of seafood and prosecutions of seafood traders.

This may be linked to the fact that improved traceability is also central for food safety regulation, something that is of extremely high concern among the public and that the government is keen to work on.

More generally, it may also form part of the Xi administration's broader agenda to crack down on corruption, something that has already negatively impacted the luxury seafood sector through reduced spending on banquets.

These sorts of wider governance initiatives may in the long-term prove crucial for the improved management of economically and ecologically important fisheries traded to China – of which sea cucumbers are just one.

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退潮之后：后补贴时代的渔村

中国决定从2015年开始逐步减少渔业燃油补贴。面对政策调整，渔民何去何从？

□ 石 毅

在别人眼里辽阔的大海，在浙江舟山的渔民魏其勇眼里却显得“拥挤”。

东海——中国最富有生产力的渔场之一，进入冬季，他却得为在哪里撒网而担忧。随着气温下降，鱼钻入深水，只有占据有利的位置才能保证一趟出海捕鱼的收入。但现在，“去哪里都是船，有时候还找不到下网的地方。”他抱怨说。

40 岁的魏其勇有 22 年的捕鱼经验。在这些年中，他见证了中国渔业的大发展，竞相出海的渔船仿佛一下子塞满了看似一望无际的大海。

“好像马路就是这么宽，但车越来越多。”魏其勇这样比较。在海上，各地的渔民会为了争夺好的“地盘”而起争执。魏其勇说，互相之间打起来也不是稀罕事，他的渔网就曾经在山东海域被人用刀割破。“所以后来就是知道那一带有鱼，也不敢去了。”

浙江舟山凉峙村码头，渔民检修渔船为出海做准备

如今，他和妻子有不少精力花在自家开在海边的民宿上。和很多他的同乡渔民一样，魏其勇正在渔业面临“退潮”的时刻，寻找新的生计与出路。

补贴退潮

从上世纪 90 年代中期开始，中国面对迅猛发展的渔业和随之而来的资源环境压力，开始主张要降低海洋捕捞强度，让海洋渔场休养生息。此后，渔船数量虽有所控制，但渔船总功率一直持续增长，捕捞量屡屡创出新高。根据《2017 中国渔业统计年鉴》，在 2016 年底，全国海洋机动渔船超过 26 万艘，总功率 1700 余万千瓦，近海捕捞量 1328 万吨，远超中国农业部和渔业专家所建议的 800-900 万吨合理捕捞量。

这种迅猛增长背后，一项政策措施的助力不容忽视。2006 年左右，伴随国际原油价格持续上涨，国内柴油价格不断攀升，为了缓解渔民生产上的困难，中国政府开始按照渔船大小和作业时间实施燃油补贴。

美国智库国家亚洲研究局的渔业专家 Tabitha Grace Mallory 在《海洋政策》上发表的一项研究计算了从 2006 年到 2013 年中国渔船燃油补贴的规模，显示在 8 年间，国家给予渔业的燃油补贴（包含近海捕捞和远洋渔业）从 31 亿元增长到了 381 亿元的规模，其中很大一部分给到了像魏其勇这样的近海捕捞渔民手中。研究认为，燃油补贴不利于渔业可持续发展。与之对应的是，2013 年中国中央政府层面的节能环保预算仅为 93.7 亿元。

这一政策的转向发生在 2015 年。这一年，财政部公开表示，过去的补贴政策“扭曲了价格信号”，与鼓励渔民减少渔船并转产的政策发生了冲突，要逐步减少补贴额，力争到 2019 年将油价补贴降至 2014 年补贴水平的 40%。政策出台有国内和国际双重背景。在国内，对生态文明的强调和渔业资源环境保护的压力，加之燃油补贴造成的巨大财政负担，导致了政策的调整。在国际上，中国在 G20 框架下的关于减少化石能源补贴的自愿行动中提出了在 2030 年之前持续改革渔业燃油补贴的目标。

“后补贴”时代的渔业

新政策直接反映到了魏其勇的账上。2016 年他获得的燃油补贴约为 11 万元，比上一年少了近 20 万之多。以他 350 马力的渔船为例，一年收入约为 200 万，其中约 100 万用于支付船员工资，30 万 - 40 万为燃油成本，另有大概 30 万用来购买和维修网具，只有不到 30 万留下来给自己和家人。他的渔船购于 2011 年，当初贷了 100 多万元的款，几年下来只还了利息，本金都还欠着。这样算下来，一年到头真正可自由支配的正是拿到手的燃油补贴，这加大了他心里的压力，“都得靠着捕鱼挣回来。”他的家乡舟山衢山岛凉峙村现有 17 艘帆张网捕鱼船，已经大不如渔业兴盛时期的 40 艘。而船长们都抱怨补贴还是减少得太多。

帆张网是岛上的渔船常用的捕捞方式。捕鱼时将船锚固定在海里，渔网张在渔船两侧，通过水潮将鱼带入网中。按照中国渔业相关规定，渔民们必须使用大网眼的渔网以保护幼鱼。舟山所在的浙江省进一步规定小于一定长度的幼鱼不得在市面上出售。但是入冬以后，船长们都暗自在大网里再套上一层网眼细密到只有几毫米的衬网，再小的鱼也能捕上来。

“如果按照规定，我们就出一趟亏一趟，自己也知道要把海洋资源搞坏的。”魏其勇解释说，“但是没办法，小鱼也很值钱，可以做鱼粉。看着一趟出去要亏了就要用，赚回人工费。”

违规使用网具在渔民们中间是公开的秘密，但谁也不愿意吃眼前亏，即便是人人都尝到了资源保护的益处。

2017 年秋季开渔后头两个月的收成比以往大多数年份好，船长们心里都轻松不少，他们中许多人将此归因为休渔期的延长。“头一个月出去一次有 50 来万收入，老板怎么会不高兴？”一位船员嘟囔着。2017 年，中国统一了各海区的休渔时间，在东海，绝大部分渔船休渔 4 个半月，比过去长了 1 月。

可是短暂的丰收让衢山镇政府的减船计划受挫。副镇长陈明在办公室里接待来访的渔民，他们听说政府有进一步延长禁渔期的计划，再加上今后渔船燃油补贴进一步减少，有的人抱怨这会让小渔民破产。陈明说，镇政府成立了专门的工作组去动员渔民上岸，如今衢山全岛拥有渔船 842 艘，比上一年减少 119 艘，但是现在一看渔获好了，有的渔民就打算买新船，重操旧业。虽然政策不允许渔民们转让捕捞许可等各种捕鱼的准入证，但难以禁止私下的交易。“估计一半左右会复产。”陈明为难地说。就像退潮过程中的海浪一样，近海渔业的压减也有波动和反复。

回到岸上

衢山岛上，伴着海岸线的村庄世代都以捕鱼为生。数百年来，赶海

浙江舟山凉峙村村景

人追着季节性洄游的鱼群而来，由大陆逐渐迁往舟山群岛定居，在那里建起了中国最大的海鲜市场。长江和钱塘江带来了陆地上丰富的有机质，季风和气流季节性地在岛屿周围交汇，这些不同的水系和变化的海床带来了数不尽的鱼群。在岛上人的记忆中，甚至只要海边一走，就能徒手抓到那些离岸不远大大小小的鱼。但现在，渔业资源的衰退正深刻地改变着这里的样貌，捕鱼变得越来越不受欢迎。

凉峙的沙滩，环抱在山丘海岛间，开阔又柔软。2016 年，这里的沙滩突然间在互联网上走红，蜂拥而至的游客让村里人喜出望外——车队把唯一一条大马路挤得水泄不通，一直堵到几公里之外。

临着海岛北岸的沙滩，凉峙村的传统民居都背靠着海岸，以遮挡北风带来的凉意。但现在，家家户户都恨不得再凿个面朝大海的窗户。经济宽裕的，便直接推倒了房子重建。开办民宿的热潮兴起，这与政府鼓励渔民上岸的契机不谋而合。村副书记陈日东说，曾经村里几乎家家都是渔民，过去 10 年捕鱼不是那么有利可图，年轻人都不再愿意出海，转而外出打工，年纪大的渔民退休，渔船就慢慢少了，尤其在去年，有条件的都希望通过经营民宿来实现上岸转型。

魏其勇也不愿放弃这个机会。2017 年利用家里过去一直荒废的宅基地，他和妻子建起了一套 8 间房的渔家乐。登上三楼的露台，那里可以越过邻居家的屋顶眺望凉峙最吸引人的沙滩，屋背后，是远处矗立在山顶上的风电塔。

夏季的旅游高峰，正好是休渔季节，夫妻两再叫上几个亲戚就可以把客人照顾得妥妥当当。但过了国庆假期，在长长的冬季，整个岛上都变得冷冷清清。陈日东认为，如果能在冬天也吸引游客到岛上旅游，大家的生计就没问题，但他们还没有找到好办法。

在环保组织绿色和平海洋项目主任周薇看来，政府减少渔业燃油补贴释放了积极的信号，有助于控制渔船马力和数量，但渔民长期依赖于燃油补贴，如何保障他们的生计将是重大的挑战。

魏其勇打定主意说决不让自己的儿子将来再干这一行，“企业里的工作机会总会多起来的，”他说。不过谈到他自己，他觉得读书少，别的选择几乎没有，就算是国家的补贴再少，他还是没法离开大海。

“上岸可以干什么活啊？到岸做不了什么活。”

石毅，澎湃新闻记者

Reducing coastal fishing, like the tide, has its ups and downs

Chinese communities struggle to adapt to subsidy cuts and curbs on coastal fishing

□ Shi Yi

It is winter in Zhoushan village on the East China Sea, one of the country's most productive fishing grounds. Fisherman Wei Qiyong is worrying about where to cast his nets. Fish swim deeply in these cold waters so you must choose your spot carefully if you want to catch the right fish. But Wei is struggling to find a place. There are too many boats on the water.

"Sometimes you can't even find space to put your net down," he complains.

Wei, 40, has been fishing for 22 years. In that time he has seen the fishing industry boom as vessel numbers have expanded.

On the seas, fishermen from different ports squabble over the best spots. It isn't uncommon, Wei says, for fights

to break out. His nets were once slashed in waters off Shandong province, north of Zhoushan.

"I daren't go back there, even if I knew that was where the fish were," he says.

Wei and his wife now spend a lot of their time running a guesthouse by the sea. Like many other fishermen in town, he sees the fishing industry shrinking and is looking for a new livelihood.

Subsidy cuts

Expansion of the fishing industry over the past 30 years has exacted a toll on China's fisheries. In response, the central authorities are advocating less intensive fishing, with closed seasons to allow fisheries to recover. Fishing vessel numbers have been curbed in some areas but, on the whole, the size of vessels continues to increase, meaning fishing capacity has reached new highs.

According to the China fishing industry yearbook, at the end of 2016 the country had over 260,000 fishing vessels with a total engine power of over 10,000 kilowatts. This yielded a catch of 13.28 million tonnes from coastal waters, exceeding the recommended level of 8 to 9 million tonnes suggested by the Ministry of Agriculture as sustainable.

China's policy to subsidise its fishing fleet has fuelled its rapid expansion. In 2006, after high oil prices made diesel significantly more expensive, China started providing fuel subsidies to struggling fishermen, depending on the size of their vessel and time spent at sea.

Research published in the journal Marine Policy by Tabitha Grace Mallory, a fisheries expert with the National Bureau of Asian Research, calculated the size of China's fuel subsidies (for both coastal and deep water fishing vessels) between 2006 and 2013. She found subsidies grew from 3.1 billion yuan (US$500 million) to 38.1 billion yuan (US$6 billion) over the eight-year period, a 1,200% increase. A large part of these subsidies went to coastal fishermen such as Wei Qiyong.

The study also found that subsidies hampered the development of sustainable fishing. For comparison, China's entire central government budget for energy-saving and environmental protection in 2013 was 9.37 billion yuan (US$1.5 billion).

The policy changed in 2015, when the Ministry of Finance said publicly that the existing arrangement had "distorted pricing signals" and clashed with efforts to reduce fishing capacity and move fishermen into other work. It made a commitment to reduce subsidies to 40% of 2014 levels by 2019.

There were both domestic and international reasons for this change of tack. At home, greater emphasis on the idea of an ecological civilisation and the protection of fisheries, as well as the huge financial cost of the subsidies exerted pressure. Internationally, China committed to sustained reform of its fishing fuel subsidies by 2030, as part of efforts to reduce fossil fuel subsidies under the G20 framework.

The 'post-subsidy' fishing industry

The policy change was soon reflected in Wei Qiyong's accounts.

In 2016 he received 110,000 yuan (US$17,400) in fuel subsidies, 200,000 yuan (US$32,000) less than the previous year. His 350 horsepower vessel brings in about 200,000 yuan a year. Crew wages account for 100,000 yuan (US$16,000), fuel another 30,000-40,000 (US$4,700-6,300), while buying and repairing fishing gear costs about 30,000 yuan. That leaves less than 30,000 yuan for Wei and his family, annually.

Wei bought his boat in 2011 with a loan of over one

"China committed to sustained reform of its fishing fuel subsidies by 2030, as part of efforts to reduce fossil fuel subsidies under the G20."

million yuan (US$150,000). Since then he has only paid off the interest. His only source of disposable income for the entire year is the fuel subsidy. The reductions have put him under even more financial pressure.

"I've got to earn all that back by catching more fish," he says.

There are 17 stow net boats working from his home village of Liangzhi on the Zhoushan island of Qushan, less than half the number there when the industry was flourishing. All the captains agree that the subsidy cuts have been too harsh.

Stow net fishing is commonly used by boats on the island, where boats are anchored out at sea and nets spread from their side. The tide brings the fish. Regulations nets to have mesh large enough to allow young fish to escape. Zhejiang, the province Zhoushan is in, goes further by banning the sale of fish below a certain size. But since winter arrived the captains have been secretly adding a second net, with a mesh size of only a few millimetres, meaning small fish get caught.

"We know we're damaging the fisheries, but if we stuck to the rules we'd be make a loss each trip," explained Wei.

"There's no other choice, the small fish are still worth money, they can be made into fishmeal. So if we see a trip is going to make a loss we use that net to make back labour costs."

The use of illegal nets is an open secret among the fishermen. Nobody is willing to risk making a loss, even if they are convinced of the benefits of protecting the fisheries.

In the autumn of 2017, catches in the first two months of the fishing season were better than most years, to the relief of the captains. Many believed they had the longer closed season to thank.

"The first month they made 500,000 each time going out," laughed one crew member, "of course, the skippers were happy." China coordinated closed seasons across its fisheries for the first time in 2017, with the majority of boats in the East China Sea tied up for four and half months, a month longer than usual.

But that brief bounty was a setback for the government's plan to reduce boat numbers.

Chen Ming, deputy township chief, met with fishermen in his office to hear their complaints about the extended closed season and subsidy cuts. Smaller vessels faced bankruptcy. Chen explained that the township had formed a special working group to find new work for the fishermen onshore. There are 842 boats working from Qushan, 119 less than a year ago. But seeing the bigger catches, some fishermen have been inspired to buy boats and get out to sea. And while fishing rules don't allow fishermen to transfer licenses and other permits, it's hard to prevent a trade going on.

"I think about half of them will go back to fishing," Chen said regretfully. Reducing coastal fishing, like the tide, has its ups and downs.

Back on dry land

For generations, the villagers of the island of Qushan have made their living by fishing. For hundreds of years people have come to the coast to catch seasonal fish populations, gradually settling on the islands of the Zhoushan archipelago and now forming China's biggest seafood market.

The Yangtze and Qiantang rivers fill these waters with rich organic matter, while the monsoon and seasonal atmospheric currents meet here bringing with them countless numbers of fish. Islanders recall being able to scoop fish large and small out of the water while walking on the beach. But now declining fishery stocks are

Wei Qiyong looks down on his guesthouse from the hillside.

changing the nature of the place, and fishing is decreasing in popularity.

Liangzhi has a broad beach of soft sand, nestled between its hills. The beach enjoyed a sudden online popularity in 2016, to the delight of locals: a horde of tourists turned up, with cars blocking the streets and queuing for miles.

The beach lies on the north coast of the island. The homes here traditionally face inwards, away from the wind. But now everyone's having new windows put in for the sea view. The more affluent residents are simply knocking down their homes to rebuild. A wave of new guesthouses has opened, supporting the government's aim of getting fishermen into new onshore jobs. Chen Ridong, deputy Party secretary for the village, said that while it used to be the case that everyone here fished, fishing hasn't been so profitable the last decade. Young folk are opting to leave and look for work elsewhere, and as their elders retire the number of working boats is falling. In particular, those who were in the position to set up guesthouses took the opportunity to come ashore last year.

And it's not a chance Wei Qiyong wants to miss. Last year he and his wife built a guesthouse on a piece of unused land. From the balcony on the third floor you can look north over the rooftops to Liangzhi's main attraction, its beach, while to the back you can see a wind turbine far off on the hilltop.

Summer happens to be both the tourist season and the closed season for fishing, and so Wei and his wife, along with a few relatives, are able to look after their guests properly. But the island is much quieter once the early October National Day holiday passes and the long winter sets in. Chen Ridong says that if they could get tourists to the island in winter there'd be a good living for everyone but they haven't figured out how to do that yet.

Zhou Wei, oceans campaigner with environmental group Greenpeace, thinks the cut in fuel subsidies sends a positive signal and will help control the size of the fishing fleet. But the fisherman have long relied on the subsidies, and protecting their livelihoods is a major challenge.

Wei Qiyong says he's determined to make sure his son chooses another career path.

"There'll always be more company jobs," he said. But as for himself, he didn't get much education and doesn't feel he has other choices. Even if the subsidies are cut again, he'll still be heading out to sea.

"What am I going to do on shore? There's nothing there I can do."

Shi Yi is a reporter at Thepaper.cn.

“洋垃圾”一令即禁，循环经济却难一蹴而就

禁止洋垃圾进口的政策，将深远影响中国的回收处置行业和制造业。

□ 冯 灏

一个来自美国的饮料空瓶，随着其他垃圾一起在天津口岸登陆，在河北被熔化再造成塑料颗粒，随后运往浙江某个作坊制成打火机壳，再在江苏的工厂里被组装成打火机，最后装船从上海送往欧洲零售——科普博客地球知识局这样描绘一件典型“洋垃圾”的环球旅程。事实上，除了塑料外壳，这只打火机的金属部件很大可能同样由进口的废金属再生制成。

但从 2018 年 1 月 1 日起，这样一套顺畅运转了几十年的体系面临重塑：在这一天，中国对于洋垃圾的进口禁令正式生效。这份禁令覆盖 4 类 24 种固体废物，包括来自生活垃圾的废塑料、未经分拣的废纸和废纺织原料等。至于禁止进口的原因，文件明确指出，“洋垃圾非法入境问题屡禁不绝，严重危害人民群众身体健康和我国生态环境安全。”

这只是一个开端，到 2019 年底前，中国还将逐步停止进口所有国内资源可以替代的固体废物。显然，中国政府对于洋垃圾的基本态度发生了转变。

禁令对废品出口国的影响不言而喻，欧盟很快做出反应，决定对塑料袋征税。而对于中国国内的再生材料产业和制造业，它又会有什么样的影响呢？业界和专家的态度并不全然积极。

中国制造与“中国回收”

再生得到的金属、塑料等原料比原生材料便宜。从根本上说，中国全球制造业中心的地位，以及由此造成的对廉价原材料的海量需求，决定了过去数十年中国持续大量从境外进口固体废物。

根据联合国商品贸易统计数据库 (Comtrade) 的数据，2015 年全世界超过 70% 的废塑料和 37% 的废纸都出口到中国。欧洲国家和美国是这些废品的主要来源地。

这一商业链条得以持续，自然是因为其中的每一个环节都有获利。对于发达国家而言，国内处理的费

用大概在每吨400美元至1000美元，运到中国，即便加上运费每吨的成本只有10美元至40美元；而中国的接收方，以极低的价格买进，通过多次挑拣分类，层层转卖出去，形成了一条条位于全球价值链底端、且自成体系的产业链条。

可以说，“中国回收”不仅为西方国家的垃圾问题提供了廉价的解决方案，也成为中国低端制造业保持成本优势的重要因素。

偏食的代价

只是，这样一个体系虽有效，但远非完美。

首先，除了政府部门批准正规进口的废品，中国每年还有不少非法入境的洋垃圾进入非正式回收处置机构。以曾经的电子垃圾处置中心广东贵屿为例，大量的从业者用危险、简陋的工具处理走私来的电子垃圾，这不仅对从业者自身健康造成威胁，周边区域的空气、水体和土壤环境也遭受破坏。

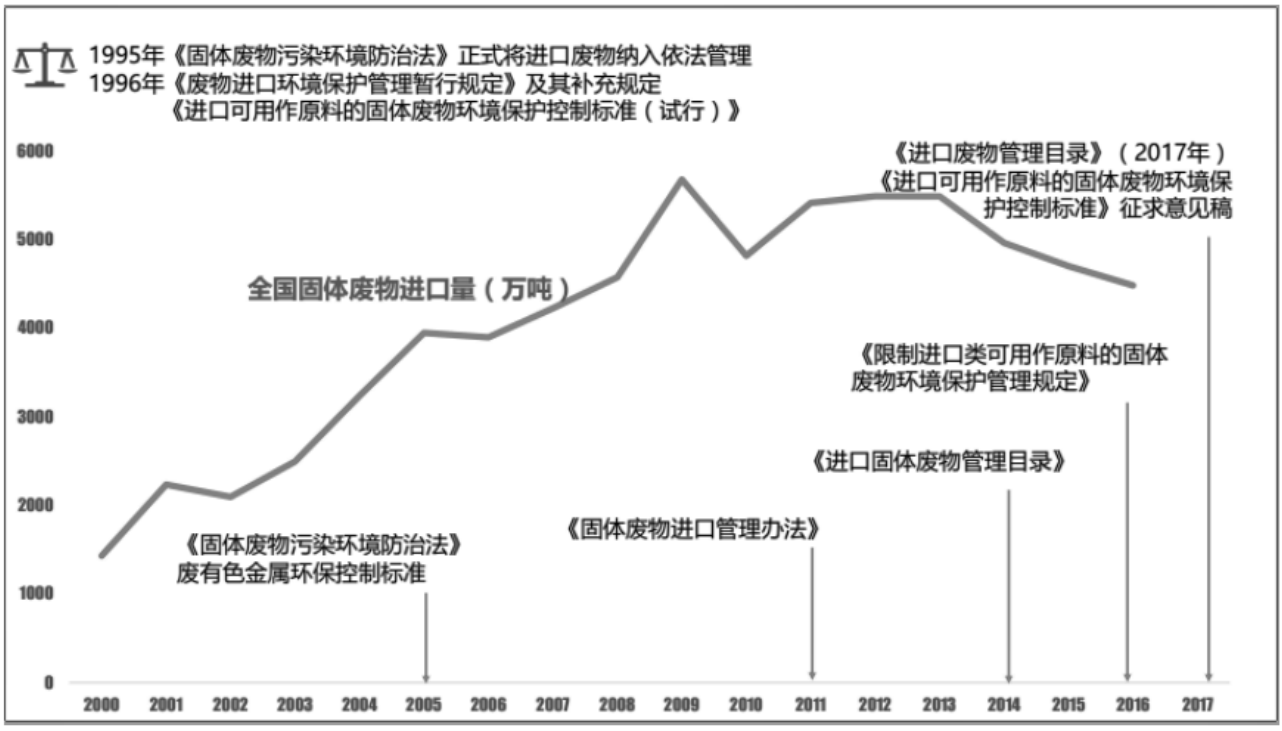
自2013年起，中国开始推行“绿篱”行动，对进口垃圾的品质进行严格管理，并以强硬姿态打击非法走私垃圾进口。但即便废品走私大为减少，对洋垃圾的长期依赖还是带来了问题。

工信部赛迪研究院工业节能与环保研究所副所长李博洋告诉中外对话，长期大量进口洋垃圾令中国的废品回收再利用产业分化出了“两层皮”—— 洋垃圾进入正规、优质的处置机构，形成大的产业链条。他近期调研了山东和福建两家再生塑料企业，这两家再生企业处置能力和管理水平一流，走入车间如同进入样品标准库。但另一方面，国内自己产生的品质比较低、回收比较费劲的土垃圾，就在一些不是太规范的小工厂、甚至作坊里面进行循环利用。

换句话说，中国的正规回收处置行业已经习惯了处理符合进口标准的正规“洋垃圾”，那么，让它们短时间内改“吃”没有经过严格分类回收的、品质更低的土垃圾，能行吗？

洛阳纸贵：禁令的威力

李博洋是乐观的，他认为，将洋垃圾的口封死之后，回收处置行业只能回过头来想怎么在国内建立和发展自己的回收体系；而优质的处置能力火力全开处置国内资源，必然会显著减少进入小作坊的垃圾比例和数量。



随着近年来中国废物回收产业的发展，再加上环保的压力，“洋垃圾”的检测标准一直在收紧、进口门槛一直在提高。
来源：中国有色金属工业协会再生金属分会（CMRA）

但也有很多人认为，这场变革带来了麻烦甚至危机。

中国再生资源回收利用协会废纸分会会长吴涛在接受《经济参考报》采访时介绍说，此次禁令生效前中国已经收紧了对进口废纸的控制，取消了一些企业的进口配额，甚至从7月以后也未再下发一张批文，导致进口废纸数量持续降低，价格飙升。

任何列在《进口废物管理目录》上的废品，其进口都需要得到环保部的批准。根据回收行业媒体再生网报道，禁止进口未经分选的废纸后，2018年能够得到环保部审批的进口废纸将比2017年的2811万吨减少797万吨，下降幅度达28%。

纸价飙升，甚至导致纸厂没有原材料生产新闻纸的窘境。人民日报社副社长张建星2017年9月在一次新闻行业会议上提出要化解党报用纸困境、确保党报出版安全。

除了直接禁止一些废品的进口，中国政府也在同一份政令中对一些仍允许进口的废品做出了严格的质量要求。以进口废有色金属为例，其他夹杂物（包括木废料、废纸、废塑料、废橡胶、废玻璃等废物）的混入总重量被限制在了进口总重量的1%以内。

中国有色金属工业协会再生金属分会副秘书长刘巍告诉中外对话，这会影响到50-70万吨的废铜原料和40-50万吨的废铝原料，对中国再生金属产业的原料供应造成的冲击不小。

不过，复旦大学环境经济研究中心副主任李志青解读说，对于行业的短期冲击肯定是有的，不过这些产业并不是垄断性的，比如塑料和纸张都是完全竞争的市场，价格上升之后，会有新的供给者立刻涌入，将短期冲击迅速消化掉。

禁止洋垃圾进口，能改善中国环境吗？

长期来看，禁令最终的目标无疑是提高国内固体废物的回收利用率，甚至倒逼出前端垃圾分类，促进循环经济的发展。

李志青告诉中外对话，制造业面前有三种选择——国外再生资源、国内再生资源和新的材料。随着中国能源资源税率的上升，新原材料的成本在上升；而洋垃圾被禁止之后，再生行业的原材料供给缺口只能依靠国内的土垃圾来补足，就会倒逼国内的土垃圾做好后端处理，再进一步倒逼前端的居民社区垃圾分类做得更好。

绿色和平东亚分部也认为，停止进口“洋垃圾”将拉动国内固体废物加工利用产业发展和垃圾分类回收。以废塑料行业为例，中国废塑料年进口量从1992年的30万吨飙升至2016年的734万吨，停止进口后，中国废塑料企业将面临每年数百万吨的原材料缺口，需要通过国内的垃圾分类和固体废物回收体系填补。

但同济大学环境与可持续发展学院教授杜欢政对此表示怀疑。他对中外对话表示，国内的资源量不足是中国从国外进口废弃物的根本原因，也就是说，真实的现状是，即使中国全方位推动生活垃圾分类，资源量依然难以满足市场需求。

针对矛盾的根源环境问题，杜欢政认为，这根本上是处置固体废弃物的产业该如何进行提升的问题。只要规模化的处置企业能保障污水处理、空气治理、职业卫生，就不应该全面禁止进口废品。

李志青也认同这一观点，他认为不能一棍子打死，认为所有的再生资源都是弊大于利的。完善的市场应该是允许进口，但要满足中国管制的要求和标准，而这个环境标准可以定的很高，因为随着中国经济发展水平的提高，破坏环境的成本也理应提高。

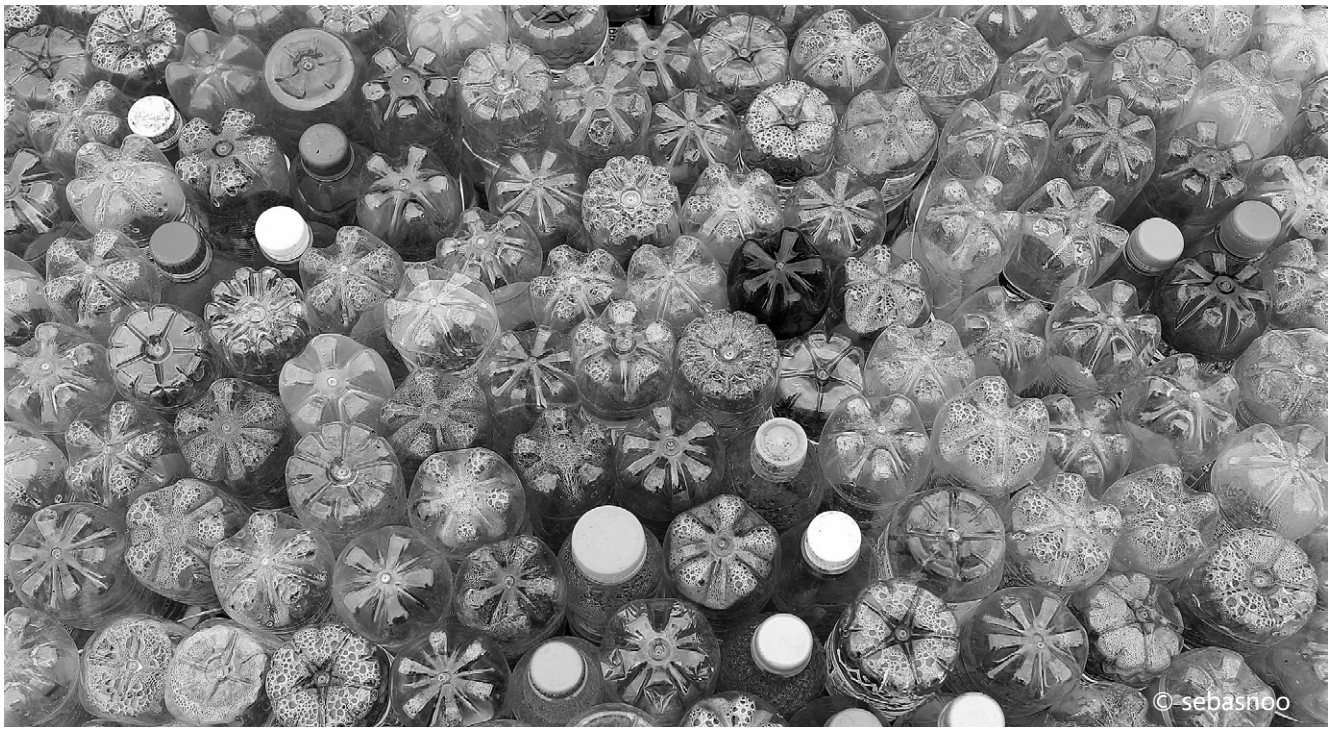
李博洋则从另一个角度对禁令表示欢迎。他坦言，固体废物的进口许可证制度容易滋长利益集团，国内市场需求那么大，而国外的进口配额又只有这么些，巨大利润的背后，“寻租的空间不是一般的大”。

冯灏，中外对话研究员

Waste ban forces unlicensed recyclers to clean up act

Immediate shocks will give way to longer term reforms in China's manufacturing sector

□ Feng Hao



In 2015, 70% of global plastic waste and 37% of waste paper was shipped to China

A cargo of discarded plastic bottles from the United States arrives at the port of Tianjin, the largest in northern China. From here they are sent to Hebei province, close to Beijing, to be sorted and melted down into plastic pellets. These are then sent south by road to Zhejiang, where they're moulded into cigarette lighters. The spark wheel is inserted in Jiangsu. Finally, in Shanghai, they are packed onto ships, destined for sale in Europe.

And so goes the cycle of plastics in China, part of a vast, multi-billion dollar global industry that trades in waste.

But the supply of solid waste that's imported each year into China is now under threat. On January 1, China's ban on imports of foreign waste came into effect, covering 24 types of solid waste, including household plastic waste, unsorted paper and textiles.

"The illegal import of overseas waste has continued

> The ban is not solely about limiting pollution, it's also a key part of China's circular economy strategy.

despite efforts to prevent it, severely harming public health and China's environment," explained the Ministry of Environmental Protection in an official statement.

But the ban is not solely about limiting pollution, it's also a key part of China's circular economy strategy, a plan to better manage and minimise waste, and shift the country towards a more sustainable model of economic growth.

A load of rubbish

China imports 7.34 million tonnes of waste per year, a 24-fold increase on the 300,000 tonnes imported in 1992. The waste is either recycled, sent to landfill, combusted, or dumped in rivers or at sea. The capacity to absorb high volumes of waste is dwindling. By the end of 2019, China will cease imports of all types of solid waste except in those categories not produced domestically.

Abroad, the impact on waste exporters has been severe. Industry bodies have lobbied to relax restrictions while foreign governments have scrambled to find other countries willing to take their rubbish. In China, the ban poses an immediate challenge to recyclers and manufacturers, which rely on the supply of foreign plastic and paper. But in the long term, the changes could lead to deep sectoral reforms.

Recycled in China

In 2015, 70% of global plastic waste and 37% of waste paper was shipped to China, according to Comtrade, the United Nations (UN) trade statistics database. Most waste comes from the US and Europe.

In China, scrap traders make a profit by buying waste at rock-bottom prices, sorting it, and selling it on. The cost of processing waste in developing countries is US$400-1,000 per tonne, according to news agency *Xinhua*. In China, it is between US$10-40 per tonne, including shipping costs.

While the waste trade has been key to China maintaining its low-end, manufacturing price advantage, it has also supported unregulated and hazardous working practices.

Take Guiyu, a city in Guangdong that was previously a centre for electronics recycling. For years, recyclers used crude and unsafe methods to dismantle smuggled electronic waste, which put their own health at risk and polluted the surrounding air, water and soil. Many centres were shut down after an investigation in 2015 exposed the extent of the contamination.

Since 2013, China's has been closely monitoring the quality of imported waste and cracking down on illegal imports (waste that is smuggled or that fails to meet the standards of official processing plants). But while waste smuggling has fallen, the long-standing reliance on imported waste is still a problem.

Two tier industry

According to some experts, the import of foreign waste has left China's recycling sector divided

Li Boyang, deputy head of the Industrial Energy-Saving and Environmental Protection Institute at CCID Wise, a thinktank, says that China's domestic, lower-quality waste is harder to recycle and ends up in smaller, unstandardised factories.

The switch from processing sorted, imported waste to lower-quality, unsorted domestic waste will be a challenge for China's recycling sector. As competition over scarcer resources increases, and the price of imported waste increases, smaller and less efficient recyclers will be squeezed out of the market, says Li. The government has already begun removing operation licenses from recycling companies.

Paper mills are already facing shortages. According to industry outlet Zz91.com, unsorted waste paper imports

will drop by 7.97 million tonnes, or 28%, in 2018, compared to 28.11 million tonnes in 2017. And there have been reports of official Communist Party publishers running out of newsprint.

Tighter import regulations

The government is tightening import standards around waste that remains legal. For example, nonferrous metals must now include no more than 1% by weight of other materials (such as waste wood, paper, rubber and glass).

Approximately 20% of waste copper and 7% of waste aluminium will be will affected according to Liu Wei, deputy head of the China Nonferrous Metals Industry Association.

Li Zhiqing, deputy head of the Fudan University's Environment and Economy Institute, says a short term loss in profits for the recycling sector as a whole is inevitable, but as material prices go up new players will enter the market and alleviate some of these impacts.

A circular economy

In the long term, the ban aims to improve the rate of recycling and reuse in China. It is hoped it will promote producer-end waste sourcing and the circular economy.

According to Li, China's manufacturing industry is faced with three choices: using recycled materials from overseas, using recycled materials from China, or using new materials.

As energy and resource taxes go up in China, such as a tax on copper, so too has the price of new materials. According to Greenpeace East Asia, ending imports of overseas waste will help China's domestic waste processing and recycling industry to develop higher standards. But it's unlikely that domestic waste will cover the shortfall in foreign supply.

"If large firms can ensure that waste water and gases are properly handled, and that employees are safe, there is no need for an outright ban," says Du Huanzheng, professor at Tongji University's Institute of Environment for Sustainable Development.

Others welcome the ban. Li Boyang admits the licensing system for waste imports helped vested interests flourish, as domestic demand is huge and import quotas were limited. That potential for huge profit allowed "more than the usual scope for rent-seeking."

Feng Hao is a researcher at chinadialogue.

捡垃圾的喇嘛

越来越多的垃圾困扰着青藏高原的环境，
喇嘛桑杰和他的志愿团队尝试解决这一问题。

□ 冯 灏

垃圾捡拾现场

已是北京时间的晚上七点多了，甘加草原上的太阳依然懒懒地斜挂着，不忍下山的样子。在斯柔部落村的帐篷外，几只土拨鼠撅着肥肥的大屁股蹲在自己的洞口，并不怕人。

我正看着出神，坐在一旁的桑杰嘉措突然问："你知道的一句藏语是什么？"

"哦，扎西德勒？"

"嗯！'扎西德勒'里的第一个音'扎'其实就意在生态平衡"，桑杰讲说，藏传佛教中，宇宙分为两部分——精华和容器。精华即包括人在内的所有动物，容器是动物以外的万物，两者合一即为宇宙。精华与容器互相支持，都需要呵护，也就是保持生态平衡。

这位有着拉卜楞寺然坚巴佛学学位的喇嘛认为环境保护的理念与自己长期关注的传统文化和佛教思想颇

有契合，“传统文化的内核，是我在藏地做环保最强大的基础和动力”。

而他保护家乡生态环境的首要任务则非常简单：捡垃圾。

垃圾食品变垃圾

甘加草原位于青藏高原东北部，地处甘肃与青海交界之地，大片丰美的高原草地被陡峭的群山环绕。近几年来，牧场上的不少牲畜无端死亡，被开膛后在胃里找到了食品塑料包装袋。藏族少年万代克告诉我说，城里说的“垃圾食品”在草原变成了真正的垃圾。

过去牧民饮食习惯里的牛羊肉、酥油茶取材自然，废弃之后也都能成为生态循环的一个环节，自然消解。而今随着牧民生活方式的现代化，加工食品被广泛接纳，方便食品的方便包装——塑料包装、饮料瓶等等——使用过后变成了垃圾，随牧民放牧的足迹被带到草原深处，污染草场环境。

据万代克的观察，这些草原深处的塑料制品很多并不是游客带来的，是牧民自己产生的。

2013 年，在瓦尔塔等几个部落村当时已有的捡垃圾志愿者队伍的基础上，桑杰发起成立了甘加环保志愿者协会，每隔半个月左右就对部落村内外来一次清理。

村里人觉得他们傻，家人也不理解，“为什么要做这个，又没有什么报酬”。 面对这样的责难，桑杰团队的志愿者勒合西起初也觉得难受，不过他说：“看看剖开的羊，胃里搅着塑料，就看一眼，你就会懂我们为什么要做了！”

志愿者团队完成垃圾的收集后，会集中到简易的填埋场

草原垃圾，水源危机

事实上，这是近年来各地的草原面临的共同问题，在黄河源头之一的约古宗列草原也是如此。

仁曾多杰是青海玉树曲麻莱县当地人，也是民间环保组织禾苗协会的创始人之一，他告诉我，有很多全国各地的各种组织来河源地做环保，做社区建设、生态保育等等，但垃圾问题才是最为现实急迫的。

尤其是在每年的赛马会期间，口感刺激的零食饮料是年轻人和孩子们的最爱。一场比试过后，大量铁质、玻璃或塑料饮品容器在草势稀薄的草场散落。这些散落的垃圾不仅会引起牲畜的误食，还会随水漂流，慢慢释放有害物质，污染临近的水源。在偏远分散的草原雪山，没有人收集它们。这意味着这些垃圾将永远留在那里，带来巨大的生态隐患。

多年来致力于见证、记录和曝光黄河沿线的生态环境危机的环保组织“绿家园志愿者”创始人汪永晨连续七年深入黄河源头，她介绍说，近些年垃圾的情况已经有了不少改善，早几年情况更为严重，垃圾堆在河边就被认为是处理了。

在西南财经大学自然资源管理与政策专业讲师贡布泽仁看来，藏族文化中的转神山、祭圣湖传统也正面临垃圾的考验。近年来，很多人用塑料制造的宝瓶及布料丢入神湖之中祭拜，然而这些宝瓶逐渐成为危害湖泊生态系统的主要因素之一。人造布料和塑料瓶子的消解年限超过百年，其释放的污染物持续威胁水生态系统中的动植物。

桑杰的甘加志愿者队伍也意识到这个问题，他们在捡垃圾的过程中着重清理靠近水源的地方。随着各地前来甘加朝拜智格尔白石崖圣山、拜谒神奇溶洞的人逐渐增加，牧民志愿者们还沿着转山的路径安放路标、捡拾垃圾，而这些隐藏在草原深处的路线，政府组织的捡拾和处理部门根本触及不到。

垃圾治理难题

如今，逐渐在乡里得到理解，牧民志愿者队伍不断壮大，扩展到了甘加草原全部 13 个部落村，人数也有 230 人。在桑杰的沟通和争取下，协会还陆续得到了一些公益平台的资金，支持牧民志愿者们装备清理垃圾所需的手套、扫帚、编织口袋等工具，以及运输清理过程中的交通费用。

运输费用始终是最让桑杰头疼的难题，“如果政府可以多投入资金和人力，在定居点设立分类垃圾回收点，更集中地做处理，效果可能更明显些”，桑杰表示。

但对于这些地方政府来说，无论是在资金还是在市政体系的建设上，都无法满足如此巨大的投入。全球环境研究所生态保护专家彭奎认为，这一套“村收集、乡转运、县处理”的一般垃圾处理模式对于内地人口相对集中的地方是经济的，但是对于广大的牧区而言则是天方夜谭，难以持续。

彭奎表示，当地政府不是不想做，是真的没有办法，“连市县一级都没有做到，怎么会有余力和资金去做乡村的”。

他介绍说，全球环境研究所的“清洁水源计划”在尝试另一种思路，把教育、分类和减量引入这个系统中。在青海省玉树毛庄乡，他们依据当地的实际情况成立保护队伍，在学校、寺庙和村民中开展垃圾减量分类教育，并从源头开始自下而上划定不同的区域，分派清理垃圾的任务，定期清理，然后统一拉到村级处理站进行分类。经过分类后，能够回收的垃圾就打包，统一存放，集中到一定程度再拉到县城去卖。不能回收再利用的，才分别采用堆肥、焚烧或者填埋的方式处理。这样算起来，最终需要运往填埋场的垃圾量减少了七八成。

换一种思路

说到底，牧区的垃圾分散，使得收集和集中处理成为政府和牧民长期坚持面临的最大挑战。

这一严峻的环境问题同样引起了商业公司的注意。台湾创新公司小智 (Miniwiz) 研发设计了将庞大垃圾回收处理系统微型化的 Trashpresso 环生零耗机，这一移动式的垃圾回收处理站，尝试解决交通不便地区的塑料垃圾回收问题。

2017 年，他们来到澜沧江源头的杂多县，把那一周收捡的垃圾回收再造成环保建材。其创始人黄谦智告诉我，Trashpresso 的技术并没有多先进，但它就是试图告诉当地游牧民一种可能性，这些影响到他们生态系统的坏东西是有机会被处理的，并且是以看得见的方式。

桑杰自己也在想办法，他觉得社区作为参与主体才能走得长远，而前期减量是关键。最近，他正计划和兰州大学的几位生态学博士一起，找一些专家做环境教育培训和环保经验分享，可以把垃圾减量和分类的一些正规方法通过培训的方式介绍给牧民志愿者。

他想要找回那个平衡，那个只有牦牛和牧民的草原生态平衡曾经是闭环的，如今被经济现代化和全球化打破了，新问题不能用老办法解决，但一个开放的草原生态系统依然要平衡，“扎西德勒”还要继续在草原回响。

冯灏，中外对话研究员

The litter-collecting monk of Tibet

A Buddhist lama and his local volunteers search for a solution to the growing piles of rubbish on the remote Qinghai-Tibetan Plateau

□ Feng Hao

The roads in Xiahe near Labrang Monastery are dotted with signs proclaiming a "Model waste-free tourism zone"

It's seven o'clock in the evening Beijing time, but out on the Ganjia grasslands, in Xiahe county, the sun shows no sign of setting. Outside the yurts of Sirou village several marmots rest by their burrows, plump rears upturned, showing no fear of people.

I was enjoying this scene when Sangay Gyatso, sitting by my side, suddenly asked: "Do you know any Tibetan?"

"Um… Tashi delek [hello]?" I replied.

"Yes! The 'ta' in tashi delek means ecological balance," Sangay said, explaining that maintaining a balance between humans and nature is a central part of Tibetan Buddhist teachings.

Sangay is a lama (a teacher of the Dhamma in Tibetan Buddhism), with a degree from the nearby Labrang Monastery. He believes that the ideals of environmental protection match up closely with the traditional culture and Buddhist thought he has spent years studying.

"The core of our traditional culture is the foundation and

Prayer wheels at Labrang Monastery, Gansu province

motive for my work on environmental protection here," said Sangay.

And his main task when protecting the environment of his home? Collecting litter.

Junk food creates junk

The Ganjia grasslands lie in the north-east of the Qinghai-Tibetan Plateau, a vast and fertile plain on the border of Gansu and Qinghai provinces, encircled by precipitous mountains. In recent years, livestock on the pastures have started dying inexplicably – and plastic food wrappers have been found in their stomachs.

In the past the herders ate meat and butter tea, natural foods, and any waste would naturally degrade. But with the growth of modern lifestyles, processed foods have become popular and herders discard the plastic packaging on the grasslands when they are grazing their livestock, polluting the environment.

Wandaike, a Tibetan youth from the village, said much of the litter he sees isn't left by tourists, but by the herders themselves.

In 2013 Sangay founded the Ganjia Environmental Volunteers Association, building on existing local volunteer teams that clean up in and around Waerta village about once a fortnight.

The villagers thought they were daft and their families didn't understand. "Why are you doing that, you're not getting anything in return?" they said. Local volunteer Leihexi found the criticism hard to deal with at first, but he continued with his task: "When you see the sheep cut open and their stomachs are full of plastic, then you'll understand why we do it," he explained.

Grassland rubbish, water pollution

Grasslands across the plateau have been facing the same problem. It's a similar story in Yueguzongli, a grassland at one of the sources of the Yellow River.

Rigzin Dorje is a local of Qumarleb village and one of the founders of the Sprouting Grain Association, an environmental organisation. He said that organisations come from all over China to work on environmental protection, community building and conservation – but actually litter is the most pressing issue.

Rubbish is a particular scourge during the big annual horse-racing festival. Young people and children love to drink soft drinks as part of the celebrations, but when the races are over metal, plastic and glass containers are left scattered across the ground. These are eaten by livestock or slowly leech toxins into the ground, polluting nearby water sources. And up on the high grasslands, nobody collects the waste for recycling. The litter sits there forever, with huge environmental consequences. The Qinghai Tibet Plateau is the source of Asia's major rivers and so this pollution will make its way downstream into China and other parts of Asia.

Wang Yongchen is the founder of Green Earth Volunteers, a group that documents the environmental problems along the course of the Yellow River and she has been visiting

> "Tthe rubbish problem has improved in recent years with the growth of volunteer litter pickers."

the river's source for seven years. She explained that the rubbish problem has improved in recent years with the growth of volunteer litter pickers. In the past, waste was simply dumped by the river side, she said.

Sacred rubbish

Gongbu Zeren is a lecturer in natural resource management at the Southwest University of Finance and Economics. He believes the Tibetan traditions of circumambulation of sacred mountains, and making sacrifices in sacred lakes, are contributing to the mounting litter problem.

Ritual offerings are placed in ceremonial bottles, sometimes made of plastic, or wrapped in a scarf and then thrown into a lake. Those bottles have become one of the main sources of pollution threatening the local ecosystem, he explained. Scarves made from synthetic fibres and plastic bottles can take over a century to break down, during which the pollutants released threaten local plants and wildlife.

Sangay and his volunteers in Ganjia are aware of the problem and focus on areas around water sources and sacred sites during their clean-ups. An increasing number of people come to worship at two sacred sites, the White Rock Cliffs and a limestone cave set within those cliffs. Volunteers have set up signposts and started collecting litter along a circumambulation route. Government waste collection and disposal systems simply don't reach as far as these remote grassland sites.

The litter problem

The locals have gradually come to understand what the volunteers are doing and the team has expanded to include 230 people across the 13 villages on the Ganjia grasslands. Thanks to Sangay's efforts, the association has won some funding to pay for the gloves, brooms, bags and transportation the volunteers need.

Transportation costs have always been a headache for Sangay. "If the government could invest a little more money and labour to build waste sorting points in villages,

Bins alongside the highway are not in use yet

so waste could be handled centrally, there'd be a bigger impact," he said.

But the local government doesn't have the funding or the organisational capacity to set up such a system. Peng Kui, a conservation expert with the Global Environmental Institute, said that centralised systems, where waste is collected at the village level and transported to the county town for treatment, make economic sense in more populous areas, but are unsustainable and impractical in vast herding areas.

It isn't that the local government doesn't want to help, said Peng, there's just nothing they can do. "It's not even happening at the city and county level, so how can there be the spare capacity and funding for townships and villages?"

Peng explained that GEI's "Clean Water Sources Programme" is trying a new approach. In the village of Maozhuang in Yushu, Qinghai, they formed a team of volunteers to teach people in schools, monasteries and villages how to sort and reduce waste. They then allocated volunteers to clean-up areas around water sources, so

> "Scarves made from synthetic fibres and plastic bottles can take over a century to break down."

waste is regularly removed before finally being transported for sorting at a community waste facility. The volunteers separate and store recyclable materials until there is enough for a trip to sell them at the county seat. Non-recyclable materials are used as fertiliser, burned or buried. This method has reduced the burying of waste by 70%.

A different approach

The serious problem of waste collection and disposal across the vast grassland area has attracted attention from commercial businesses. Taiwanese firm Miniwiz has designed the Trashpresso, a mobile and solar-powered unit which provide plastics recycling in remote areas.

In 2017 Miniwiz arrived in Zaduo county, the source of the Lancang River, and turned a week's collected waste into environmentally-friendly building materials. Founder Huang Qiangzhi told *chinadilaogue* that the technology behind Trashpresso isn't actually that advanced, but he hopes the project will show the local nomadic herders that their waste can be turned into something useful.

Sangay is also trying to come up with new ideas. He believes the whole community will need to get involved if they want to significantly reduce waste. Recently, he and some PhD students from Lanzhou University have been working on a plan to get environmental experts to train his volunteers in more formal approaches to waste handling and sorting.

The grassland ecology in Qinghai once only supported yaks and herders, but rapid modernisation has changed all that, and old approaches will not work on new problems. But Sangay hopes that his innovative ideas and growing band of volunteers can restore the delicate ecological balance to the grasslands.

Feng Hao is a researcher at chinadialogue.

守护水泥森林中的鸟语花香

都市化如火如荼的中国，应该如何处理鸟、城市、人的关系？保护学者们有话要说。

□ 罗·海伦

北大校园面积只有一平方公里，但其中树木、自然植被和池塘占了近40%

北京大学校园深处的偏僻一隅，湖光掩映，落叶缤纷，翠柏无声，这里就是山水自然保护中心的所在地。这家非政府组织由知名环保人士吕植博士创办，她提出了一项大胆的计划，想要改变中国的城市保护方法。

吕博士正在积极奔走，呼吁将这座历史悠久的大学校园列为法定自然保护区。如果她的这一目标达成的话，北大校园将成为中国首个此类保护区，从而使其免受城市开发和农药使用的影响。 这一举措将使生活在校园内的200 多种鸟类获益，其中包括鸳鸯和一些受保护的猫头鹰，以及生活在未名湖水系及树木上的其他野生动物。

据吕博士介绍，北大校园面积只有一平方公里，但其中树木、自然植被和池塘占了近 40%。一些濒危鸟类已经将这里当成了栖息地。她还补充说：“鸟类对于人类的发展

和生存空间的缩小有着更强的耐受性，这就是为什么你仍然能看到很多鸟类聚集区。你只需要增加一个小池塘，第二天鸟儿就会飞来。”

“我们希望借助这个校园和这所大学的影响力做一项案例研究，以证明掌握正确的方法对保护野生动物的效果将会产生怎样的影响。”

中国森林砍伐现象严重影响了留鸟和候鸟的生存。过去三十年中，城市人口增长了 5 亿之多，2000-2010 年间中国城市面积翻了一番。据山水介绍，2000-2015 年间，近 1355 平方公里的森林遭到破坏。

包括中国凤头燕鸥在内一些极度濒危的本地鸟类野生数量已不足 50 只；濒危的靛冠噪鹛现在仅有一个省份还有分布；还有黄胸鸦，从数量丰富到极度濒危仅用了十年。山水中心的数据显示中国有 314 种濒危鸟类。

沿海地区城市发展最为显著。自 1978 年以来，沿海地区的城市用地增加了五倍，过去的湿地被混凝土建筑物所占据，候鸟也失去了栖息地和食物。

无处歇脚的候鸟

中国沿海湿地是候鸟在澳大利亚和西伯利亚之间迁徙的关键驿站，在这条路线上迁飞的物种约有 10% 目前已濒临灭绝，其中极度濒危的野生勺鹬鹬仅有约 200 对。

世界自然基金会中国水资源事务部的张亦默说：“中国沿海的滩涂原本是候鸟迁徙途中的落脚地，而现在它们正受到城市开发的威胁。”

虽然政府在全国各地设立了 2000 多个自然保护区，但状况却参差不齐，有些只不过是借保护区之名大搞生态旅游而已。

北大校园里的星头啄木鸟

“自然保护区可分为三类，”陕西师范大学鸟类生态学副教授赵洪峰博士介绍说。

“由中央直属的国家级自然保护区是最好的，那里工资待遇好，培训制度完善，确保所有员工都投身于野生动植物保护之中；第二级是省级自然保护区；第三级是市级自然保护区，它们资金相对不足，面积也较小。表面上是生态旅游，但它们往往只想赚钱，而非致力于野生动植物的保护。因此，虽然我们知道自然保护区越来越多，但只有一部分是真正为了保护濒危物种和野生动物。”

山水中心的一份报告指出，土地价值的暴涨使地方政府缺少保护自然野生动物栖息地的驱动力，正因为如此，吕博士提出的在现成土地上建立小型城市保护区的方案能够获得支持。

目前，濒危鸟类聚集的地区中，只有 2% 是自然保护区，且多数位于中国西部或更偏远的地区。而在人口更密集的东部地区也生存着许多种类的鸟类。

除了森林砍伐之外，对濒危鸟类构成威胁的其他因素还包括以鸟类入药和食用、偷猎，以及近来的线上销售。

鸟类数量减少

“20 年前黄胸鸦数量非常多，”张亦默解释道。“传统观念认为这种鸟味道鲜美，还可以壮阳。虽然已禁止狩猎和贸易，但在黑市上仍然很受欢迎且价格相当昂贵。据估计，在过去的 11 年里，这种鸟的数量减少了 80% 左右。”

去年，活动人士称，尽管中国法律禁止未经许可捕猎任何野生鸟类，但在淘宝上仍然可以买到黄胸鸦。环境保护组织“北京观鸟”收集了他们认为存在违法行为的链接 100 余处，有些是销售鸟类，有些则是贩卖偷猎设备。阿里巴巴称其在 10 月

份移除了这些链接，并正在进行“程序审查”。

国家也出台了一些保护鸟类的举措，如去年修订了1989年出台的《野生动物保护法》。政府还在不断推行“海绵城市”政策，倡导在城市建设更多的湿地和天然灌木林，以应对洪水风险和改善环境。

此外，中国国家海洋局1月份宣布，将遏制滨海湿地的商业开发，拆除或关闭所有破坏环境的非法土地开发项目。此外还表示，为了保护生态，将对5300万公顷的湿地进行保护，使其免受开发的威胁。

观鸟风尚的正反面

同时，中国的民间保护运动和“公民科学”（公众自发进行的科学研究）也在蓬勃发展。据张亦默介绍，致力于环境保护的非政府组织数量已近3500个，而且还在快速增长。山水中心推出的《中国自然观察报告》中大部分数据都是由所谓的公民科学家整理的。

“全国各城市的观鸟团队数量在不断增加。”保尔森基金会研究所保护项目副主任石建斌博士说。

“志愿者不仅帮助识别鸟类，还介绍鸟类及其重要的生态意义等相关知识。许多参与者都是优秀的鸟类鉴定专家，他们的记录为我们了解鸟类种群数量和分布做出了宝贵贡献，这些知识无疑将有益于鸟类的保护。”

“国际鸟盟”已在中国成立了20多个观鸟团，而志愿组织也在吸引越来越多的“粉丝”，如“全国拆网协作中心”这样的致力于拆除偷猎者架设的捕鸟网的组织。不过即使这些组织初衷是好的，也需要一个成长学习的过程。

“越来越多的摄影者开始在都市中心拍摄鸟儿的照片，但我观察到许多摄影者的行为对鸟类本身是有害的。”石博士补充说。

“比如，他们可能会离鸟太近，从而干扰或扰乱了鸟类的正常行为，尤其是繁殖和哺育等行为；或者有人使用人造诱饵来吸引鸟类，这甚至可能会导致针对这些鸟类的非法捕猎。”

吕植表示，有些学校开始设置了自然教育课程，她注意到北京市民对北大校园里的野生动物越来越感兴趣，因为即便他们身处在大城市，也同样渴望重回大自然。

“很多城市也不断为公民创造更多的公共绿色空间，但要定义绿色空间的“好坏”仍需要一些科学的论证。”吕植说，“如果不打农药，草坪可能会不太好看，植物的树叶上也会有虫眼，但它却是一个更理想的栖息地。这就需要将生态理念完整地纳入城市地区的绿地管理中。干枯的叶子可以为昆虫提供重要的栖息地，而昆虫又是鸟类的食物；可是在城市中，为了保持环境的整洁，落叶通常都会被清理掉。

“我们所想的不只是如何维护鸟类的生存，而且包括如何管理城市绿地。”

罗·海伦，撰稿人、编辑，现居上海

Protecting birds in an urbanised China

Creating more green spaces in cities and managing them better can bring the birds flocking back

□ Helen Roxburgh

Tucked away in one of the most remote corners of Beijing's Peking University campus amid rolling banks, fallen brown leaves and conifer trees, is the Shanshui Conservation Centre, a non-governmental organisation led by renowned conservationist Dr Lü Zhi, who has a bold plan to change China's approach to urban conservation.

Dr Lü is campaigning to get the historic university campus legally recognised as a protected conservation area. This would be the first designation of its kind in China, and protect the site from development and pesticide-use. The move would benefit over 200 species of birds including Mandarin ducks and several resident protected owls, as well as the other wildlife that visit area's lakes, streams and trees.

"This campus is only one square kilometre, but about 40% is trees, natural vegetation, ponds. Some endangered birds have found habitat here," Dr Lü says, adding:

"Birds are more tolerant of human development and smaller spaces, and that's why you still see many birds in developed areas. You just need to add a small pond and on the second day, the birds will come,"

"We're using this campus and the university's high profile as a case study to show how much difference it can make if you know what to do to help the wildlife."

Deforestation in China has heavily impacted native and migratory birds. In the past three decades, the urban population has grown by 500 million people, and China's urban land use between 2000-2010 doubled. According to Shanshui, between 2000-2015, around 1,355 square kilometres of forest were destroyed.

Some of the most endangered native bird species include the Chinese crested tern, with less than 50 remaining in the wild; the endangered blue-crowned laughing thrush, now only found in one province; and the yellow-breasted bunting, which has gone from abundant to critically endangered in a decade. Shanshui figures record 314 endangered species of birds in China.

Much city development has taken place along coastlines. The amount of urban land in coastal areas has increased five times since 1978, turning wetlands into concrete developments, and robbing migratory birds of their habitat and food.

The city of Taiyuan replaced over 8,000 combustion engine taxis with electric vehicles

On the flightpath

China's coastal wetlands are crucial points for birds that migrate between Siberia and Australia, and some 10% of the species that use this migratory route are now facing extinction, including the critically endangered spoon-billed sandpiper, with only about 200 breeding pairs in the wild.

"The mudflat along the coastline of China that they use as stop-over site is under threat of being reclaimed," says Zhang Yimo, director of habitat and species, Water Practice, at WWF China.

While the government has implemented a series of nature reserves across the country – as many as 2,000 – they are not all equal, and some are little more than excuses for sham eco-tourism.

"There are three categories of nature reserve," says Dr Hongfeng Zhao, associate professor of Bird Conservation at Shaanxi Normal University, Xian.

"National nature reserves under the control of central government are the best ones; they can pay and train their workers well, and ensure that all the staff are committed to protecting the wildlife. The second level are provincial nature reserves. The third level are municipal nature reserves, they have less money, and less land. Superficially, it's eco-tourism, but all-too-often they just want to make money and aren't committed to protecting wildlife. So although we know there are more-and-more nature reserves, only some actually protect endangered species and wild animals."

A report from the Shanshui Centre warns that rocketing land values make it hard to incentivise local governments to protect areas of natural wildlife, which is why Dr Zhi's solution of small urban conservation designations for existing sites could gain support.

Currently, of the areas where most endangered birds are, only 2% are protected as nature reserves – most nature reserves are in the West or more remote parts of China, and many species of birds are found in denser Eastern parts.

Apart from deforestation, other threats to endangered birds include their use in traditional Chinese medicine and banquets, poaching, and more recently their sale online sale.

Fewer birds

"Yellow-breasted buntings used to be very abundant 20 years ago," explains Zhang. "Traditionally, the birds are considered a delicacy and believed to boost sexual vitality. Though hunting and trading are banned, the birds remain popular and quite expensive in the black market. The population of the birds is estimated to have decreased by around 80% during the past 11 years."

Last year, activists claimed yellow-breasted buntings were available to buy on Taobao, despite a law forbidding any wild bird being captured in China without a license. Environmental group Birding Beijing compiled links of more than 100 places where they believed the law was being violated, either through the sale of birds or poaching equipment. Alibaba says it removed the links in October and is undertaking a "review of procedures".

State initiatives are also helping protect birdlife, with an update to the 1989 Wild Animal Conservation Law last year. The government is also promoting its "sponge cities" policy, which advocates more wetlands and natural shrubbery in cities, both to tackle flooding risks and provide better environments.

In addition, China's State Oceanic Administration announced in January it will curb commercial development of coastal wetlands, and demolish or shut down all illegally reclaimed land that damages the environment. It has also stated that 53 million square kilometres of wetlands will be protected from development for ecological purposes.

Citizen science

Meanwhile, grassroots conservation and "citizen science" (scientific research conducted by members of the public) in China has been booming. According to Zhang, the number of NGOs dedicated to environmental protection is already around 3,500 and is growing rapidly. Much of the data in Shanshui's China Nature Watch report is compiled by the public.

"There is an ever-increasing number of birdwatching groups in cities across the country," says Dr Jianbin Shi, associate director for Conservation Programs at the Paulson Institute.

"The volunteers not only guide identification of birds, but also introduce knowledge on birds and their ecological importance in ecosystems. Many participants are excellent experts in identifying birds, and their records have contributed much to the knowledge about abundance and distribution of birds, and such knowledge will inevitably contribute to bird conservation," adds Dr Jianbin.

BirdLife International has set up more than 20 birdwatching societies in China, while volunteer societies have been gathering fans, such as the China National Net Removal Centre, whose members remove birds nets set up by poachers. But even among these well-intentioned groups, there is a learning curve.

"More and more photographers are becoming interested in taking pictures of birds in urban centres, but I've observed the behaviour of many photographers is harmful to birds themselves," adds Shi.

"For example, they approach so close to the bird they disturb or disrupt their normal behaviour, particularly breeding and feeding behaviours. or use artificial baits to attract birds, which may even lead to illegal hunting of the target birds."

Dr Lü says some schools are starting nature education classes and she has seen growing interest in the wildlife at Peking University from Beijing residents, amid a desire to reconnect with nature even in the middle of major cities.

"Many cities are making more green spaces to be shared by citizens, but defining 'good' green areas needs some scientific input," says Dr Lü. "The green lawn may not look as nice without pesticides, plants may have holes in the leaves, but it is a better habitat. There's a whole set of ecological concepts that need to be introduced in greenfield management in urban areas. Dead leaves can provide important habitat for insects, which provides food for birds but in cities, leaves are usually cleaned away because they look dirty.

"We aren't just talking about how to manage birdlife, but how to manage green land within cities."

Helen Roxburgh is a Shanghai-based writer and editor.

煤电厂的诱惑：波黑面临艰难抉择

深陷失业和污染双重困境中的波黑，
究竟该如何权衡来自中国的煤电建设贷款的利弊？

□ 杰克·戴维斯　珍雷纳·帕托里

“矿工们见面寒暄不会说日安，而会说祝你好运。”哈塔·穆拉托维奇·哈桑斯帕希奇在一个混凝土升降梯门口说道。她每天都会乘这个电梯下到地下300米的地方采矿。哈塔是波斯尼亚中部山城布雷扎的一名煤矿工人。

虽然工作很辛苦，但哈塔仍希望她的儿子也能继续从事这门家传行业。在布雷扎，能在煤矿工作仍然被认为是一份很好的工作，因为收入稳定，而且不会拖欠。

在波斯尼亚和黑塞哥维那（简称“波黑”），就业机会很少，但煤炭资源丰富，这是这个巴尔干国家在中资海外燃煤电站建设热潮中找到的机会。目前在建的发电项目至少有六个，它们得到了中国“一带一路”倡议相关贷款的支持。

煤矿上的波黑

波黑主要依靠煤和水电来满足其能源需求，而在太阳能和风能等低碳技术的应用上步伐缓慢。该国褐煤储量高达13亿吨。由于这种煤污染极其严重，无法出口到已禁止使用褐煤的欧盟国家。布雷扎的一个矿区负责人Ćamil Zaimović证实，他的矿区每年生产的70万吨煤大部分都用于国内消费。

波斯尼亚的失业问题非常严峻，因此政客们鼓励新建煤炭项目，以此来创造就业机会。根据世界银行的数据，2016年波斯尼亚失业率达到了25.1%。

但很多人对于由此产生的重大环境风险和经济收益的不确定性提出了警告：这些煤炭项目受到了公民社会团体、学者和环保人士的广泛反对。

就业为先

据公共财政研究和活动组织“银行监督”（Bankwatch）称，波斯尼亚拟建和在建的大型煤电项目共六个，预计总成本超过20亿欧元（24.4亿美元）。该组织发现，那些已知大致

成本的项目都是由中国国有银行提供融资的。

而波斯尼亚的政治家们也乐于接受这些贷款。

在走访 Kreka 煤矿时，波黑三人主席团中的波什尼亚克族成员巴凯尔 · 伊兹贝戈维奇表示，支持建设新的燃煤发电厂，以创造就业机会。同样，前联邦能源矿业和工业部长埃达尔在 2014 年表示，布戈伊诺新建的燃煤电厂将创造约 1000 个就业岗位。

“他们用这种论调赢得选民支持，宣称这是战后国内最大的投资，但这其实是贷款。”非政府组织“图兹拉生态与能源中心”（CEET）的协调员 Denis Žiško 警告说。

他认为国家能源公司 Elektroprivreda 无力偿还贷款。当谈及图兹拉燃煤电厂时，他表示，“最终还是要我们，波黑的公民来偿还债务。”

根据波斯尼亚政府 2018-2020 年的预算，该项目将花费 16.22 亿波黑可兑换马克（约 10 亿美元）。

政治学家和前塞尔维亚外交官武克 · 瓦克萨诺维奇说：“或许应该更谨慎一些，但此时此刻，决策者们因经济未能实现复苏而承受着巨大的压力。”

“大多数（政治家）关心的都是连任和民意调查。战略家们的前瞻性只有三个月，而政治家们考虑事情不会超过一周。”他补充道。

英国上议院国际关系委员会一月份的一份报告指出，世界银行和国际货币基金组织已经就西巴尔干地区国家从中国借贷的风险发出了警告。报告指出，中国对黑山共和国的贷款额相当于这个小国 GDP 的四分之一，并且由于货币波动又增加了 25%。

> “他们用这种论调赢得选民支持，宣称这是战后国内最大的投资，但这其实是贷款。”Denis Žiško 警告说。

燃煤电厂新增的就业机会也可能少于预期值。根据联邦就业局的数据，截至 2016 年，波斯尼亚的矿区就业人数共 8571 人，国内薪资待遇最高的是能源部门。

然而，图兹拉大学教授、能源规划专家 Mirza Kušuljgić 表示，一些燃煤电厂的贷款条件中明确规定，在工程建设中应雇佣中国工人。他补充说，在 2016 年投入运营的斯坦纳瑞燃煤电厂有 80% 劳动力来自中国。

通往欧盟的大门？

然而，中国的贷款方从这些项目中寻求的可能不止是资金回报。

“因为这些都是政策性银行（提供贷款），比起项目的可行性，他们更感兴趣的是项目能够产生的政治资本。”盖洛普说道，“只要项目能回本就可以。”

对于中国庞大的基础设施和互联互通项目——“一带一路”而言，西巴尔干地区是它的另一个节点。

“中国的长期目标是欧盟，巴尔干地区国家是通往欧洲的关口，而且有一天甚至可能成为欧盟成员。”瓦克萨诺维奇说。2018 年 2 月，欧盟委员会再次重申，希望五月份在保加利亚首都索非亚举行区域峰会之前，包括波斯尼亚在内的巴尔干地区六国能够加入欧盟。

宽松的条款

2013 年，中国对中欧和东南欧价值 130 亿美元的基础设施专项贷款项目启动，这些地区的政府迫切地希望利用这些贷款。

中国的贷款“为希望规避国际金融机构规定的领导人提供了另外的选择”，民主化政策委员会的联合创始人库尔特 · 巴斯纳在对英国上议院国际关系委员会的书面证词中说。

欧盟不愿意为褐煤项目提供财政支持，并且要求大大降低新电站的碳排放量，而中国则没那么挑剔。

欧盟成员国标准提出了包括法治、运输和能源连通在内的“六大旗舰举措”。为了加入欧盟，西巴尔干地区的国家受到反污染条例的约束，尽管这些条例不像对欧盟内部国家那样严格。

环保门槛

该地区国家都加入了旨在将非欧盟成员纳入能源共同市场的《能源共同体条约》（ECT）。塞尔维亚和波黑于 2005 年签署该条约，并且按要求，于今年开始正式执行减排规定。

据盖洛普表示，塞尔维亚政府对该条约中规定的义务缺乏理解。

中国在塞尔维亚的第一个煤炭项目是为科斯托拉茨的一个燃煤电厂升级污染控制设备，但这些设备并未达到《能源共同体条约》的要求。

“银行监督”在一份即将发布的报告中指出，中国已经正式承诺确保西巴尔干地区的项目符合欧盟和东道

国的法律，但报告同时对中国“在遵守欧盟法律方面尽到独立尽职调查的能力或兴趣有多大”表示怀疑。

相反，地方政府才是这些项目背后的驱动力。“这些项目存在的主要原因是当地的决策者，”盖洛普说。“这是一种惯性。从历史上看，整个地区的基础设施都建立在水电和煤电之上。这是他们唯一信任的系统。

能源规划专家 Kušuljgić 认为，中国没那么严格的贷款方式也适合当地的决策者。

他表示：“中国在市场民主化、尊重环境等方面没有任何要求。他们唯一的要求是要有政府贷款担保。”

然而，波黑中央银行通信主管齐贾达 · 科瓦茨在邮件中对中外对话表示：“中国的投资仍处于初步协议和公告阶段。真正落地的 [中国] 投资仍然很少。”

但鉴于西方对投资波斯尼亚持谨慎的态度(根据美国国际贸易管理局的数据，2015 年到 2016 年，该地区外国直接投资下降了近一半)，中国的贷款意愿对波黑绝对是好消息。

中国并不是唯一一个投资西巴尔干地区煤炭项目的国家。2017 年年底，中国尚未认可其主权的科索沃地区与美国能源公司 ContourGlobal 签署了一份 60 万千瓦燃煤电厂的建设协议。

根据比利时非政府组织“健康与环境联盟”的资料，这座燃煤电厂位于首都普里什蒂纳附近。普里什蒂纳已经是世界上污染最严重的城市之一，而电厂建成后，将使该市每年的公共卫生费用增加高达 3.52 亿欧元（4.36 亿美元）。尽管如此，该项目得到了美国大使馆的极大支持，并得到了世行的部分风险担保。

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Chinese banks move into Bosnian power sector

Balkan coal projects are expanding under the Belt and Road banner

□ Jack Davies Jelena Prtoric

"Miners don't say good day, we say good luck," says Hata Muratović Hasanspahić, standing at the door to a concrete elevator shaft that carries her 300 metres below ground each day. Hata is a coal miner in the central Bosnian mountain town of Breza.

It is hard work but Hata hopes her son will continue the family tradition. Working in a mine is still considered a good job in Breza as you're sure to be paid, and on time, too.

Jobs are scarce and coal is plentiful in Bosnia and Herzegovina, which is how the Balkan country finds itself in the midst of a building boom of Chinese-funded coal-fired power stations. At least six power generation projects are underway, backed by Chinese loans linked to the country's Belt and Road Initiative (BRI).

Coal country

Bosnia and Herzegovina relies principally on coal and hydropower for its energy needs and has been slow to adopt low-carbon technologies, such as solar and wind power. The country has significant lignite coal reserves of 1.3 billion metric tonnes. This type of coal is too polluting to export to the European Union (EU), which has regulations banning its use. At Breza, mine director, Ćamil Zaimović, confirmed the bulk of his mine's annual output (700,000 tonnes) is for domestic consumption.

Bosnian politicians have embraced new coal projects as a way to create jobs in a country that is suffering from acute unemployment. In 2016, this stood at 25.1% according to the World Bank.

But many voices are warning of significant environmental risks and questionable economic benefits: the projects have been widely opposed, not least by civil society groups, academics, and environmentalists.

Jobs first

Six large coal-power projects are planned or underway in Bosnia, at an estimated total cost of more than 2 billion euros

1 in 4 people are unemployed in Bosnia and Herzegovina, where politicians are promising new jobs in coal ahead of local elections. Tuzla coal plant

(US$2.44 billion), according to the research and activist network Bankwatch, which focuses on the use of public finances. It has found that for several projects, Chinese state banks are understood to be providing financing. And Bosnia's politicians are happy to accept the loans. When visiting the Kreka coal mine, Bakir Izetbegovic, the Bosniak member of the tripartite presidency, expressed his support for new coal-fired generators and the jobs they will create. Similarly, Erdal Truhulj, former federal minister of energy, mining and industry, in 2014 stated that the new coal plant in Bugojno, would create about 1,000 jobs.

"They are selling this narrative to the electorate that this as the biggest investment in the country since the war, but this is a loan," warned Denis Žiško, a coordinator with the Centre for Ecology and Energy in Tuzla (CEET), a non-governmental organisation.

Žiško does not believe state energy firm Elektroprivreda can repay the loan. "It is us, the citizens of Bosnia and Herzegovina that will have to pay it off," he says of a coal power plant in Tuzla.

According to a Bosnian government budget for 2018-2020 the project will cost 1,622 million Bosnian marks (US$1 billion).

"There probably should be more caution, but at this moment in time the policymakers are burdened with the fact that economic recovery hasn't really come," said political scientist and former Serbian diplomat Vuk Vuksanovic.

"Most [politicians] are concerned about re-election and opinion polls. The strategists think three months in advance, and the politicians don't think past next week," he added.

Countries across the Western Balkans have been warned of the risks of borrowing from China by the World Bank and International Monetary Fund, according to a January report from the UK House of Lords International Relations Committee. The report notes that the burden of one Chinese loan to Montenegro (equal to approximately a quarter of the small country's GDP) increased by 25% due to currency fluctuations.

The coal plants may also result in fewer jobs than hoped. As of 2016, there were 8,571 people employed in Bosnia's

mines, according to the Federal Employment Bureau. Some loans for coal-power plants specify the use of Chinese workers during construction, said Mirza Kušuljgić, a professor at the University of Tuzla and an expert on energy planning. He added that 80% of the workforce on the Stanari coal plant, for example, which has been operational since 2016, came from China.

Gateway to the EU

However, China's lenders may be looking for more than financial returns from the projects.

"Because these are policy banks [providing the loans], they're less interested in the feasibility of the projects than they are in the political capital they generate," said Bankwatch researcher Pippa Gallop.

For China, the Western Balkans are another link in its Belt and Road Initiative, a massive network of infrastructure and connectivity projects.

"China's long-term target is the European Union, and the Balkans are a gateway to it, and may someday even be EU members," said Vuksanovic. In February 2018, the European Commission reiterated its hopes that six Balkan nations will join the bloc, including Bosnia, ahead of a summit on regional engagement in the Bulgarian capital of Sofia in May.

Easy terms

In 2013, China initiated what has become a US$13 billion line of credit for infrastructure projects in central and south-east Europe, which governments are eager to utilise. China's loans offer "alternatives to leaders who wish to avoid the stipulations of international financial institutions", said Kurt Basseuner, co-founder of the Democratization Policy Council, in written testimony to the UK's House of Lords International Relations Committee.

While the EU is unwilling to provide financial support to lignite coal projects, and is demanding greatly reduced carbon emissions in new power stations, Chinese firms are sometimes less fussy.

The EU's membership criteria stipulate convergence on "six flagship initiatives", including the rule of law, transport, and energy connectivity. As part of their effort to join, countries in the Western Balkans are bound by anti-pollution regulations, albeit less stringent than those within the EU.

Environmental obligations

The Balkan states are signatories to the Energy Community Treaty (ECT), which seeks to integrate non-EU members into the common market for energy. Serbia and Bosnia signed up in 2005, and its stipulations for the reduction of carbon emissions come into force this year. The Serbian government has little understanding of its treaty obligations, according to Gallop. China's first coal project in Serbia was the refurbishing of pollution control equipment in a plant in Kostolac, which are expected to fall short of ECT requirements.

A forthcoming Bankwatch report notes that China is officially committed to ensuring projects in the Western Balkans meet EU and host country laws, but queries the "capacity or interest in independent due diligence on compliance with EU law".

The report highlights the role of local governments. "The primary reason these projects exist is local decision makers", says Gallop. "It's a case of inertia. Historically, the

> "China's policy banks are less interested in the feasibility of the projects than they are in the political capital they generate."

whole regional infrastructure has been built on hydro and coal [power]. It's the only system they believe in."

Kušuljgić, the energy planning expert, thinks China's less stringent approach to lending also suits regional authorities.

"China doesn't have any requirements in terms of democratisation of the market, respect of the environment, and so on. Their only requirement is to have a state loan guarantee," he said.

However, in emailed remarks, Zijada Kovac, head of communications at the Central Bank of Bosnia and Herzegovina, told chinadialogue, "Chinese investments are still at the point of preliminary deals and announcements. The realised [Chinese] investments are still pretty low."

Given Western timidity when it comes to investing in Bosnia – foreign direct investment fell by nearly half from 2015 to 2016, according to the US International Trade Administration – the promise of a Chinese loan is better than nothing.

China is not alone in funding coal projects in the Western Balkans. In late 2017, Kosovo, whose sovereignty is still unrecognised by China, signed a deal with US energy firm ContourGlobal for construction of a 600-megawatt coal plant. Located close to the capital Pristina, already one of the most polluted cities in the world, it could increase the city's annual public health costs by up to 352 million euros (US$436 million), according to Belgian NGO Health and Environment Alliance. Nonetheless, the project has been warmly endorsed by the US embassy and received a partial risk guarantee from the World Bank.

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湄委会 CEO：中国的参与对湄公河下游环境至关重要

面对水电建设大潮，湄公河下游国家需要中国投资者和水利部门的通力合作，湄委会首席执行官范遵潘说。

□ 王 妍

湄公河流经的柬埔寨上丁省，树木自然地生长在水里

随着湄公河委员会（以下简称“湄委会”）第三届峰会于2018年4月5日在柬埔寨暹粒召开，湄公河流域的未来再一次成为国际焦点。

湄公河发源自中国（中国段称澜沧江），流经缅甸、老挝、泰国、柬埔寨和越南。然而，中国和下游国家修建的大型水电大坝正在迅速改变这条河流。

“湄委会”作为一个重要的政府间组织，旨在改善泰国、老挝、柬埔寨、越南之间湄公河的跨境管理和可持续发展，缅甸和中国作为“对话伙伴”参与其中。委员会的工作涉及渔业、防洪、水电、灌溉和航运。

在今年的峰会上，湄委会发布了一项新的研究结果，对水电的成

本和效益进行了详细分析。这项在2012至2017年间进行的研究尚未接受同行审查，其结果称在湄公河上筑坝发电将对该地区产生巨大影响。

到2040年，水电开发可带来高达16倍的经济效益增长，但新大坝可能会导致渔业收入减少15%，河口泥沙沉积减少97%。此类沉积物富含养分，其流失将对鱼类和农业（尤其是在三角洲地区）造成灾难性影响。

随着大量投资涌入湄公河流域的水电开发行业，类似湄公河委员会这样的政府间平台能为促进经济和环境正义做些什么？中国在湄公河下游事务中又发挥怎样的作用？在峰会会场边，我们和湄公河委员会首席执行官范遵潘讨论了这些问题。

出席湄公河委员会第三届峰会的各国领导人及部长，左起为：中国水利部副部长鄂竟平、越南总理阮春福、柬埔寨总理洪森、老挝总理通伦·西苏里、泰国总理巴育·占奥差、缅甸自然资源和环境保护部部长翁温

王妍(以下简称"王")：您对澜沧江-湄公河沿线的水电建设有何看法？

范遵潘(以下简称"范")：我根据我们的工作核心（1995年通过的湄公河流域可持续发展合作协定），湄公河干流上所有拟建的水电大坝都需根据湄公河委员会的PNPCA程序（Notification, Prior Consultation and Agreement，简称PNPAC，即"通知，事先协商，协议"）进行事先磋商。

委员会的研究结果非常清楚地表明从整个流域的角度来看，各国的计划并非最佳和可持续的。各国的计划都是从自身角度出发制定的，所以这是可以理解的。"湄委会"将把各国联合起来，共同优化未来的方案，在增加效益的同时降低潜在成本。

我对塞内加尔河流域（流经马里、毛里塔尼亚和塞内加尔）以及其他一些国家共同拥有并经营水电大坝的例子非常感兴趣。此类例子告诉我们，只有通过联合投资、共担费用、共享利益，各国才能解决发展造成的更大影响。

与此同时，"湄委会"正在与成员国合作开发针对干流大坝的联合环境监测计划。该计划是以之前沙耶武里（2011）、东萨宏（2015）和北本（2017）这三座拟建干流大坝事先磋商过程所提出的建议为基础制定的。（编者注：尽管"湄委会"建议在进一步的影响研究结果完成之前暂停大坝建设，但这三座位于老挝境内的水坝仍在建造中。目前，湄公河下游干流共有11座大坝正在建设或开发之中，中国境内建有7座大坝。）

该计划将包括监测5项主要的环境参数，包括水坝所在地附近的水文、沉积物、水质、水生生态和渔业。监测结果将为水电项目的适应性管理措施提供可供参考的信息。

王：湄公河委员会作为一个政府间组织在澜沧江-湄公河地区，尤其是在弥补认知上的差异和塑造共同利益方面发挥了怎样的作用？

范：我认为"湄委会"在水资源及相关资源可持续发展的区域治理方面发挥着独特的作用。

应当指出的是，各国对利用湄公河水资源促进区域经济发展的需求都很高。如果没有适当的对话和利益分享机制，一国的发展可能会造成另一国的损失。但各国之间如果有一个适当的合作机制，就给实现合作与和平创造了机会。

在这方面，"湄委会"作为水外交的区域性平台发挥着极为重要的作用。再没有其他组织能够拥有这样的权力或能力，从整个流域的角度出发，提出一个全面综合的水资源治理方案。

"湄委会"还有一项独特的能力，

那就是在部门内部和部门之间开展专业分析，如水电、渔业、航海、灌溉、水质、湿地等领域。

通过对整个流域进行战略性评估，我们就可以确定并尽可能降低风险。作为一个区域组织，“湄委会”可以扮演对话的促进者，并且通过研究跨国界利益分享机制来协助确定和降低风险。

“湄委会”的这一作用得到了出席第三届峰会的各国领导人的认可和再次肯定，而且“湄委会”的重要性也得到了我们的对话伙伴（中国和缅甸）的认可。

王：能否举几个例子说明“湄委会”是如何促进流域各国达成共识的？

范：比方说4个成员国正在通过我们的水外交平台加强双边对话，就关键的跨境水问题建立共识，合作找出解决问题的长期办法，并分享水资源管理方面的最佳实践。

此外，各国还同意实施5个促进水资源开发和管理方面投资的联合项目。例如，柬埔寨和老挝之间的湄公河和色贡河（Sekong River）渔业管理项目所要解决的是洄游型白鲑鱼种类减少的问题，柬埔寨和泰国的洞里萨湖（Tonle Sap Lake）和宋卡湖（Songkhla Lake）流域交流扩展项目通过对外的学习交流，支持湖泊的健康治理。

王：此类合作面临哪些障碍？

范：我们的成员国已经在1995年签订的“湄公河协定”下进行了良好的合作，也得到了世界各地合作伙伴的支持。但湄公河流经6个国家，加入委员会的却只是下游国家，我们一直希望我们的对话伙伴中国和缅甸能够加入我们。

我相信，如果中缅两国能够为了我们共同的水资源和民众生计，加入“湄委会”，我们就能取得更多成就。我们还需要与澜沧江-湄公河合作机制紧密协作，它们也应该本着合作和开放的精神与我们合作。（注：为促进本国与湄公河下游5国的合作，中国于2016年3月宣布成立澜沧江-湄公河合作机制。）

王：中国作为对话伙伴，在“湄委会”中发挥了怎样的作用？您觉得“湄委会”和中国提出的“澜湄合作机制”是否兼容？

范：虽然中国不是湄委会的正式成员，但二者之间存在合作关系，近年来这种关系正逐步改善。合作的基础是对湄公河深入科学地分析和理解。

作为“湄委会”的对话伙伴，中国深知水电建设的潜在影响，并表示愿意就这些问题开展技术合作。中国还明确表示将在确保下游水流量保持在可接受水平的基础上审慎运营上游的水电项目。

在第三届峰会上，中国再次表示愿意与“湄委会”及沿岸所有国家合作，并邀请我们在澜-湄水资源合作中发挥建设性作用。

但必须指出，合作仍需加强。我非常确定，我们需要向外界表明中国和“湄委会”的密切合作，以打消外界对“湄委会”与“澜湄合作机制”存在竞争关系的疑虑，我也邀请中国与我们紧密合作。

王：现有“湄委会”成员之间是否存在生态补偿机制？您对跨境生态补偿有何看法？

范：我们目前还没有生态补偿项目。这种计划国家层面上需要法律法规，在地区/跨境层面上必须经过谈判。可能的做法是建立一个“湄委会区域基金”，用于管理和保护具有区域性意义的重要生态和环境资产。

我们目前刚刚开始制定一项流域环境管理战略。

王妍，《中国新闻周刊》英文版NewsChina Magazine编辑记者，关注环境议题

Mekong River Commission reaches out to China to avert dam damage

China's participation key to minimising losses from Mekong dams, says head of Mekong River Commission Pham Tuan Phan

□ Wang Yan

The future of the Mekong River Basin was in the spotlight again at the third summit of the Mekong River Commission (MRC), held on 5 April 2018 in Siem Reap, Cambodia.

The Mekong flows from China (where it is known as the Lancang), through Myanmar, Laos, Thailand, Cambodia and Vietnam. However, it is rapidly being changed by large hydropower dams in China and downstream.

The MRC is an important intergovernmental organisation that aims to improve cross border management and sustainable development of the Mekong between Thailand, Laos, Cambodia and Vietnam, with Myanmar and China participating as "dialogue partners". It works on fisheries, flood control, hydropower, irrigation and navigation.

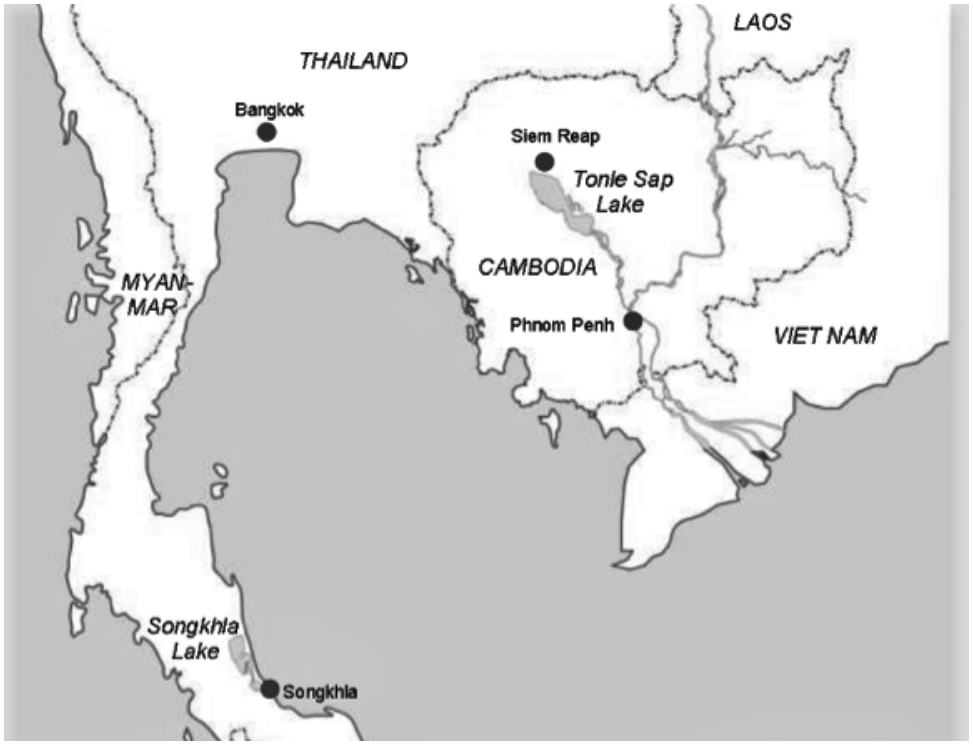
At this year's summit, the MRC released findings of a new study it commissioned to provide a detailed analysis of the costs and benefits of hydropower. Carried out between 2012-2017, the study, which is not peer-reviewed, claims that damming the river for power generation will have huge implications for the region.

By 2040, hydropower development could deliver a whopping 16-fold increase in economic benefits. But new dams may reduce income from fisheries by up to 15% and reduce sediment reaching the river mouth by as much as 97% by 2040. Loss of such nutrient rich sediment would be disastrous for fish and agriculture, particularly in the delta.

As investment rushes into hydropower development in the Mekong River Basin, what can intergovernmental platforms such as the MRC do to promote economic and environmental justice? What role does China play in lower Mekong affairs? To discuss these questions, we sat down with Mr Pham Tuan Phan, chief executive officer of MRC.

Wang Yan (WY): What is your perspective on hydropower construction along the Lancang Mekong River?

Pham Tuan Phan (PTP): At the core of our work (the 1995 Mekong Agreement to cooperatively and sustainably develop the river basin), any proposed construction of



Locations of the Tonle Sap Lake and Songkhla Lake (Map: Mekong River Commission)

hydropower dams on the Mekong mainstream requires prior-consultation, under the MRC Procedure for Notification, Prior Consultation, and Agreement (PNPCA).

The Council study results are very clear that countries' plans are not optimal and sustainable from a basin-wide perspective. It is understandable as countries plans are made from a national perspective. The MRC will bring countries together to optimise their future plans to increase benefits and reduce potential costs.

I am very interested in the Senegal River Basin (shared between Mali, Mauritania and Senegal) and other examples where countries have jointly owned and operated dams. Such cases tell us that only through joint investment, and sharing costs and benefits, will countries address the bigger impacts of development.

At the same time, the MRC is now working with member countries to develop a joint environmental monitoring scheme for the current mainstream dams. The development of this scheme is based on the recommendations of the past prior consultation processes of three proposed mainstream dams: Xayaburi (2011), Don Sahong (2015) and Pak Beng (2017).

[Editor's note: These three dams are being built in Laos despite MRC recommendations to suspend construction until further impact studies had been completed. A total of 11 dam projects are either under construction or being developed on the mainstream of the Lower Mekong River, with seven on the river in China.]

The scheme will include monitoring five key environment parameters, including hydrology, sediment, water quality, aquatic ecology and fisheries, to be conducted close to the dam sites. Results of the monitoring will inform adaptive management measures of the hydropower projects.

WY: What role does the MRC play in the Lancang-Mekong region as an intergovernmental organisation, particularly in bridging gaps of understanding and shaping common interests?

PTP: I think the MRC has a unique role to play in the regional governance of water and related resources for sustainable development.

It should be noted that there has been high demand for using Mekong water to boost economies in the region. Without a proper dialogue and benefit sharing mechanism, development in one country may mean losses in another. But when there is a proper mechanism for the countries to work together this creates the opportunity for cooperation and peace.

This is where the MRC plays the most important role as the platform for water diplomacy. No other organisation has the mandate or capacity to present an overall integrated basin perspective.

The MRC also has a singular ability to carry out professional analysis both within and across sectors – hydropower, fisheries, navigation, irrigation, water quality, wetlands and so on.

Taking a strategic basin-wide assessment allows us to determine and minimise risks. As a regional body, the MRC can assist here by acting as a facilitator of dialogue and by looking into mechanisms for sharing of benefits across borders.

Such a role was acknowledged and reconfirmed at the third summit by leaders of the MRC member countries. Our dialogue partners (China and Myanmar) also acknowledged the MRC's importance.

WY: Can you give us some examples of how the MRC is promoting common views among different Mekong countries?

PTP: For example, through our water diplomacy platform the four countries are now increasing bilateral dialogue to build a common understanding of key cross-border water issues, find durable solutions to address issues together, and share best practices in water resources management.

On top of this, the countries also agreed to implement five joint projects that would lead to investment in water development and management. For example, the Mekong and Sekong Rivers Fisheries Management Project between Cambodia and Lao PDR addresses the issue of declining migratory whitefish species, and the Tonle Sap Lake and Songkhla Lake Basins Communication Outreach Project between Cambodia and Thailand supports healthy lake governance through outreach and learning exchange.

WY: What are the barriers to such cooperation?

PTP: Our member countries have been cooperating well under the 1995 Mekong Agreement, and with strong support from partners around the world. But since the Mekong River flows through six countries, and only countries in the lower reaches of the river are members of the commission, we have always wanted our dialogue partners – China and Myanmar – to join us.

I believe we could achieve more if the two countries join – for the sake of our shared water and people's livelihoods. We also need to work closely with the Lancang-Mekong Cooperation mechanism and they should also work with us in the same spirit of cooperation and openness. *[Editor's note: In March 2016 China announced the establishment of a new sub-regional mechanism that promotes cooperation between China and the five lower Mekong countries.]*

WY: What is China's role as a dialogue partner in the MRC? Do you think the MRC is compatible with the Lancang-Mekong Cooperation mechanism, proposed by China?

PTP: Although China is not a full member of the MRC, there is a cooperative working relationship, which has gradually improved in recent years. The basis of that co-operation is good scientific analysis and understanding of the Mekong.

As a dialogue partner with the MRC, China is well aware of the potential consequences of hydropower construction and has indicated its willingness to work together at a technical level on these issues. China has also clearly stated

"As a dialogue partner with the MRC, China is well aware of the potential consequences of hydropower construction and has indicated its willingness to work together."

that it will operate the upstream projects so that river flows downstream are maintained at acceptable levels.

At the third summit, China has once again expressed its willingness to work with the MRC and all riparian countries, inviting us to play a constructive role in the Lancang- Mekong water resources cooperation.

But it should be noted that cooperation still needs to be stronger. I am determined to showcase close cooperation and to eliminate doubts that MRC and LMC are competing. I invite China to work closely with us.

WY: Are there any existing mechanisms to provide ecological compensation among MRC members? What's your view on cross-border ecological compensation?

PTP: We do not have any existing ecological compensation projects yet. At the national level, there are laws and regulations. At the regional/transboundary level, these kinds of schemes have to be negotiated. A possibility would be to have a MRC regional fund for managing and protecting key ecological or environment assets with regional significance.

We are now at an initial stage of preparing a strategy for basin-wide environment management.

Wang Yan is editor and journalist at NewsChina Magazine, the English edition of China Weekly, covering environment issues.

抗灾与致富：中资旅游项目的海岛难题

加勒比海上的安提瓜和巴布达岛饱经气候灾难的摧残。飓风过后，中国投资者的到来激起了热烈的讨论。

□ 罗·苏塔　玛丽安·爱斯嘉福丽特

一达国际投资集团已获准继续在安提瓜岛的离岛圭亚那岛建造饱受争议的赌场度假村

加勒比岛国安提瓜和巴布达岛（以下简称安巴）的巴布达岛几乎被飓风厄马夷为平地，但这并没有阻碍中国投资者继续推进安提瓜岛上的建设项目。这些项目对于岛屿抵御自然灾害能力的影响，则令一些当地居民担忧。

去年 9 月，近十年来最强的大西洋风暴以超过 185 英里的时速席卷安巴，造成 134 人死亡，巴布达岛上近 95% 的房屋被毁，安提瓜岛则逃过一劫，几乎没受损失。

虽然红树林生态系统对保护岛屿免受自然灾害极为重要，但一达国际投资集团已获准继续在安提瓜

岛的离岛圭亚那岛（属于安巴东北海洋管理区）建造饱受争议的赌场度假村。这片在理论上应该被保护起来的海岸线上生长着脆弱的红树林生态系统。根据安巴2006年的《渔业法》，渔业司只有出于环保目的，才能批准“修剪”红树林。

但当地传回的图像清楚地显示，一达度假村新造的海滩已经造成红树林的减少。据当地媒体《观察家报》报道，安巴总理加斯顿·布朗曾表示，为了加快该项目的进度，将考虑修改环境法。该项目先期将建设两家酒店。

“这一地区环境非常敏感，受到各种法律保护，那里有大片的珊瑚礁、海草床、沙地浅滩、未开发的小岛和极具生产力的海洋栖息地，”在脸书上创建了“拯救圭亚那岛环境”页面的环境活动家福斯特·德里克说。

德里克还说，一边是保护自然生产环境和随之而来的低就业，另一边是旅游相关产业带来的各种建设项目和管理工作，小岛屿国家政府很难抵抗后者的诱惑。

安巴环境部表示，需要综合地对沿海环境影响和工程进行研究。但该部并未要求一达集团提交一份能突出项目存在的主要问题的新的环境影响评估（EIA）来替代现有文件。

“新建海滩既不利于可持续发展，也不切实际，而且时间会证明这样做的代价会非常高昂，”环境部在审核一达目前的环境影响评估时说。

至关重要的红树林

“红树林行动”（Mangrove Action）项目的生物学家、加勒比专家菲奥娜·威尔莫特指出，红树林

“一边是保护自然生产环境和随之而来的低就业，另一边是旅游相关产业带来的各种建设项目和管理工作，小岛屿国家政府很难抵抗后者的诱惑。”

不仅能够保护岩礁鱼类的繁育场所，还可以为候鸟提供栖息地，因此具有至关重要的意义。根据现有最近期的数据（2010），飓风厄马来袭之前，安提瓜岛上红树林的覆盖面积约为2161英亩（875公顷），即本岛面积的3%，而巴布达岛上红树林的面积为14468英亩（5855公顷），相当于该岛面积的35%。

它们曾经是繁荣的潮间生态的一部分。

红树的根深植于海岸的沙土中，不仅能在潮汐变化时抵御汹涌而来的潮水，还能作为天然屏障，阻挡飓风季节的大风。砍伐红树林导致土地更容易受到侵蚀，从而令附近居民在暴风雨来临时得不到保护，安全受到威胁。

根据剑桥大学和“大自然保护协会”的一份报告，海啸时，红树林可以让海浪高度降低5%到30%，并且能够通过捕获二氧化碳来减轻气候变化的影响，抵御海平面上升造成的威胁。

威尔莫特建议，对安巴地区可能已经被飓风破坏了根系的红树林进行人工修复，并由政府从救灾资金中拨专款保护自然物种。

艰难的灾后重建

飓风厄马过后，中国政府向安巴提供了1600万美元的一揽子援助。在此之前，两国刚刚签署了一项经济技术合作协议。然而，目前还不清楚大部分援助资金将花在哪里。只有约120万美元将用于赈灾和建设新的社区中心。

安巴环境部的阿里卡·希尔在电子邮件中告诉“中拉对话”：“为了应对不断加剧的自然灾害，我们正在优先进行一些重点工作。”

这包括对遭受厄马破坏的三个地区的自然保护热点地带（如巴布达的科德灵顿湖国家公园）受到的影响进行更全面的评估，以及提升其抵御热带风暴和干旱的能力，希尔补充道。

然而，由于巴布达岛几乎所有的房屋和公共建筑都毁于厄马飓风，岛上民众担心政府会不顾环境法，以重建为由，把土地卖给那些企图建造旅游度假村的外国投资者。类似状况曾出现在安提瓜岛。

至关重要的红树林

“（安提瓜岛上的）一达项目令环保部门的弱势角色更加根深蒂固了，巴布达的重建过程似乎也出现了这种势头。”德里克说。

政府也没有明确说明，巴布达岛将花多大的力气种植或复植能够保护该岛免遭极端天气事件和沿海洪灾侵袭的红树林。

安巴总理布朗在宣布财政部2018年的预算时表示，中国、加拿大、日本、委内瑞拉、印度和欧盟等都为巴布达的重建提供了资金。

此外，中国政府还通过联合国开发计划署的“中国援助灾后恢复项目”赠款200万美元，为巴布达受飓风破坏的建筑物修缮屋顶。

中国驻安巴大使王宪民谈到这个200万美元的屋顶修缮项目时说：“中国政府很乐意为重建这一人间天堂提供支持”。

但布朗估计巴布达的重建成本为6亿美元，相当于政府去年一年税收的95%，单靠援助捐款远远不够。

布朗说，气候适应性将是新建项目主要考虑的因素：“我们正在重建巴布达，希望能让岛上每一位居民更强大、更安全、更有能力抵御气候灾害，从而克服未来气候变化可能带来的任何挑战。”

但遭飓风袭击后，尽管布朗做出了种种努力，他所领导的政府还是因为对此次危机反应不足遭到了抨击。

人道主义组织“地面真相解决方案”（Ground Truth Solutions）最近的一份报告显示，29%的巴布达人（在被调查者中比例最大的一部分人群）认为自己的需求“根本没有”得到满足。类似地，超过三分之一的受访者（也是人数最多的一部分）认为援助不会去到那些最需要的人。

押宝旅游业

安巴政府正在把两个岛屿打造成吸引外国投资的旅游热点地区，并认为这是本国经济发展的最佳途径。

上个月宣布本国2018年的预算时，布朗把“以强大的旅游产业为依托，振兴本国经济”列为政府的首要任务。他说，该岛能够从旅游业的“大举投资”中受益。

据当地新闻报道，布朗还在最近一次与中国外交官的会议上邀请中国土木工程集团（中土集团）参与旅游基础设施的开发。

安巴政府已经和中土集团签订了一份价值9000万美元的合同，由后者负责首都圣约翰一处货运港和游船港的建设。该项目由中国进出口银行负责融资。

但德里克警告政府在签订与旅游业相关的大型合同时，切忌“贪多嚼不烂”：“类似一达和同一地区几年前的谭拿督（Dato Tan）这样的大型项目，对安巴这样的国家来说太大了，不管是建设还是不断监测和缓解其日常活动的影响，安巴无法很好地对所有这些领域进行有效的管理。”他说。

希尔说，安巴2003年的《实体规划法》允许任何利益相关方就发展项目决策提出异议。

“中拉对话”联系到了一位不愿具名，自称只是“员工”的一达雇员，他不愿多谈项目对环境的影响，并暗示项目符合政府规定。

中国海外投资的新规则

安巴灾后重建工作得到的国际支持有限，因此政府欢迎中国投资其各类经济领域，包括旅游业。

尽管最终负责落实环境法的是政府，但中国也在采取措施应对中资企业不负责任投资所引发的批评。

去年8月，国务院针对负责任海外投资出台了新的《指导意见》。其中，酒店和房地产项目被列为“限制开展”的境外投资领域。

国家发改委还在另一项声明中提出要大力抑制其认为是“非理性”的投资。

在发布新的《指导意见》的同时，国务院还在推进“一带一路”倡议框架下的相关项目。近期在智利圣地亚哥举行的中国-拉美和加勒比国家共同体论坛部长级会议上，拉美和加勒比国家都被邀请加入这一倡议。

但在加勒比地区，投资方和承包商之间的争议已经打乱了一些旗舰项目的进度，如造价35亿美元的巴哈玛度假村项目。在牙买加的山羊岛上，由于民众担心会影响海洋生态，中国港湾工程有限公司在当地的深水港口被迫搁置。

这些都增加了该区域民众的担忧。他们既担心沿岸开发项目对岛屿气候适应性造成影响，另一方面也对中国投资工程的环境影响倍加关注。

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。

玛丽安·爱斯嘉福丽特，中国问题分析员，常驻美国华盛顿

Chinese tourism investments flow into Antigua and Barbuda despite risks

Development pressures are threatening mangroves that help protect the islands from storms

□ Robert Soutar Maryan Escarfullett

Mangroves protect coral reef fish nurseries and provide a home for migratory birds

Hurricane Irma's near total destruction of Barbuda – one of two Caribbean islands comprising the state of Antigua and Barbuda – has not deterred Chinese investors from pressing ahead with construction projects on the larger island of Antigua, which residents say have already weakened its resilience to natural disasters.

Antigua escaped largely unscathed following the most powerful Atlantic storm in over a decade, which ripped through Caribbean islands at speeds of over 185 miles per hour in September last year, leaving 134 dead and around 95% of homes on Barbuda destroyed.

Despite the importance of mangrove ecosystems

to protecting the islands from natural disasters, Yida International Group has been allowed to move ahead with a controversial tourist and casino complex situated on Guiana Island, part of the North East Marine Management Area (NEMMA). This notionally protected stretch of coastline is home to fragile mangrove ecosystems. Under Antigua's 2006 Fisheries Act, the Fisheries Division can only grant permission to "prune" a mangrove when this is of benefit to the environment.

Yet images from the ground clearly show that new beaches created as part of Yida's resort have resulted in the removal of mangroves. Prime Minister Gaston Browne, said the government will override environmental laws to expedite the development, with the initial construction of two hotels, the Antigua Observer reported.

"This is an environmentally sensitive area, protected by various legislation and characterised by large areas of coral reef, seagrass beds, sandy shoals, untouched islets and an extremely productive marine habitat," said Foster Derrick, an environmental activist who set up the Save the Guiana Island Environment Facebook page.

Derrick added that it is extremely difficult for the governments of small island states to opt for the minimal jobs created by maintaining naturally productive environments over the various construction and management jobs in tourism-related operations.

The Antigua and Barbuda Department of the Environment (DoE) said that comprehensive coastal environmental impact and engineering studies were needed. Yet it has stopped short of calling for Yida to produce a new environmental impact assessment (EIA) to replace the existing one, which highlights major problems.

"The creation of beaches is neither sustainable nor practical and will prove to be very costly," it said in its review of the EIA.

Vital mangroves

Mangroves are critical in protecting coral reef fish nurseries and providing a home for migratory birds, according to Fiona Wilmot, a biologist and Caribbean expert at the Mangrove Action Project. Before Irma, they covered around 2,161 acres of land, or 3%, in Antigua and 14,468 acres of Barbuda, equivalent to 35%, according to most recent available data (2010).

"Images from the ground clearly show that new beaches created as part of Yida's resort have resulted in the removal of mangroves."

They were once part of a thriving intertidal ecology.

Mangroves defend against flooding during tidal changes by sinking roots into sandy coastlines. They also establish a natural barrier that blocks harsh winds during hurricane season. Removing mangroves threatens human safety because land is more vulnerable to erosion, leaving nearby populations less protected from storms.

According to a report by the University of Cambridge and conservation group The Nature Conservancy, mangroves can reduce the wave height of tsunamis by 5-30%, and play an important role in mitigating climate change by capturing carbon dioxide and defending against rising sea levels.

Wilmot recommends that mangroves in Antigua and Barbuda, which may have been uprooted by Irma, be restored by hand and that the government earmark disaster relief funds for preserving natural species.

Rebuilding

In the wake of Irma's devastation, the Chinese government provided Antigua and Barbuda with a US$16 million aid package. The aid followed the signing of an economic and technological cooperation agreement between the two countries. However, it is unclear where the majority of funds will be spent. Only about US$1.2 million will go towards disaster relief and the construction of new community centres.

Arica Hill, from the Antigua and Barbuda DoE, informed

Diálogo Chino via email: "There are several areas that are being prioritised in response to the imperative of heightened natural disasters."

These include better assessing the impacts on conservation hotspots such as Barbuda's Codrington Lagoon national park, breeched in three areas by Irma, and building resilience against the impacts of tropical storms and droughts, Hill added.

Yet with almost all homes and public buildings in Barbuda destroyed by Irma, there are fears the government will use the need for rebuilding as an excuse to sell land to foreign investors that want to construct tourist resorts and override environmental laws as it has on Antigua.

"The Yida project enhances the already negative precedent of ignoring the Environment department's advice and this appears to be being followed in the rebuilding of Barbuda," said Derrick.

Nor has it been clarified to what extent efforts to rebuild Barbuda will include planting or re-planting mangrove forests that can protect it from extreme weather events and coastal flooding.

Among others, China, Canada, Japan, Venezuela, India and the EU have contributed funds towards re-building Barbuda, Prime Minister Browne said on announcing the treasury's 2018 budget.

The Chinese government disbursed a further US$2 million grant through the UNDP-China Aid Post Disaster Restoration Initiative administered to replace roofs on hurricane-affected buildings in Barbuda.

Wang Xianmin, China's ambassador to Antigua & Barbuda said of the US$2 million roofing programme: "The Government of China is delighted to support rebuilding this paradise".

But with Browne estimating the cost of re-building Barbuda at US$600 million – equivalent to 95% of tax revenue collected by the government last year – aid donations on their own will likely leave a significant shortfall.

Browne said climate resilience would be a main consideration in new construction projects:

"We are on our way to rebuild Barbuda in a way that will make each of its residents more secure, more resilient, and more endowed, to overcome any future challenges that climate change might bring."

However, since the storm and despite his efforts, Browne's government has come under fire for its inadequate response to the crisis.

A recent report by Ground Truth Solutions, an organisation that works in the humanitarian sector, revealed 29% of Barbudans, the largest percentage of those surveyed, felt their needs were "not at all" being met. Similarly, over a third of respondents, again the largest fraction, said aid was not going to those who needed it most.

Tourism drive

The Antigua and Barbuda government is touting both islands as promising sites for foreign investment in the tourism sector, which it regards as the islands' best bet for economic development.

Browne listed first among his government's priorities the, "building a strong tourism industry to anchor our economy," on announcing the country's 2018 budget last month. He said the island stood to benefit from "significant investment" in tourism.

The prime minister also invited China Civil Engineering and Construction Company (CCECC) to participate in the development of tourism infrastructure in Barbuda in a recent meeting with Chinese diplomats, according to local news reports.

The Antigua and Barbuda government has already awarded a US$90 million contract to CCECC to construct a cargo port and cruise ship harbour in the capital St. John's. The state-owned Export Import Bank of China (China EXIM Bank) is financing the development.

However, Derrick warned against the government "biting off more than it can chew" in promising large tourism-related contracts:

"Projects that are as large as the Yida project and the Dato Tan project of earlier years in the same area, are far too large for countries such as Antigua and Barbuda to properly and effectively manage in all areas from construction to constant monitoring and mitigating of everyday activities," he said.

Hill said Antigua and Barbuda's 2003 Physical Planning Act allows any concerned party to appeal decisions made on development projects.

A Yida employee contacted by *Diálogo Chino* who did not wish to be identified, describing himself only as a "worker", declined to give a comment but played down the environmental impacts of the project, suggesting it complied with government regulations.

Barbuda was left barely habitable following Hurricane Irma, which destroyed 95% of its buildings

New Chinese rules

With limited international support for the rebuilding effort, the Antigua and Barbuda government has welcomed Chinese investment in the tourism sector and wider economy.

While the government is ultimately responsible for ensuring the islands' environmental laws are upheld, China is also taking steps to address criticisms that its companies are investing irresponsibly.

In August, the State Council – China's chief administrative authority – set out new guidelines on responsible overseas investment, identifying hotels and real estate as an area in which activity should be "restricted".

In a separate announcement, China's top economic planning agency the National Development and Reform Commission strongly discouraged investments it deemed "irrational".

On releasing the new guidelines, the State Council also promoted projects under the framework of the Belt and Road initiative (BRI), a project that Latin American and Caribbean states were invited to participate in at the recent CELAC-China ministerial meeting in Santiago, Chile.

However, in the Caribbean, disputes between investors and contractors have derailed flagship projects such as the Bahamas' mammoth US$3.5 billion Baha Mar tourist resort. And a deep-water port on Jamaica's Goat Island backed by China Harbour Engineering Group was shelved over fears about its impacts on marine life.

This has further added to regional concerns over the environmental impacts of Chinese investments and the effect of coastal developments on climate resilience.

This article is republished from Diálogo Chino.

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中资北极天然气厂需避免生态风险

北极脆弱珍贵的生态环境不容有失，中国分享北极资源时也必须谨慎。

□ 珍妮 · 约翰逊

随着北极变暖，用于石油和天然气开采的道路、铁路和管道正在兴建

亚马尔半岛是从西伯利亚延伸进入北冰洋的一块广袤的冻土带，那里有着俄罗斯最大的天然气储量，占全球已知天然气储量的 20%。

这片荒凉的土地是世界上现存最大的游牧驯鹿民族涅涅茨人的家园，这座 700 公里长的半岛周围的水域则支撑着在国际上拥有重要地位的俄罗斯渔业。

这个偏远的地方正处在大国政治和人类生存问题的交汇点上。亚马尔半岛是一个脆弱的生态系统，那里有着大量尚未开发的化石燃料储备，而随着人为造成的气候变暖，这些储备正在变成可采资源。大国间的利益竞争推动着这一地区的发展，这不仅威胁着涅涅茨人的传统生活方式，还可能加剧气候变化的影响。

战略愿景

对亚马尔半岛感兴趣的国家之一便是中国。中国的国有企业已经投资了亚马尔的一个集开采、液化、出口为一体的液化天然气项目。据项目控股方俄罗斯天然气生产商诺瓦泰克称，该项目的年产量约为 1650 万吨。

亚马尔液化天然气厂于2017年12月正式投入生产，第一批液化天然气货物在现货市场出售后，沿北海航线送往美国波士顿。采购合同的细节尚未披露，但根据诺瓦泰克称，该厂生产的液化天然气中96%都签订了20到25年的协议，其中大部份都将出口至中国和日本。

俄罗斯吞并克里米亚、介入乌克兰事件后遭到了欧美制裁。而亚马尔液化天然气厂项目之所以能够如期完工很大程度上要归功于中国投资者的注资。

中国石油天然气集团公司和中国丝路基金拥有亚马尔液化天然气项目近30%的股份。这对中国来说是一项很实用的投资。随着中国政府不断推动供暖的“煤改气”和“油改气”，希望借此来减少空气污染，中国国内的天然气需求正在增长。

据美国能源信息管理局（EIA）预测，2040年，中国每天将燃烧近600亿立方英尺的天然气，较2015年的每天200亿立方英尺有大幅上涨。尽管中国拥有包括世界上最大的可采页岩气储备在内的丰富的天然气储量，但其液化天然气的进口需求可能将与目前世界上最大的天然气进口国日本相当。

中国与北极航道

亚马尔液化天然气项目首批货物出口恰逢中国国务院信息中心1月26日发布了首份《北极政策白皮书》。

除了在该地区的其他利益，中国在“北极政策白皮书”中还强调了航运和捕鱼的权利。

“全球变暖使北极航道有望成为国际贸易的重要运输干线，”白皮书中写道，并提出中国希望与各方合作，通过发展北极航道来建立一条“极地丝绸之路”，这一说法将北极和中国建立全球基础设施和运输网络的“一带一路”愿景联系到了一起。

圆圈位置为亚马尔LNG项目所在地俄罗斯的亚马尔半岛

与此同时，俄罗斯正在制定一项航运政策，企图禁止非俄罗斯船只沿其北方航道运输化石燃料。该航线穿过俄罗斯长达200海里的专属经济区。这一禁令将有利于俄罗斯航运商。

随着海水温度上升，鱼类种群向北移动，海冰消退，中国希望确保本国的捕鱼船队能够进入北极公海。

“中国支持就北冰洋公海渔业管理制定有法律拘束力的国际协定，”白皮书中说。

中国正通过参与多地区的事务来确立自身地位，以确保此类协议反映出其作为“近北极国家”的利益，而不只是俄罗斯、美国、挪威、芬兰、瑞典、丹麦、加拿大和冰岛的利益。

北极通航的潜在问题

由于北方航线上海冰减少，这条航线的通航性大增，航运对北极脆弱环境的影响已经成为许多研究和决策讨论的主题。

国际海事组织于2017年发布了《极地规则》，限制北极水域的石油、污水和垃圾的排放，同时对极地船舶的设计、建造和设备做出要求。以重油为燃料的船只产生的黑碳排放也令人担忧，原因在于这些污染物会落在冰上，加速其融化。

专门为亚马尔项目制造的特殊货船以液化天然气为燃料，不会排放黑碳，造成的碳排放也更小。北极航运面临最大的风险或许来自海冰流动和风暴造成的恶劣危险的环境。鉴于人类在偏远地区清理石油泄漏的能力极其有限，加之石油在低温

中分解的时间更长，因此，泄露可能会产生长期影响。相关国家已经签署协议，同意在灾难发生时提供搜索、救援和清理援助。

2017 年 12 月，国际社会在海洋保护方面取得突破性进展，包括中国和欧盟在内的九大主要捕鱼国签署了一项禁止在亚马尔半岛北面的北冰洋中部进行商业捕鱼的禁令，禁捕期为 16 年。目前这片海域还没有开展商业捕鱼。这项禁令将在保护鱼类种群的同时研究这片人类尚不了解的生态系统。

鱼类繁育地被破坏

然而，亚马尔液化天然气项目相关的开发和航运活动已经威胁到了半岛渔业的未来。

亚马尔项目的天然气输出港口是位于半岛东边的萨贝塔港。为了使往来的船只能够进出，港口挖了一条约 300 米宽、15 米深的航道。

根据俄罗斯联邦海运和内河运输局的数据，2014 至 2017 年间，为了在鄂毕湾的浅水海域中挖掘这样一条航道，共动用 23 艘挖泥船从这里的海底挖走了 7000 万吨泥沙。

环境影响评估显示，航道挖掘改变了鄂毕湾。作为鄂毕河的入海口，鄂毕湾是北极地区最活跃的鱼类繁育地，在全球范围内有着独特而重要地位。

鄂毕湾“对一些珍贵鱼种而言，是世界上最重要的地方。”2013 年萨贝塔港口项目动工时，有专家在俄罗斯刊物《渔业》上警告说。

他们推荐了另一个地点，在那里建港对鲟鱼、穆松白鲑、胡瓜鱼等在那里育种的白鲑鱼属的鱼类伤害更小，但没有被采纳。

海湾水质面临变化

俄罗斯联邦海运和内河运输局 1 月 6 日表示正在采取“措施消除对水生生物资源及其生境的不利影响，”包括重新向该地区投放幼鱼。

绿色和平俄罗斯能源项目主任弗拉基米尔 · 丘普洛夫表示，目前最令人担忧的是新航道的挖掘可能会导致盐水进一步入侵海湾。

“那里如果成为一个盐水更多的新生态系统，就可能会改变这里鱼类物种的多样性。”丘普洛夫说。

基础设施建设抢夺了本属于麋鹿的土地

主要鱼种面临风险

对亚马尔当地的涅涅茨人而言，最令人担心的是这个项目会对营养丰富的穆森白鲑造成影响。丘普洛夫指出，穆森白鲑渔业正在崩溃，而过度捕捞被怀疑是造成其崩溃的主要原因。

联合国工商业与人权工作组成员、原住民发展基金 Batani 委员会主席帕维尔 · 苏尔彦德西加称，亚马尔半岛 2014 年颁布了针对穆森白鲑的禁捕令。

尽管如此，穆森白鲑的数量依旧没能恢复。到底是什么原因导致的，是萨贝塔港口的建设，采矿和基础设施开发造成的持续污染，还是非法捕捞等其他原因，目前还不清楚。为了应对这一情况，渔民已经开始捕捞其他鱼种。

半岛上的工业开发也给涅涅茨人带来了严重的威胁。

亚马尔 - 涅涅茨自治区的政治领袖致力于代表涅涅茨人的利益。苏尔彦德西加本人和家庭因其发起原住民权利运动而遭到威胁，目前正在美国寻求政治庇护。

涅涅茨人是优秀的游牧驯鹿民族。他们的组织性很强，在其祖先土地上开挖的开采项目也给予了他们经济补偿。然而，基础设施项目仍在争夺牧民用于饲养驯鹿的土地。“有驯鹿没牧场，这当然是个大问题。”他说。

冻土融化

由于气候变化导致冻土融化，北极地区温度的上升和海冰的减少都打破了有史以来的记录。在绿意盎然的北极，为石油和天然气开采配套的道路、铁路和管道正在建设之中。

气候变化对游牧民族构成了威胁，因为他们主要在冰面和雪地上活动。

北极海底和陆地上的冻土融化被认为是一个影响全球的临界点，可能会造成大量甲烷迅速释放，这种强大的温室气体能在短时间内导致全球平均气温上升。

冻土融化还有可能释放长期掩埋在地下的毒素，使人类有可能感染上新的病原体，或者像外界对炭疽病毒爆发的揣测一样，使前苏联埋在地下的有毒废料和化学弹药重见天日。

“未来基础设施的扩张……加上气候造成当地地貌和冻土的改变，给当地社区带来了前所未有的挑战。”美国宇航局资助的一项为期 4 年的重大研究项目总结道，该项目研究了亚马尔基础设施对岛上社会生态系统的影响。

“未来几十年拟建的化石燃料开发项目的规模将彻底压垮当地社区适应气候变化的能力。”这项 2017 年完成的研究显示。

亚马尔液化天然气项目控股方诺瓦泰克已经在和中国投资者讨论北极液化天然气 2 号项目的前景，双方在 2017 年签署了初步的谅解备忘录。这个雄心勃勃的项目计划在鄂毕湾的海上平台上建设天然气设施和存储设备。

“北极液化天然气 2 号”项目的初步环境评估已经得到了亚马尔半岛政府和亚马尔原住民协会代表的批准，规划建设的海上设施将“更便宜，且不会给环境造成很大的负担。”亚马尔 - 涅涅茨自治区区长德米特里 · 柯比尔金 2017 年 6 月在圣彼得堡国际经济论坛上发言时说。

北极地区的化石燃料因为人为气候变化的灾难性影响而变成可采资源，而这一地区化石燃料的工业化开采又将加剧气候变化。这一悖论将给这一地区带来深刻的影响。外界对这一地区未来航运规模的估测差别很大，但海洋保护协会最近的一项研究表明，与 1998 年的 150 万吨相比，2030 年的货物流量可能达到每年 1 亿吨，

为全球迁徙物种提供重要的保护区和觅食地的冰层正在以惊人的速度消退。在俄罗斯北极地区，这意味着只要必要的资金能够到位，最大限度地开发陆上和海上资源及建设配套基础设施都不在话下。这种情况之下，北极地区的开发，尤其是俄罗斯北极地区的开发，中国扮演的角色将至关重要。

珍妮 · 约翰逊，曾经常驻俄罗斯5年，最近迁到美国缅因州

Arctic gas plant threatens native peoples

Yamal gas plant embodies China's vision for the region but threatens a delicate ecosystem

□ Jenny Johnson

The Yamal Peninsula is a vast expanse of tundra jutting into the Arctic Ocean in Siberia, and Russia's biggest natural gas reserve, holding 20% of the planet's known natural gas.

The brutal, harsh landscape is home to the world's largest remaining group of nomadic reindeer herders, the Nenets, while the waters around the 700-kilometre-long peninsular support a globally important fishery.

This remote place finds itself at the intersection of great power politics and issues of human survival. The peninsula is a fragile ecosystem that holds one of the last great reserves of hydrocarbons, reserves that are being made accessible by anthropogenic climate change. Development of the region, which is being driven by the competing interests of world powers, threatens the traditional way of life of the Nenets and could exacerbate the impacts of climate change.

Strategic vision

One of those powers is China, whose state enterprises have invested in Yamal LNG, a natural gas extraction, liquefaction and export project. Yamal LNG's output capacity is around 16.5 million tonnes per year, according to Novatek, the project's majority owner.

It was officially opened in December 2017, sending its first cargo of liquefied natural gas (LNG) along the Northern Sea Route to Boston in the United States, after being sold on the spot market. Details of purchase contracts have not been disclosed, but 96% of the LNG produced by the plant has been contracted under 20-25-year agreements, with most of the gas going to China and Japan, according to Novatek.

Yamal LNG met the developers' tight deadlines in large part because Chinese investors stepped in with funding after the US and Europe imposed sanctions on Russia for its annexation of Crimea and involvement in the Ukraine.

China National Petroleum Corporation and China's Silk Road Fund own nearly 30% of the Yamal LNG project. This is a practical investment for China, where demand for natural gas is rising as the government looks to reduce air pollution by switching coal and oil heating to natural gas.

The US Energy Information Administration (EIA) predicts China will burn nearly 60 billion cubic feet of gas per day in 2040, up from nearly 20 billion cubic feet in 2015. Although it has ample reserves of its own, including the world's largest reserves of recoverable shale gas, China's demand for LNG imports is likely to rival Japan's, currently the world's biggest importer of gas.

Arctic access

Yamal LNG shipped its first exports around the time China's State Council Information Office published the country's first Arctic Policy white paper on January 26.

China's Arctic Policy stresses shipping and fishing rights among its interests in the region.

"As a result of global warming, the Arctic shipping routes are likely to become important transport routes for international trade," the policy document said, adding that China hopes to work with all parties to build a 'Polar Silk Road' by developing Arctic shipping routes, a phrase that ties the Arctic into China's expansive Belt and Road vision of a global infrastructure and transport network.

Meanwhile, Russia is formulating a shipping policy that excludes non-Russian ships from transporting hydrocarbons along the Northern Sea Route. This route passes through the country's exclusive economic zone of 200 nautical miles. The ban would be a boon to Russian shippers.

With fish stocks moving northward as seawater temperatures rise, China's government wants to ensure its fishing fleets have access to the Arctic's high seas as sea ice retreats.

"China supports efforts to formulate a legally binding international agreement on the management of fisheries in the high seas portion of the Arctic Ocean," the Arctic policy document said.

China is positioning itself, through its many regional involvements, to ensure that any such agreement reflects its interests as a "near Arctic state" and not just those of Russia, the US, Norway, Finland, Sweden, Denmark, Canada and Iceland.

Development dangers

The impacts of shipping in the Arctic's fragile environment have been the subject of much study and policymaking as the Northern Sea Route looses sea ice and becomes more accessible.

The International Maritime Organization issued a Polar Code in 2017 that restricts oil, sewage and garbage discharges in Arctic waters. It also set out requirements for the design, construction and equipment used by polar ships. Black carbon emissions from vessels burning heavy fuel oil are also of concern, because the pollutant settles on ice and snow and increases the rate of melting.

The special cargo ships built to service the Yamal project burn LNG as a fuel. They don't emit black carbon and produce less emissions. Perhaps the biggest risk of Arctic shipping is from accidents in the harsh and dangerous environment of moving ice flows and major storms. The capacity to clean up an oil spill in the remote region is extremely limited and would likely have long term impacts, as oil takes much longer to break down in the cold. Arctic countries have signed an agreement to provide search, rescue and clean up assistance in the event of a disaster.

In a breakthrough for marine conservation in December 2017, nine major fishing nations, including China and the EU, signed up to a 16-year ban on commercial fishing in the Central Arctic Ocean, north of the Yamal peninsula. This area is not yet commercially fished. The ban will preserve fish stocks while studies are made of this barely-understood ecosystem.

Fish nursery dredged

However, the development and shipping activity associated with Yamal LNG are already threatening the future of the peninsula's fishing industry.

The Yamal gas export terminal is at Port Sabetta on the eastern edge of the Yamal peninsula. Ships servicing the port require a channel that's around 300 metres wide and 15

metres deep, which was dredged to provide access.

To achieve this in the shallow waters of the Gulf of Ob, 23 dredger vessels removed 70 million tonnes of seabed between 2014 and 2017, according to the Russian Federal Agency for Maritime and River Transport.

Dredging the channel has changed the gulf, a unique estuary with global significance as the most productive fish nursery in the Arctic territory, according to environmental impact assessments.

The Gulf of Ob "is the most important place in the world for a number of valuable fish species," warned experts in the Russian publication Fisheries in 2013, as the Port Sabetta project got underway.

They recommended an alternative site where the port would do less harm to sturgeon, muksun, smelt and many other white fish species that breed there, but did not prevail.

Salination

The Russian Federal Agency for Maritime and River Transport said on January 6 that it is now undertaking "measures to eliminate the negative impact on the state of aquatic biological resources and their habitat," including reintroducing juvenile fish into the area.

But the greatest concern at the moment is the potential for salt water to intrude deeper into the gulf as a consequence of the new channel, according to Vladimir Chuprov, director of the Energy Program at Greenpeace Russia.

"If it becomes a new ecosystem with more saltwater, it will possibly lead to changes in the biodiversity of fish species," Chuprov said.

Staple foods at risk

For the Nenets, Yamal's native people, the project's impact on the nutritious, salmon-like muksun is a major concern. Chuprov noted the muksun fishery is currently experiencing a collapse, although overfishing is suspected as the main cause.

Fishing for muksun was banned in Yamal in 2014, according to Pavel Sulyandziga, member of the United Nations Working Group on Business and Human Rights and chairman of the Board of Batani, a development fund for indigenous peoples.

Despite the ban, muksun numbers have failed to recover. It is still unclear whether this is because of the construction of Port Sabetta, persistent pollution caused by mining and infrastructure development, or other causes, such as illegal harvesting. In response, fishermen have begun targeting other species.

Industrial development on land also presents serious threats to Yamal's Nenets.

The political leadership in the Yamal-Nenets Autonomous Region is committed to representing the interests of the Nenets people. Sulyandziga is now seeking political asylum in the US following threats against him and his family due

Ships servicing Port Sabetta require a channel that's around 300 metres wide and 15 metres deep

to his indigenous rights campaigning.

The Nenets are successful nomadic reindeer herders. They are well organised, and benefit from economic compensation from the extractive projects in their ancient land. However, the infrastructure projects still compete for land that herders need to raise reindeer. "Naturally it is a big problem if there are reindeer but no pasture," he said.

"The sheer scale of the proposed hydrocarbon developments in the next few decades could overwhelm the ability of the local communities to adapt."

Permafrost melting

Roads, railways and pipelines for oil and gas extraction are being built in an already-greening Arctic, as climate change melts permafrost, creating warmer temperatures and less ice than has ever been recorded.

Climate change presents a threat to nomadic people, who depend on frozen ground, snow and ice to move.

The melting of permafrost, both on the seafloor and on land, in the Arctic is identified as a global tipping point, because it could lead to the rapid release of massive amounts of methane, a potent greenhouse gas, potentially increasing the global average temperature in a short period.

Thawing permafrost also has the potential to release long buried toxins, exposing humans to new pathogens, or uncovering toxic waste and chemical munitions buried during the former Soviet Union, as is suspected to have been the case with the anthrax outbreak.

"Future expansion of infrastructure . . . combined with climate-induced changes to local landscapes and permafrost present unprecedented challenges to local communities," concluded a major four-year study of the consequences to social-ecological systems of infrastructure on Yamal, funded by NASA.

"The sheer scale of the proposed hydrocarbon developments in the next few decades could overwhelm the ability of the local communities to adapt to changing conditions," the 2017 study said.

Already, Novatek, the majority owner of Yamal LNG, is discussing the prospect of Arctic LNG 2 with Chinese investors, who signed an initial memorandum of understanding in 2017. The ambitious project envisions construction of a gas plant and storage units on floating platforms in the Gulf of Ob.

The initial environmental assessment for Arctic LNG 2 has been approved by the Yamal government and representatives of the Yamal Association of Indigenous Peoples. The type of floating construction envisioned "is cheaper, and there will not be a very big burden on the environment," said Yamal governor Dmitry Kobylkin, speaking at the St Petersburg International Economic Forum in June 2017.

The paradox of the industrialisation of the Arctic to extract hydrocarbons, which have been made accessible due to the disastrous effects of human-caused climate change, will profoundly reshape the region. Estimates vary widely on projecting future shipping volumes, but one recent study by the Ocean Conservancy says cargo flow could approach 100 million tonnes per year by 2030, up from 1.5 million tonnes in 1998.

The ice that provides a globally important sanctuary and feeding ground for migratory species continues to recede at a shocking pace. In the Russian Arctic, this will mean exploitation of resources on and off shore to the greatest extent possible, with the accompanying infrastructure to support it, as long as the requisite financing is available. In this way, China will play a pivotal role in advancing the exploitation of the Arctic, particularly in Russia.

Jenny Johnson is a journalist who spent 5 years in Russia and recently relocated to Maine

比特币：热闹背后的能源足迹

呼风唤雨的比特币背后是默默无闻的发电厂，被寄予厚望的区块链技术有着怎样的环境影响？

□ 简·麦克贾克

现在获得一个比特币所需的电力几乎相当于一户普通美国家庭两年的用电

2017年12月加密货币市场因投机而疯狂暴涨的时候，每个比特币的价值飙升了2000%，其碳足迹也呈指数增长。据分析人士计算，现在获得一个比特币所需的电力几乎相当于一户普通美国家庭两年的用电。气象学家埃里克·霍尔塔乌斯强调，这是一条不可持续的增长轨迹：他断言到2020年2月，仅比特币网络的用电就“将相当于目前全球的用电量”。

区块链技术是比特币等加密货币网络所不可或缺的，而搭载这项技术的电脑运行时需要大量电力。区块链技术只是一个出现还不到十年的试验性概念，并没有实在的内在价值，而全球却为其投入如此多的电力消耗。对此，环保人士感到震惊。

耗电最大的是比特币的专用集成电路，即所谓的ASICs，能够以最高速度解决复杂的算法。这种特殊的

电路在世界各地的大型仓库中飞速运转，从明尼苏达到蒙古，它们嗡嗡作响，不断地计算并为交易网络提供电力。因为发展中国家的电力常常来自政府补贴的煤电，而不是通过可再生资源发电获取，所以污染日益严重。

“潜在的盈利往往比环保人士的警告更有号召力，而且削减加密货币系统的财务和环境成本方面的创新已经在进行中。美国主要技术公司英特尔的目标是将比特币挖矿的能源需求减少约35%。”

比特币挖矿成“电老虎”

一些经济学家认为，比特币挖矿（目前运用最广泛的区块链技术）目前已经占全球电力消耗的 0.13%。电力支出占全球各地加密货币挖矿人总支出的近 80%。去年冬天比特币市场暴涨带来的一个意想不到的结果可能是可再生能源投资的增加。

“事实上中国很多挖矿人使用的都是四川省廉价而充足的水电。”加密货币企业家马克 · 贝文德三月份的时候告诉记者。

需要正确看待这些数据。“自然资源防御委员会”对北加利福尼亚州的一项研究显示，目前 25% 的家庭能源消耗浪费在闲置的电器设备上。著名经济博主查尔斯 · 休 · 史密斯解释说：

“这意味着这些处于‘关闭’、待机、或休眠模式的设备可以消耗相当于 50 个大型电厂生产的电力，每年浪费超过 190 亿美元（1200 亿元人民币）电费。”

一些新的应用程序和扩展中包含隐藏的加密货币采矿脚本，会在未经用户同意的情况下在后台运行，这也会带来隐形成本。恶意软件开发者——一些黑客不顾用户利益钻平台漏洞的行为，已经引起了科技公司和政府的关注。

“众所周知，要估计区块链的能源消耗量非常困难，或者说也不准确，既没有办法分辨特定时间内是谁在挖矿，也无法确定他们的实际设置。”软件工程师、专家弗兰德说。他主持了一些旨在加深人们对区块链技术了解的研讨会。

“例如，我现在就可以在笔记本电脑上启动一个挖掘节点，也随时可以停止。相比一个位于煤电地区专门用于（加密货币）挖矿的设备，我在加拿大水力发电地区的一台笔记本上业余挖矿的碳足迹会有很大的不同。”

“现如今从金融和法律到‘云养猫’、在线约会，区块链无处不在。”弗兰德指出。

区块链技术其实就是创建了一张无法修改的公共电子表格。由于区块链技术的分散性和匿名性，跨国界监管十分困难。

“区块链技术让遍布全球的一群并不认识彼此、也不互相信任的人就一个系统的全局状态达成一致。”弗兰德解释说，“通常情况下他们会就分类账的全局状态达成一致，即谁拥有什么加密令牌，而第二代区块链会更加复杂。”

解决办法

潜在的盈利往往比环保人士的警告更有号召力，而且削减加密货币系统的财务和环境成本方面的创新已经在进行中。美国主要技术公司英特尔的目标是将比特币挖矿的能源需求减少约 35%。该公司近来为可以在较低的温度和更小的空间中运行的新一代硬件加速器申请了专利。使用过剩的电力和可再生能源，再加上性能更好的硬件，或许很快就能减少比特币的污染足迹。

算法上的重要改进预计将降低能源需求，并提高替代加密货币的成本效益。比特币使用一种工作量证明（Proof-of-Work，简称 PoW）协议，这在 2009 年其首次亮相时是最先进的算法。为了阻止黑客、防止崩溃，比特币要求任何请求服务的人解决一道复杂的数学难题，第一个完成并提交解决方案的便可获得一个加密令牌。

工作量证明旨在防止有人重复消费同一个货币，难度更高意味着需要在电脑上进行更多工作，也就会使用更多的能源。而这道手续是不断往复进行的。

另一个被看好的绿色替代算法是权益证明（Proof-of-Stake，简称 PoS），以太坊等一些比较新的货币会采用这种算法。软件工程师弗兰德称，这种权益证明算法用“基于投票的奖励对策”取代了复杂的计算链。加密

货币的挖矿人通过寻求令牌来维持系统的运转，但这种算法令他们面临风险，因为新开采的加密货币可能会因疏忽或不良行为而丢失。

虽然加密货币常常被吹捧为货币的最终替代品，但它还不能做到完美防盗。苹果公司创始人之一的史蒂夫·沃兹尼亚克曾经遇到有人通过信用卡在线购买他的比特币，随后对方又突然取消了付款，但这张信用卡是偷来的，无法追查，他因此被骗 7 个比特币——当时价值 7 万美元。沃兹尼亚克现在只持有一种他表示欣赏的代币。在他看来，这种代币政府无法操纵，"这是数学，是纯粹的，不能被改变，”他最近在印度参加全球商业峰会时说。

据报道，另一大商业巨头乔治·索罗斯在对数字资产的不稳定性提出警告后仅三个月，就选择参与交易。自他发出警告后，比特币的价值骤跌 41%，而索罗斯旗下 260 亿美元（1640 亿元）的家族基金正在计划交易加密货币。

中国技术

去年 9 月以来，英特尔一直在和中国技术巨头腾讯合作优化物联网。当消费者、企业和政府机构通过带有嵌入式传感器的设备彼此连接起来时，网络安全必须变得更加严格。基于云计算的区块链有着巨大的未开发潜力，其在记录和传递信息方面有着极大的优越性。城市社区的数据隐私、安全监控和产品安全评估将得到改善。物联网的目标是建立一个无缝运行、无需密码的智慧城市。

区块链技术其他很有前途的应用包括跟踪食品配送、以及精简国际航运所需的大量文件。目前航运业一些不必要的程序带来的成本占到了总成本的 20%，嵌入式“智能合同”可以在电子表单填写完成后实时触发付款。

地方层面上，加利福尼亚北部的伯克利正在利用区块链技术增加市政债券的销售和住房建设。“伯克利区块链倡议”将于 5 月 19 日在加利福尼亚举行的“公共财政未来”会议上启动。该倡议主要支持者之一、理事会成员本·巴特利特并没有过分担心自己这项计划的碳足迹，他们把整个复杂的债券系统转移到一个数字平台上，通过省去中间商环节来降低交易成本。

“实际上，区块链不像比特币，不会消耗特别多的能源。它就跟用谷歌一样，”巴特利特说。（不过，一位记者在谷歌上搜索得出：使用谷歌进行 100 次搜索的耗电量可以供一个 60 瓦的灯泡亮 28 分钟。平均每条检索查询的用电约为 0.0003 千瓦时。）

“我们生活在现代世界，”巴特利特继续说，“新的技术可以大大降低我们项目的成本。在联邦政策提高了住房补贴难度后，伯克利市长杰西·阿雷金和我才开始注意到这一点。这座城市里有上千名无家可归的人，我们是时候积极一点，承担更多社会责任了。这样可以把（买入债券的）价格从 5000 美元（31500 元人民币）降低至 50 美元（315 元人民币），其目的是为更多人提供机会，这是积累资产从而推动下一轮包容性经济活动的一个途径。”

“这只是一个开始，”他说。

简•麦克贾克，环境记者，关注环太平洋地区的环境及气候议题

Is blockchain energy use sustainable?

As virtual ledgers move beyond the realm of cryptocurrencies, curbing power use will be key

□ Jan McGirk

When cryptocurrency speculation skyrocketed in December 2017, increasing the value of each Bitcoin by an astonishing 2,000%, its carbon footprint also grew exponentially. Analysts calculated that obtaining a single Bitcoin now requires electrical power roughly equivalent to running an average household in the United States for two years. Meteorologist Eric Holthaus stresses that such a trajectory is unsustainable: by February 2020, he asserts, the Bitcoin network alone could "use as much electricity as the entire world does today."

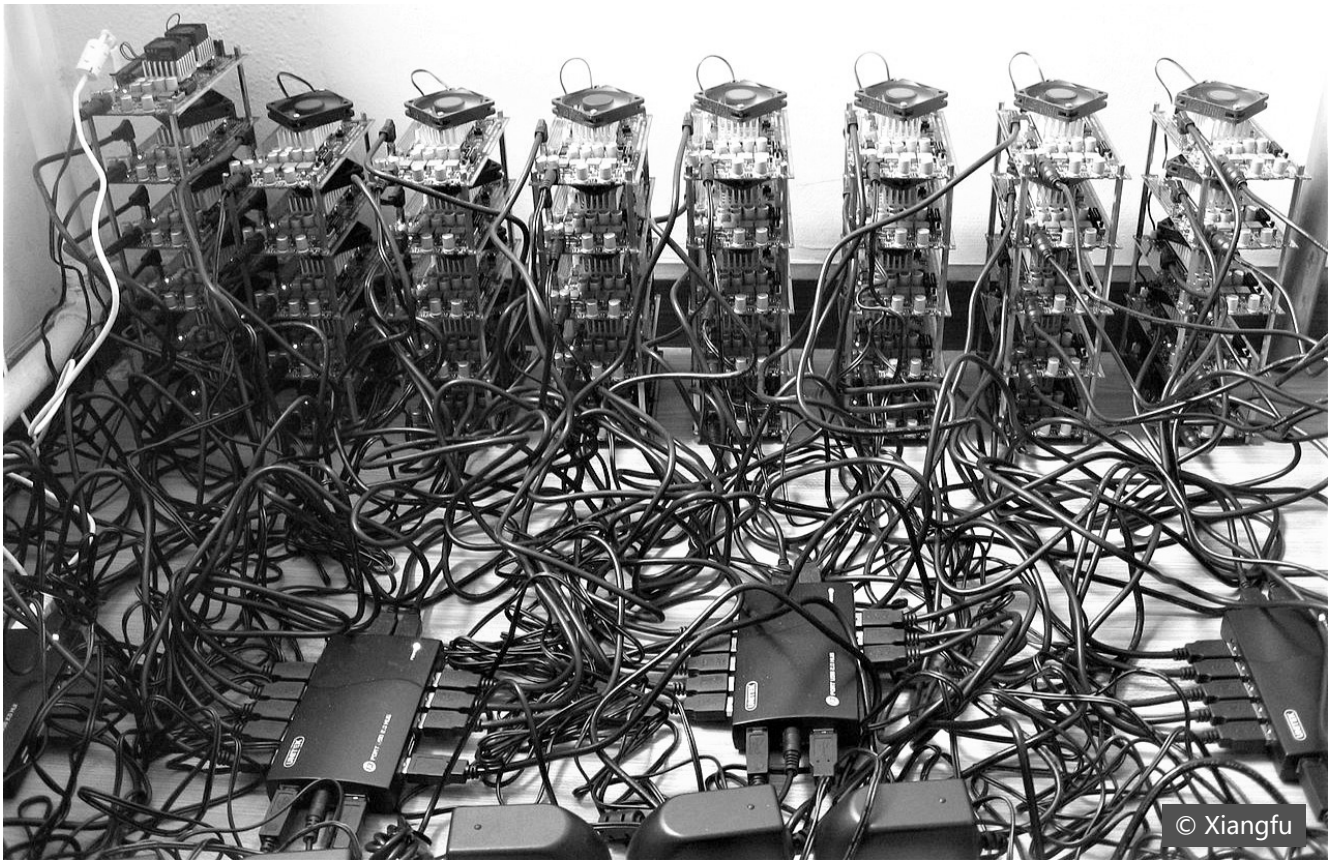
Vast amounts of electricity are needed to run computers for the blockchain technology that is integral to Bitcoin and other cryptocurrencies. Environmental activists are aghast at so much global power consumption devoted to an experimental concept, not yet a decade old, with no tangible intrinsic value.

The biggest power devourers are Bitcoin's application-specific integrated circuits, known as ASICs, designed to solve its complex algorithms at high speed. This customised circuitry whirs away inside vast warehouses, from Mongolia to Minnesota and beyond, continuously computing and powering transaction networks. Since electric power is often drawn from subsidised coal-powered grids in developing countries rather than from renewable sources, pollution is a growing concern.

> "Some economists suggest that Bitcoin mining already comprises 0.13% of global electricity consumption."

Some economists suggest that Bitcoin mining, by far the most popular use of blockchain technology, already comprises 0.13% of global electricity consumption. Nearly 80% of all expenses for the cryptocurrency miners scattered around the world go towards electricity. One unexpected outcome of last winter's Bitcoin bonanza might be an increased investment in renewables.

"Actually, a large fraction of miners in China are using hydroelectricity, plentiful and cheap in the Sichuan



A Bitcoin mining rig

province," crypto-entrepreneur Marc Bevand told reporters in March.

It is instructive to put these statistics in perspective. Currently, 25% of household energy expenditure gets wasted on idle electric devices, according to a study of northern California by the Natural Resources Defense Council. Charles Hugh Smith, a prominent economics blogger, explains:

"That means that devices that are 'off', or in standby or sleep mode, can use up to the equivalent of 50 large power plants' worth of electricity, and cost more than US$19 billion (120 billion yuan) in electricity bills every year (in the US)."

Hidden costs can also accrue from new apps and extensions that contain hidden cryptocurrency mining scripts running in the background without the user's consent. Cryptojackers, the malicious software developers who try to abuse the platform at the expense of its users, have been put on notice by tech firms and governments.

"Estimating how much energy blockchains consume is notoriously difficult or inaccurate. There's no way to accurately tell who is mining at any given time, or what their actual set up is like," says software engineer S Friend, an expert who also leads workshops on understanding blockchain technology.

"For example, I can start a mining node up on my laptop right now and stop it at any time. My carbon footprint, on a laptop in a hydro-powered region of Canada, is going to be very different than on specialised [cryptocurrency] mining hardware run in a coal powered area."

"Blockchain is everywhere these days, from finance and law, to kitten-collecting and dating-apps," Friend points out.

Essentially, the technology creates a public spreadsheet that cannot be revised. Regulation across international borders is difficult because it is so decentralised and anonymous.

"Blockchains allow for a group of people all over the world who don't know and do not trust each other to agree

about the global state of a system," Friend elaborates. "Typically, what they're agreeing to is the global state of the ledger. That is, who owns what crypto tokens, though there are more complex second generation blockchains."

Solutions

Potential profits usually are more motivating than warnings by green activists, and already innovations to cut the financial and environmental costs of cryptocurrency systems are underway. Intel, a major technology firm in the United States, aims to reduce the energy demands of Bitcoin mining by around 35%. It recently applied to patent a new generation hardware accelerator that runs at a lower temperature and requires less space. Using surplus electricity and renewable energy, along with improved hardware may soon reduce Bitcoin's dirty footprint.

Critical changes to the algorithms are expected to lower energy demands and make alternative cryptocurrencies much more cost-effective. Bitcoin uses a Proof-of-Work (PoW) protocol that was state-of-the-art ten years before the cryptocurrency debuted in 2009. To deter hackers and avert crashes, Bitcoin obliges anyone requesting service to solve a complex mathematical puzzle. The first to finish and submit the solution gets rewarded with a crypto-token.

Ben Bartlett, a proponent of the Berkeley Blockchain Initiative

PoW is designed to prevent anyone from spending the same coin twice. Higher difficulty means more work on the part of the computers and consequently more energy use. This will fluctuate constantly.

A promising green alternative is Proof-of-Stake (PoS), which is being adopted by some newer currencies, such as Ethereum. According to S Friend, the software engineer, this PoS method replaces the complex chain of computations with "a vote-based incentive game." Cryptocurrency miners, who maintain the network through their quest for tokens, now have something at stake because their newly mined crypto-coins can be lost through negligence or bad behaviour.

Although cryptocurrency often gets touted as an eventual replacement for money, it is not yet theft-proof. Steve Wozniak, the co-founder of Apple, was conned out of seven Bitcoins — worth $70,000 at the time — when an online purchase with a stolen credit card was cancelled abruptly and couldn't be traced. Wozniak now owns just one token of a currency he has praised because governments cannot manipulate it. "It is mathematical, it is pure, it can't be altered," he recently told a global business summit in India.

Another business magnate, George Soros, reportedly has opted to trade digital assets just three months after cautioning against their volatility. Since then Bitcoin's value plummeted by 41%, and his US$26 billion (164 billion yuan) family office is looking at trading crypto coins.

Chinese technology

Since last September, Intel has been collaborating with Tencent, the Chinese technology giant, on optimising the Internet of Things (IoT). When consumers, businesses, and government agencies are linked through devices with embedded sensors, cybersecurity must become even more stringent. Cloud-based blockchains have enormous untapped potential; for recording and transferring data, they are supreme. Urban communities stand to gain enhanced data privacy, security monitoring and product safety evaluation. The goal is a smart city that can run seamlessly, with no need for passwords.

Other promising uses of blockchain range from tracking food distribution to streamlining the enormous amounts of documentation required for international shipping. Red tape now accounts for 20% of its cost and embedded "smart contracts" could trigger payments in real-time once the forms are digitally filled out.

On a more local scale, a city in northern California known for liberal politics is turning to blockchain to increase its municipal bond sales and build housing. The Berkeley Blockchain Initiative will be launched at a California conference on the Future of Public Finance on May 19th. Council member Ben Bartlett, one of its main proponents, is not overly worried about the carbon footprint of his plan to transfer the whole complex system of bonds to a digital platform and reduce transaction costs by eliminating middlemen.

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"Actually, unlike Bitcoin, blockchain is not an especially heavy user of energy. It's just like using Google," Bartlett says. [Of course, a reporter Googled that: 100 searches are equivalent to a 60-watt light bulb burning for 28 minutes. It takes about 0.0003 kWh of energy to answer the average search query.]

"Life does take place in the modern world," Bartlett continues, "and new technology can greatly reduce the costs of targeting for our project. It wasn't until federal policy made it harder to fund housing that the Mayor of Berkeley, Jesse Arreguín, and I looked into this. There are a thousand homeless in our city. It's about time we get positive and more socially responsible. This can lower the price [of buying a bond] from US$5,000 (31,500 yuan) to US$50 (315 yuan). It's meant to open the door to many more people and a way to build assets in order to propel the next wave of inclusive economy activity."

"It will be the first of many," he says.

Jan McGirk reports on environmental issues and climate change around the Pacific Rim

走进智利“龙虾岛”的生态文明

当过度捕捞成为海洋生物的噩梦，智利的胡安·费尔南德斯群岛却闪耀着人与海和平共处的双赢智慧。

□ 伊莎贝尔·希尔顿

朱利安·查莫罗居住在一个他认为近似于天堂的地方。也许每个人的品味不同：胡安·费尔南德斯群岛是一组火山群岛，距智利海岸600英里，仅有1000个居民。三个岛屿中，有两个分别叫作鲁滨逊·克鲁索岛和亚历山大·塞尔柯克岛。丹尼尔·笛福的小说《鲁滨逊漂流记》正是基于塞尔柯克被流落孤岛的经历。但是对朱利安·查莫罗来说，祖先们世代生活的岛屿的真正特殊之处在于，这里展现了一个环境管理的经典成功案例。

岛上居民靠捕捞一种学名为Jasus frontalis的岩龙虾为生。与分布在岛屿周围海域90%的生物一样，这种岩龙虾是胡安·费尔南德斯群岛和以北不远处的圣费利克斯岛和圣安布罗西奥岛所特有的。随着秘鲁寒流从南极而来的冰冷海水赋予了这种龙虾独特的味道。它的数量之所以丰富还要得益于一百年前老一辈岛民的远见和审慎。

朱利安·查莫罗解释说，1914年，很多工业渔船来到岛上，新建的罐头企业看中了这里丰富的龙虾资源，打算靠生产龙虾罐头大赚一笔。200多年来一直在这里进行可持续捕鱼作业的岛民们却发现，龙虾的储量和他们的维生之本在快速消亡。

“他们带走了所有的东西。”他说，“大批量地捕捞龙虾，无论大小。岛上的居民很快就意识到，这种状况不能再继续下去。”

他们制定了一系列规定，先从自己人开始执行：禁止捕捞带卵母龙虾；禁止捕捞尺寸不达标的龙虾；在为期四个月的繁殖期内禁止捕捞，并且只允许使用他们传统的木制捕捞工具。

21年后，智利政府于1935年颁布了一项法令，岛民自己制定的这些规则正式具有了法律效力。去年10月，智利政府宣布将扩大两个海洋保护区，一个在好望角附近，另一个在胡安·费尔南德斯群岛周边。今年2月，总统米歇尔·巴切莱特在其任期结束前的12天还颁布法

令，宣布建立更多的海洋保护区。这样一来，海洋保护区的总面积超过140万平方公里，占智利领海面积的42%。而四年前她上任时，这个数字仅为4%。

近期在墨西哥举行的“全球海洋峰会”上，智利与加拿大、厄瓜多尔和墨西哥等国共同宣布将进一步沿着美洲大陆的海岸线，建立一个由北极延伸到南极的海洋保护区。

里卡多·拉各斯·韦伯是瓦尔帕莱索选区的参议员。胡安·费尔南德斯岛和拉帕努伊岛（复活节岛）就位于这个选区。他在峰会中表示，要说服智利人将资源投入小岛的海洋环境保护中，并非一件易事。

“将精力、时间和政治资本投入海洋事业有时候并非易事，压力很大。”他说。

拉各斯补充说，发展中国家的政治家们需要在海洋保护与贫穷、住房、卫生和犯罪等亟待解决的社会问题之间作出政治权衡。

拉各斯称，根据国际劳工组织（ILO）第169号公约的规定，拉各斯政府必须就岛屿周围建立海洋保护区的问题征求岛上社区的意见。“我们必须询问他们是否想要建立海洋保护区；这个问题解决后，第二个需要讨论的，就是他们需要什么样的保护区？哪些年份可以捕鱼？哪种类型的捕鱼作业？”

他解释说，查莫洛岛周围的海域具有独特的生物多样性，但若不是岛上居民保护了这些物种，今天就不会存在Jasus frontalis这种龙虾了。

“1914年是不同寻常的一年。”查莫罗先生说，“当时全球的思维模式是认为海洋资源是取之不尽的，你可以随意索取。我们的祖先具有远见卓识，他们明白这是不可能的。这是他们与全球渔业的不同之处。”

朱利安·查莫罗认为这个智利海岸600英里，仅有1000个居民的火山群岛是一个近似于天堂的地方

他解释说，龙虾的分布具有区域性。

“我们的龙虾只在这个岛周围的水域中活动。他们不会到大陆或是太平洋。他们只生活在距海岸大约3000米、最大深度160米的海域内。再往下你就找不到龙虾了。我们既不用网，也不捕捞其他种类的鱼，尽管法律允许手工捕捞。我们达成共识，不会对其他渔业资源进行商业开发，因为我们靠龙虾已经可以为生。我们无需更多的钱，也不需要捕更多的鱼。如果我们的子孙后代需要，他们可以自行决定，但我们这代人不需要。”

> “我们靠龙虾已经可以为生。我们无需更多的钱，也不需要捕更多的鱼。如果我们的子孙后代需要，他们可以自行决定。”

长期注重环境保护给这个小社区留下的是富足的生活。

“我们的生活质量非常高。”他说，“我们有书，有互联网，生活得轻松惬意。我们一年中有八个月的时间捕鱼，但工作强度并不高。周一撒网，周三再来把龙虾捞上来，或许周五再来重复一遍。所以我们一年中实际工作时间只有三个月左右。我们用余下的时间享受生活，与家人一起航海，度过美好时光。”

“我们这有一种海洋文化，却没有商业的贪婪。我们这里的高中有140名学生，与大多数捕鱼社区不同，这里的多数年轻人都想成为渔民。像我这样的上一代人，会去大陆读大学，以我为例，我是一名工程

师，有博士学位。之后我回到了岛上当渔民。其他人有的是医生、老师或护士。我们的人生观和做事方式与他人不同。我们就是为了海洋而生。”

他说，这种价值观曾是太平洋地区的人们所共有的。“在全球商业市场到来之前，太平洋所有的岛屿，像帕劳和密克罗尼西亚群岛等，走的都是自给自足的可持续发展道路。我们靠这里的资源为生。但随着商业化的到来，情况变了。”

如今岛民们仍在保护着自己的生活方式以及他们赖以生存的龙虾资源。根据2006年颁布的移民法案，人们可以进入岛屿，但只能停留三个月。这项法案将胡安·费尔南德斯群岛和加拉帕戈斯群岛立为特区。

两年后，为保护其独特的生物多样性，智利议会禁止在圣胡安费尔南德斯群岛附近进行商业捕鱼作业。

“我们非常清楚，”他说，“胡安·费尔南德斯群岛是一个宝藏。我们需要像守护其他宝藏一样守护它。我们不远处有一个海军基地，智利政府要求所有的船只都配备船舶自动识别系统（AIS），这样就很容易识别附近的外来的船只，包括智利船只在内。智利总统承诺要为这一海域配备相应的资源，包括海军和两架大型空中巡逻无人机。这是智利对联合国做出的承诺，令人心安，因为这意味着总统将信守诺言。”

他表示，现在除了打击非法捕鱼作业外，岛上居民还关心如何将岛上独特的文化教育传给下一代。

“这对我们来说至关重要。”他说，“将来管理这些资源的是他们这一代人，他们需要了解我们正在做的事情。学校里有生态学和渔业方面的讲习班，所以我们的孩子从小就接受这样的教育。我们99%的鱼类资源都是区域性的，是属于全世界的独特宝藏。失去它们将是一场灾难。即便只是一个物种消失，对整个地球来说都是一场悲剧。我希望世界上所有的孩子都能清楚这一点，就像我和我的儿子一样。我希望这样的观点能够代代相传。这里是一个非常特殊的地方。”

罗伯·苏塔对本文亦有贡献

伊莎贝尔·希尔顿，中外对话首席执行官及总编

Sustainable fishing on Lobster Island

A remote island paradise in Chile is a lesson in the benefits of responsible marine stewardship

□ Isabel Hilton

Julian Chamorro lives in a place that he considers close to paradise. It would not, perhaps, be to everybody's taste: the remote volcanic Juan Fernández islands, 600 miles off the coast of Chile and inhabited by just 1,000 people. One of the three islands is Robinson Crusoe, a third is Alexander Selkirk, in honour of the castaway who inspired the Daniel Defoe novel. But to Julian Chamorro, what makes his ancestral island special is that it is a case study in the benefits of environmental stewardship.

The islanders live from fishing a rock lobster, jasus frontalis, which, like 90% of the other creatures that inhabit the waters around the islands, is unique to Juan Fernández and the neighbouring islands of San Felix and Sant'Ambrosio to the north. The lobster's special flavour derives from the cold waters of the Antarctic, carried north to the islands by the Humboldt current. Its abundance is owed to the foresight and prudence of earlier generations.

In 1914, Julian Chamorro explained, industrial fishing boats arrived in the islands, hoping to cash in on the abundant lobsters for the newly established canning business. The islanders, who had been fishing their waters sustainably for more than 200 years, saw that their stocks and livelihoods were rapidly disappearing.

"They were taking everything," he said. "Big ones, small ones, in large quantities. The islanders quickly understood that this could not continue," he said.

They drew up a set of regulations that they first imposed on themselves: not taking females with eggs; not taking undersized lobsters; not taking them at all during the four-month breeding season and permitting only the use of their traditional wooden lobster traps.

Twenty-one years later, in 1935, the Chilean government issued a decree that made the islanders' rules official. Last October, the Chilean government announced it would enlarge two marine reserves, one in the vicinity of Cape Horn and the other surrounding the Juan Fernández archipelago. In February this year, 12 days before ending her presidency, Michele Bachelet decreed yet more marine protected areas, bringing the total area of Chilean waters they cover to more than 1.4 million square kilometres, or 42% of the country's national waters. It was 4% when she entered office four years ago.

> The global paradigm was that the ocean was an inexhaustible source. Our forebears were visionaries who understood that it wasn't possible.

Earlier this month, Chile joined forces with Canada, Ecuador and Mexico at the Global Ocean Summit in Mexico, to announce further protected areas along a continental coast that stretches from the Arctic to the Antarctic.

Ricardo Lagos Weber, a senator for the Valparaíso constituency that includes Juan Fernández and Rapa Nui (Easter Island), told the summit that persuading Chileans to dedicate resources to the protection of its small islands' marine environments has been a challenge.

"To allocate energy, time and political capital to investing in the oceans is difficult sometimes, it's a pressure to sell," he said.

In a developing country, Lagos added, such important things involve a political trade-off with urgent social issues, such as poverty, housing, health, and crime.

The International Labour Organisation (ILO) convention 169 obliged Lagos' government to consult local communities on designating marine protected areas around their islands, Lagos said. "We had to ask them if they want a marine protected area. The second discussion, since that was the easier part, was what kind? What fishing year? What type of fishing?"

The waters around Chamorro's island, he explained, are uniquely bio-diverse, but jassus frontales would not exist today had the islanders not protected the species.

"It was unusual in 1914," said Chamorro. "The global paradigm then was that the ocean was an inexhaustible source, and that you could take whatever you wanted. Our forebears were visionaries who understood that it wasn't possible. That was the difference between them and the global fishing industry."

Lobsters, he explained, are territorial.

"Our lobsters only circulate in the currents around the island. They don't go either to the mainland or into the Pacific. They live in a zone that starts around 3,000 metres from the beach and to a maximum of 160 metres in depth. Below that you don't really find lobsters. We don't fish other species or use nets, although Chilean law would allow that, as an artesanal fishery. But we agreed not to exploit fish commercially, because we live well from lobster. We don't need any more money and we don't need to exploit the fish. If future generations need the fish they can make that decision, but not this generation."

The legacy of the long history of environmental protection is a life of abundance for the small community.

"We have a very good quality of life," he said. "We have books, we have the internet. Life is very relaxed. We fish for eight months of the year, but our fishing is not very stressful. On a Monday you set the traps; you revisit them on a Wednesday and take out the lobster. Then perhaps you do it again on Friday. So we really work around three months in a year. Otherwise we enjoy life, spend time with our families, go sailing."

"There is a culture of the sea, not commercial greed. We have a high school with 140 pupils, and unlike in most fishing communities, most of our young people want to be fishermen. The older generation, like me, went to the mainland to university: I am an engineer, for example, with a PhD. Then I came back to be a fisherman. Others are doctors, teachers or nurses, so we have a different outlook and a different way of doing things. We were born to the sea."

It is a culture, he says, that used to exist across the Pacific. "Before the arrival of the global marketplace, all the islands of the Pacific, places like Palau and Micronesia, were self-sufficient and sustainable. We lived from what we had. But with commercialisation, it changed."

Today the islanders are still protecting their way of life

Robinson Crusoe island, part of Chile's protected waters that cover more than 1.4 million square kilometres, or 42% of the country's national waters.

and the lobsters on which it depends. People can come to the islands, but may only stay three months under a 2006 migration law that recognised Juan Fernández and the Galapagos as special territories.

Two years later, the Chilean parliament banned commercial fishing in the vicinity of San Juan Fernández in recognition of its unique biodiversity.

"We are very aware," he said, "that San Juan Fernández is a treasure. Like all treasures it has to be guarded. We have a naval base not far away, and Chile obliges all ships to carry identifiers (AIS) so it's easy to see any foreign ships – including Chilean – in the vicinity. The president of Chile has promised resources, including the navy and two big aerial patrol drones. It's a United Nations commitment, which is reassuring, since it means she will keep her promise."

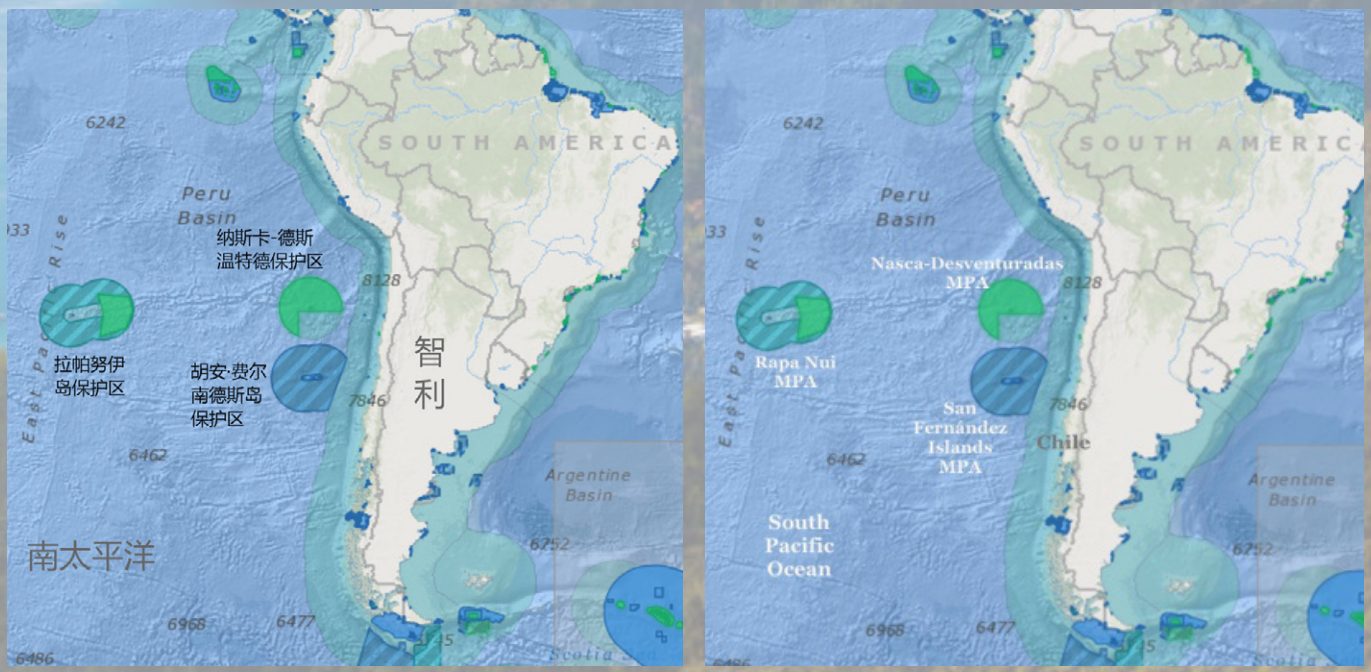
Now, he says, apart from fighting illegal fishing, the islanders are concerned to educate the next generation on the island's unique culture.

"This is vital for us," he said. "The generation that will manage the future these resources need to understand what we are doing. They have workshops in school on ecology and fishing, so our children learn very young. 99 per cent of our fish are endemic. It's unique and a treasure that belongs to the world. Losing it would be a tragedy. When even one species disappears, it's a tragedy for the whole planet. I hope all the children in the world will be able to see this, as my son and I can. I hope it lasts for generations. It's a very special place."

With additional reporting by Rob Soutar.

Isabel Hilton is CEO and Editor of chinadialogue

环境保护和可持续捕鱼的悠久历史意味着，胡安·费尔南德斯群岛的小社区拥有丰富的海洋生物
A long history of environmental protection and sustainable fishing means there is an abundance of marine life for the small community of the Juan Fernández Islands



地图中显示的三个群岛被纳入了2018年更新的海洋保护区域版图
Chile's marine protected areas, including the Juan Fernández Islands.
Image adapted from the MPAtlas published by the Marine Conservation Institute (March 2018)

2018年气候谈判关键日程
2018 KEY DATES

6.16-6.18	德国匹兹堡对话 Petersberg Climate Dialogue
6.20-6.21	气候行动部长级会议 Ministerial on Climate Action
9.3-9.7	曼谷非正式气候谈判 Bangkok Intersessionals
9.12-9.14	全球气候行动峰会 Global Climate Action Summit
9.18-9.30	联合国大会和气候周 United Nations General Assembly and Climate Week
10.8	政府间气候变化专门委员会发布1.5摄氏度特别报告 launch of the IPCC Special Report on 1.5 degrees
12.1	20国集团首脑会议 G20 summit
12.3-12.14	COP24

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