中外对话
chinadialogue

气候政局
Climate politics in the age of Trump

总编　伊莎贝尔·希尔顿

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“美国优先”，气候让路

特朗普政府的“美国优先”预算计划砍掉本国环保署近1/3经费，此举也将令全球气候资金无以为继。

□ 丽萨·林奇　胡安妮塔·康斯坦博

众所周知，特朗普总统曾表示，气候变化是一场“骗局”。而最近发布的特朗普政府美国优先预算蓝图将把气候变化否定论变成美国的一项国策。新政府毫不掩饰自己的意图。先是环境保护署署长斯科特·普鲁伊特否认二氧化碳是全球变暖的主因。接着，行政管理与预算局主管米克·马尔瓦尼宣称：“至于气候变化……我们不会再在那方面花钱了。我们认为那是浪费你们大家的钱。”

如果特朗普总统的预算案正式生效，联邦政府将基本停止一切国内和国际的减排行动，削减大多数气候科学研究，终止开发高能效和可再生能源技术，并不再帮助相关社区预防并适应暴风、洪水、干旱以及其他气候变化影响。

这是一份“污染者优先”的预算，而不是一份“美国优先”预算。

特朗普削减气候变化预算的做法不仅不计后果，而且是短视的。正如在其他很多方面一样，特朗普的预算是对包括其支持者在内的数百万美国人民的背叛。国会必须否决这份预算。

向碳减排说再见？

特朗普政府的预算将EPA的预算总额削减了31%，是所有主要政府机构中预算削减最大的。这将导致EPA开展的重要气候变化工作几乎丧失全部资金支持。具体来说，预算蓝图将“停止为清洁能源计划、国际气候变化项目、气候变化研究与合作伙伴项目以及相关工作提供资金”，从而削减大约1亿美元的资金。

预算还将大幅削减国务院的气候行动资金，违反美国对国际社会做出的气候承诺。此外，预算将“削减美国与绿色气候基金相关的资金投入”，而这些资金有助于发展中国家采用更清洁的能源，以降低这些国家日益增长的碳排放并应对气候变化的影响。预算方案还将取消对乔治·W·布什政府2008年利用两党支持建立的气候投资基金的支持。在这份预算案下，美国将放弃其在全球清洁能源竞赛中的领先地位。

气候科研遭到重创

在国会听证会上，环保署署长

“特朗普政府的预算将EPA的预算总额削减了31%，是所有主要政府机构中预算削减最大的。这将导致EPA开展的重要气候变化工作几乎丧失全部资金支持。”

普鲁伊特以及其他内阁提名成员以气候科学仍非定论为由，回避讨论气候变化相关的问题。这等于宣告我们需要继续深化对于气候变化成因和效应的研究。

但这份预算打算把政府各层面的此类研究项目几乎全部砍掉。

美国国家航空航天局（NASA）的预算将削减 1.02 亿美元，该机构以地球为中心的思路将被扭转，并将“终止四项地球科学项目”——监控气候变化与海洋的 PACE 项目；监控大气碳浓度的 OCO-3 项目；测量大气温度的 CLARREO 探路者计划；以及监控天气模式和臭氧水平的深空气候天文台（DSCOVR）卫星的地球观测设备。理由是，NASA 应该更多面向外太空，放弃针对地球的计划。

预算还提出大幅削减对美国海洋暨大气总署（NOAA）卫星数据部门的资金支持。该部门负责支持天气预报工作，帮助我们更好地追踪海啸登陆、龙卷风以及严重的风暴，并提供干旱、山火等灾害的预警。

预算案将大幅削减能源部（DOE）研究预算，并取消能源部高级研究计划署（ARPA-E），而该署的工作刚刚得到新任能源部长里克·佩里的特别表扬。总体来看，除去核武器项目之外，能源部预算将被砍近 18%，而其应用研究项目也将被砍 45%。

特朗普政府的预算案将砍掉 EPA 研发办公室近一半的经费，这可能会导致该机构对于美国全球气候研究项目的贡献彻底清零——这个政府各部门联合参与的气候科学项目近期刚刚受到美国国家科学院的高度赞扬。

EPA 遭到削减的科学经费主要针对的是成果科学（STAR）项目这类竞争性申报项目的经费。通过这一项目渠道支付的拨款一般流向全国各地的科研机构，以拓展 EPA 的科研能力，其中包括保护空气和水资源不受极端事件破坏的项目。举例来说，俄勒冈州立大学正在研究如何在降水密集的雨季更好地预测下水道流量，以更好地应对在气候变化背景下日益常见的强降水。这一问题影响着 700 多个美国城市。

大幅削减气候适应项目

预算案还打算大幅削减用于向受气候变化影响的人口和社区提供帮助的经费。预算将取消一系列灾害预防和灾后重建项目，从旨在帮助沿海社区更好地应对海平面上升的 NOAA 项目，到帮助建设可以抵抗强风暴的学校、医院和警察局的联邦应急管理署项目。

预计将被砍掉的气候相关的 EPA 项目中包括美国墨西哥边境项目，一个旨在改善亚利桑那州道格拉斯、德克萨斯州拉雷多等边境社区健康、安全和灾害应对能力的双边合作项目。边境项目已经支持了加州帝王谷等地的儿童健康项目，为当地的低收入家长提供指导，帮助他们更好地应对儿童哮喘。边境墙无法保护美国儿童免受空气和水污染以及气候变化影响的伤害。

内政部和森林管理局的森林保护项目也几乎被全部废除。这些项目对于保护美国的自然遗产，确保野生动植物可以在气候变化影响下存活至关重要。

能源战略大开倒车

特朗普政府的预算案对提高能源效率和发展可再生能源不利，却对造成污染的化石能源亮起绿灯，这将损害美国消费者的利益。这份预算将废除 EPA 和 DOE 发起的、已经获得广泛成功的能源之星自发能效标识项目。该项目虽然需要每年投资 5000 万美元，但却可以为消费者每年节约超过 300 亿美元的电费。

受到威胁的 DOE 能效项目包括房屋节能改造补助项目（Weatherization Assistance Program，每年可以提供 8500 个就业岗位并节约 3.4 亿美元能源成本），以及电器与设备标准项目（每年为普通家庭节约 500 美元电费）。

与此同时，内政部将批准更多污染性能源项目，在公用土地和离岸水域资源上“为工业企业提供开发权”。

肮脏的空气、不安全的饮用水或者不稳定的气候没有写在美国人民的选票上。这份否定气候变化事实的预算案忽略了公众的意愿，给我们带来巨大的风险。国会必须否定这份预算案，并在今年稍后编制预算案的过程中将美国人民的健康和安全放在首位。

英文原文载于自然资源保护协会网站

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Trump attacks science

The new US budget plans to slash the EPA funding by 31%, a disaster for environmental protection

□ Lissa Lynch Juanita Constible

President Trump famously derided climate change as a "hoax," and his America First budget blueprint that was released last week would make climate denial our national policy. The new administration is not hiding its intentions.

Earlier this month, Environmental Protection Agency (EPA) administrator Scott Pruitt would not agree that carbon dioxide is the primary cause of global warming. Furthermore, Office of Management and Budget director Mick Mulvaney declared: "as to climate change...we're not spending money on that anymore. We consider that to be a waste of your money."

If the President's budget became law, the federal government would stop virtually all domestic and international efforts to curb carbon pollution, cease most climate science and research, halt efforts to develop energy efficient and renewable energy technologies, and quit helping communities prepare for and recover from storms, floods, droughts, and other climate change impacts.

This is a "Polluter First" budget, not an "America First" budget.

Trump's proposed climate cuts are reckless and short-sighted. As in so many other ways, Trump's budget betrays millions of Americans, including the president's supporters. Congress must reject it.

Eliminating efforts to curb carbon pollution

The budget proposes to slash the overall EPA budget by 31%, the deepest cut of any major agency. It would eliminate virtually all funding for the EPA's critical climate work. Specifically, the budget blueprint would cut US$100 million by "discontinu[ing] funding for the Clean Power Plan, international climate change programs, climate change research and partnership programs, and related efforts."

The budget would also decimate the State Department's climate activities, reneging on our international climate commitments. It would "eliminate U.S. funding related to the Green Climate Fund" that helps developing countries adopt cleaner energy sources to reduce their growing carbon pollution and cope with climate impacts. The proposal also guts support for the Climate Investment Funds established

Damage from Hurricane Matthew last year. Cutting help for people and communities struggling with climate change impacts is just one area where the budget is looking to save money

in 2008 with bipartisan support under President George W Bush. Under this budget, America would abandon its leadership position in the global clean energy race.

Slashing climate science and research

In Senate testimony, administrator Pruitt and other cabinet nominees parried climate questions by claiming the science is still uncertain. That would suggest the need for continuing and deepening scientific research into the causes and effects of climate change.

But the President's budget would slash funding for nearly all such research across the government.

The budget would cut US$102 million from the National Aeronautic and Space Administration's (NASA) budget by eliminating the agency's "earth-centric" focus and "terminat[ing] four Earth science missions" - the PACE mission, which monitors climate change and oceans; the OCO-3 programme, which monitors atmospheric carbon levels; the CLARREO Pathfinder mission, which measures atmospheric heat; and the Deep Space Climate Observatory (DSCOVR) satellite's earth-viewing instruments that monitor weather patterns and ozone levels. The stated rationale is that NASA should only look outward and give up its mission to understand our home planet.

The budget also proposes to cut significant funding from the National Oceanic and Atmospheric Administration's satellite data division, which supports the weather forecasters we rely on to track hurricane landfalls, tornadoes, and severe storms, and provide notice of threats like droughts and wildfires.

The proposed budget makes major cuts to the Department

of Energy's (DOE) research programmes. It would eliminate the Advanced Research Projects Agency-Energy (ARPA-E), which energy secretary Rick Perry singled out for praise in his confirmation hearing. Overall, excluding nuclear weapons programmes, the DOE budget would be cut by almost 18%, and the DOE's applied research programmes would be slashed by 45%.

Trump's budget proposal would hack away nearly half the funding for the EPA's Office of Research and Development, likely zeroing out the agency's contribution to the US Global Climate Research Program, the government-wide climate science programme recently highly praised by the National Academy of Sciences.

Cuts to the EPA's science budget will target grants like the competitive Science to Achieve Results (STAR) programme. Grants through this programme go to institutions across the country to expand the EPA's scientific capacity, and include projects to protect our air and water from extreme events. As an example, Oregon State University is trying to better predict sewage overflows during heavy rains, which are becoming more common as the climate changes. This is a problem facing more than 700 American cities.

Halting assistance

The budget proposes deep cuts in assistance to people and communities struggling with the impacts of climate change. The budget would eliminate a wide array of disaster preparedness and recovery programmes, from NOAA programmes that help coastal communities prepare for sea level rise to the Federal Emergency Management Agency's programme that helps storm-proof schools, hospitals, and police stations.

Among the climate-related EPA projects on the chopping block is the US Mexico-Border Program, a bilateral partnership to improve the health, safety, and disaster preparedness of border communities like Douglas, Arizona and Laredo, Texas. The Border Program has supported childhood health efforts like the project in Imperial Valley, California that gives low-income parents guidance on managing their children's asthma. A border wall won't protect American kids from air and water pollution and climate change impacts.

The Department of Interior and the Forest Service would also see their conservation programmes nearly eliminated. These are critical to ensure that our nation's natural heritage and wildlife can adapt to and survive the ongoing impacts of climate change.

Gutting clean energy

Trump's budget favours dirty energy over energy efficiency and renewables, to the detriment of American consumers. The budget would eliminate the EPA's and DOE's popular and successful ENERGY STAR voluntary efficiency labelling programmes that turns a US$50 million annual investment into US$30+ billion worth of annual customer utility bill savings.

Energy efficiency programmes under threat at the DOE include the Weatherization Assistance Program (which supports 8,500 jobs and saves US$340 million in energy costs in a typical year) and the Appliance and Equipment Standards Program (which saves a typical household US$500 a year in utility bills).

Meanwhile, the Interior Department would unleash more dirty energy projects and "provide industry access" to our public lands and offshore waters.

Americans didn't vote for dirty air, unsafe water, or an unstable climate. This climate denial budget proposal ignores the will of the public, putting us all at risk. Congress must reject this budget and put the health and safety of Americans first when it writes appropriations bills later this year.

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气候大游行：一场小众狂欢？

美国气候运动需要向特朗普学习如何扩大“群众基础”。

□ 莉迪亚·麦克马伦-莱尔德

2014年我搬到中国，因为当时我觉得中国是最需要环境倡议人士的地方。但随着唐纳德·特朗普当选，形势发生了改变，我觉得是时候回到美国继续我的战斗了。

我还记得在北京办公室观看2014年人民气候游行的影像资料。那时我为气候行动能够吸引这么多人深感兴奋。当听说今年在华盛顿特区的人民气候大游行定在特朗普上任第100天举行的时候，我就想要参加。

最近，气候变化的内容被从环境保护署的官网移除，特朗普政府也在破坏美国的气候政策。在这种情况下，我本以为会有成千上万人愤怒地到场发出呼吁，但实际情况远不及我的预料。

游行从国会山开始，绕白宫一周之后在华盛顿纪念碑结束，大约有20万人参加。这个数字听起来或许很多，但比不上2014年气候大游行时的31.1万人，较之今年一月份参加女性游行的50万人更是相形见绌。

参加这次游行的人在32摄氏度（90华氏度）左右的高温中坚持，大汗淋漓的场面时刻提醒着我们气候变化的影响，今年的气温竟然比华盛顿同期平均气温高出大约6.7摄氏度（20华氏度）。

除了当我们走过特朗普国际酒店大楼时高喊“可耻！可耻！”之外，这场游行有一种克制却又很欢乐的狂欢节气氛。在我们面临如此严重的环境问题，并且白宫中高坐一位气候变化否认者的情况下，这种气氛有些不合时宜。

这场游行吸引了很多机构，包括宗教团体、环境倡议人士、科学家和医疗专业人员。游行为各种各样的诉求提供了发声舞台，有些议题甚至与气候变化没有太大关系。

许多人在跟我聊天时候表示，是特朗普的当选让他们决定来参加游行，但他们无法提出任何明确的政策目标。游行主要是对特朗普政府的一种象征性抵抗，而不是一项为了推动变革而经过深思熟虑的策略。

不过，虽然参与游行的组织多种多样，但参与游行的人群却高度同质化。除了立石运动的原著民以及少数移民和环境公正团体之外，游行的主要是一些自命不凡的白人自由主义者，他们的表情仿佛在说：只有智商低下的人才会否定气候变化。游行人士打出的许多标语不仅贬低特朗普，更贬低了其支持者的智力水平。

保守主义人士十分稀少，不过我还是找到了一些每周六都在华盛顿特区抗议的反堕胎人士。他们出于自己的利益，也决定拉拢气候游行。

威廉是一位来自弗吉尼亚的保守主义农民，也是反对堕胎抗议人士之一。我问他如何看待这场游行，他坦白地说他觉得气候变化是一场骗局。但谈话中威廉的一句话出乎我的意料。虽然他在大选中投了特朗普的票，并且支持他的大多数政策，但他对斯科特·普鲁伊特这样的商业巨头接管环境保护署这件事并不满意。

这让我意识到，美国的气候运动并没有以正确的方式传达信息。

如果学界 97% 的人都认同气候变化但都不能说服威廉以及全国成千上万与他一样的气候变化否认者，那么在他们面前挥舞标语、矮化贬低他们也不会让他们心服口服。

但对抗企业的贪婪和腐败，特别是化石燃料企业，却是大多数美国人都支持的观点。

《纽约时报》的问卷调查显示，80% 的共和党人相信，金钱对政治的影响力过大。化石燃料行业当然就是绝佳的例证。例如，石油天然气行业在 2016 年大选中贡献了超过 1 亿美元（约合 6.9 亿元人民币）的政治献金。

尽管政见不一，尽管其中一些人并不相信气候变化，但蓝领工人普遍被经济困扰，而且对乘他们之危的大企业心存愤恨。

我在北达科他州巴肯采访过的油田工人对于大企业削弱油井安全监管标准十分失望。他们中的一些人由于企业的贪婪而受伤甚至死亡。并且正如伯尼 · 桑德斯的高人气所证明的那样，许多把票投给了共和党的保守主义工人阶层选民持有的政治观点并不那么保守。他们希望得到的，是对他们奋斗挣扎的肯定和认可。这也许听起来有点讽刺，但我认为美国气候运动应该在这方面效法特朗普。

工会在周六的游行中并不起眼，但它们也认识到了保守群体的巨大潜能。在游行中，他们着重在就业以及清洁能源如何可以帮助困境中的美国人重新站起来的话题上发声。

根据美国能源部的一份报告，去年太阳能行业的就业人数占电力行业就业人数的 43%；相比之下，化石燃料发电行业的就业人员仅占总数的 22%，这是一个惊人的数字。仅在煤炭一个行业，每年就减少 1 万个就业岗位，因为这个行业正处于衰退期，不再有利可图。

特朗普曾在竞选时承诺通过振兴化石燃料行业来增加就业。我认为，为了应对特朗普未来的政策，气候倡议组织需要关注可再生能源可以为保守主义选民带来哪些好处。

气候运动不仅不必冥顽不化地与气候变化否认者“死磕”，从而加剧美国社会两极分化，还可以通过关注更加为大众所关注的经济问题而获得更多支持。要建立真正的人民气候大游行，我们必须关注所有美国人，而不仅仅是那些受过良好教育、有条件读懂气候变化科学的人们。

莉迪亚 • 麦克马伦-莱尔德，环境记者，中外对话北京办公室图文制作人

US Climate March fails to recognise economic truths

America's climate movement would benefit from focusing more on living standards and less on patronising skeptics

□ Lydia McMullen-Laird

I moved to China in 2014 because at the time I thought it was the country with the greatest need for environmental activists. With the election of Donald Trump that dynamic shifted, and I decided it was time to bring the fight back to the US.

I remember watching the footage of the 2014 People's Climate March on television from my office in Beijing, and thinking how exciting it was that the climate movement was drawing big crowds. When I heard that this year's People's Climate March in Washington DC would be on Trump's 100th day in office, I wanted to be part of the action.

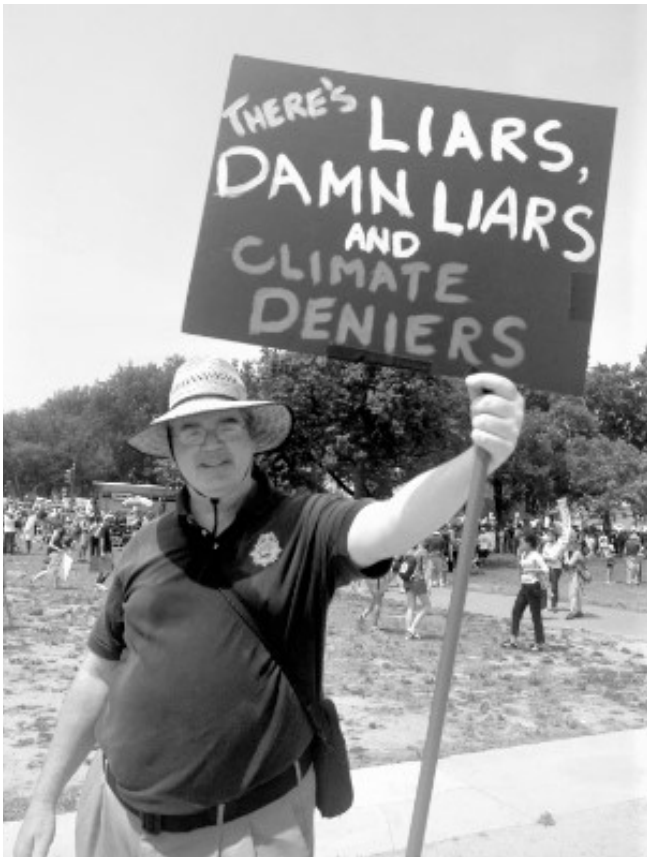
With the recent removal of climate change from the Environmental Protection Agency (EPA) website and Trump's dismantling of US climate policies, I assumed people would arrive by the thousands, outraged, to make their voices heard. The result was underwhelming.

The March, which took us from the Capitol, surrounded the White House and ended at the Washington Monument, drew about 200,000 people. That may sound like a lot, but fell short of the 311,000 who attended the 2014 Climate

March and pales in comparison to the half a million who took to the streets for the Women's March in January.

This time round people persisted through temperatures of over 90 degrees Fahrenheit, a sweaty reminder of the effects of climate change and 20 degrees above the average in Washington for this time of year.

Other than shouts of, "Shame! Shame!", as we walked past the Trump International Hotel, the atmosphere had a subdued but joyous carnival vibe, which felt inappropriate



considering the scale of the environmental problems we are facing and the gravity of having a climate change denier in the White House.

The March drew many organisations, including religious groups, environmental activists, scientists and health care professionals. The result was a multi-faceted message, with some topics being aired only tangentially related to climate change.

Many people I spoke to said Trump's election inspired them to attend the March, but they were unable to articulate any concrete policy goals. The March mainly felt like a symbolic resistance to the Trump White House rather than part of a deliberate strategy to enact change.

But despite the diversity of organisations, the makeup of individuals in the crowd was homogenous and predictable. Other than the indigenous community from the Standing Rock movement and a few smatterings of immigrant and environmental justice groups, the March consisted mainly of white liberals with a pretentious message: if you're a climate denier you are intellectually inferior to us. Many of

the signs belittled not only Trump, but also the intelligence of his supporters.

Conservatives were hard to come by, but I did manage to find some pro-life advocates who protest every Saturday in DC. They had decided to co-opt the climate march for their own benefit.

When I asked William, a conservative farmer from Virginia and one of the pro-life protesters what he thought

of the whole thing, he admitted that he thought climate change is a hoax. But as we kept talking, William said something I wasn't expecting. Although he voted for Trump and supports most of his policies, he wasn't happy that the EPA is being taken over by corporate tycoons like Scott Pruitt.

That's when I realised the climate movement in the US isn't packaging its message correctly. If the 97% scientific consensus on climate change hasn't convinced people like William and the thousands of climate deniers around the country, waving a sign in their face belittling them won't either.

But fighting back against the greed and corruption of corporations, especially the fossil fuel industry, is something that most Americans can get behind.

Polling by the *NYTimes* indicates that 80% of Republicans believe money has too much influence in politics. The fossil fuel industry is certainly a big part of that. The oil and gas industry, for example, contributed more than US$100 million (690 million yuan) during the 2016 election cycle.

Blue collar workers across the political spectrum are suffering from economic hardships, and although some of them don't believe in climate change, they are still angry at the corporations who are taking advantage of them.

Oil field workers I interviewed in Bakken, North Dakota were frustrated that corporations are cutting corners in terms of safety regulations on the oil rigs. Members of their communities are getting injured and even dying because of corporate greed. And as indicated by the popularity of Bernie Sanders, many conservative working-class voters have policy views that are much more liberal than their voting choices indicate. The main thing they are looking for is someone to recognise their struggle. As ironic as it sounds, I think the climate movement should follow in Trump's footsteps in that regard.

The labor unions, a small contingent of Saturday's March that recognised the potential of appealing to the conservative base, focused on jobs and how clean energy can help disenfranchised Americans get back on their feet.

According to a report from the Department of Energy, solar employed 43% of the Electric Power Generation workforce last year, an astonishing number in comparison to the 22% employed by fossil fuels. The coal sector alone is losing 10,000 jobs per year because the industry is in decline and no longer profitable.

In order to combat Trump's lucrative promises of bringing back jobs by reviving the fossil fuel industry, I think that climate advocates need to focus on the benefits renewable energy can offer conservative voters.

Rather than contributing to the polarisation of the American public, the climate movement would benefit from focusing on economic issues that appeal to a broader base rather than the losing battle against climate deniers. To create a true People's Climate March, we have to focus on all people, rather than just those educated enough and with the resources to understand climate science.

Lydia McMullen-Laird is a freelance environmental journalist and producer for chinadialogue.

退出《巴黎协定》，特朗普摆了世界一道

《巴黎协定》就算要重新谈判也得花上三年时间，特朗普相当于把锅甩给了下任美国总统。

□ 萨乔伊迪普·格普塔

美国总统唐纳德·特朗普最终宣布美国将退出巴黎气候协定。他还说，美国将“开始就重新加入巴黎协定或者一个真正全新的交易展开谈判，这个新协议无论对美国还是其商业、工人、人民和纳税人都应该是公平的”。特朗普讲话的第二部分对世界的影响更加重大，因为《京都议定书》正是这样被扼杀的。

唐纳德·特朗普宣布美国退出《巴黎协定》，世界一片哗然

如果美国退出《巴黎协定》并不再加入，这才是最大的不公平。因为这意味着美国不必为其从工业化时代开始造成的世界最大累积排放承担任何后果。但是，如果美国还待在气候谈判里面，结果只会更坏。

这样一来，美国代表将出现在未来“联合国气候变化框架公约”（UNFCCC）下所有的谈判场合。如果按照京都谈判的经验，美国将利用联合国每个决议都必须协商一致的原则，逐条反对《巴黎协定》。这将毫无疑问地宣告协定的死亡。

特朗普说，他不会“支持一个惩罚美国”但世界其他主要污染国却不承担“重大义务”的协议。

6月1日，特朗普在一份关于《巴黎协定》的声明中说：

“比如，这个协定为中国排放的增长留出了漫长的13年，在此期间他们可以为所欲为。但我们不能。印度则可以从发达国家手中得到成千上万亿美元的援助。中国还被允许建设数百座新的燃煤电厂，但我们不行。印度到2020年可以将其煤产量再翻一番，但我们只能减少产煤。就连欧洲都可以继续建造燃煤电厂，但美国不行。”

美中印，到底谁是污染大户

但有一件事特朗普缄口不言：他所说的“世界最大污染国”的人均碳足迹跟美国一比只是小巫见大

> 目前，美国在全球温室气体排放中占15%，中国占30%，欧盟占10%，印度占6%。

巫——中国还不到美国的三分之一，印度更不及其八分之一。

还有一件事他也没有提及。尽管中国承诺到 2030 年达到温室气体排放峰值，但这一目标有望提前实现。

作为《巴黎协定》成员国，印度承诺将通过国内措施控制排放，并表示如果能从发达国家获得资金，减排力度还会增大。印度的确有一个公开的目标，到 2022 年新增燃煤发电能力 1.1 亿千瓦，但太阳能和风能发电的迅速增长可能会显著减少新增煤电装机。

同样到 2022 年，印度已经承诺实现 1.75 亿千瓦的可再生能源装机目标。莫迪总理访问了欧洲四国，期间他反复强调印度将留在《巴黎协定》中，继续履行自己的承诺。

特朗普悍然自绝于全球

很多特朗普行动的批评者都指出，美国的退出将自己与叙利亚、尼加拉瓜等没有参与《巴黎协定》的国家置于同一层次。但极少有人提到的是，尼加拉瓜之所以没有签署巴黎协定，是因为它认为该协定不足以抵御气候变化。这个观点得到了不少分析家的支持，据他们计算，所有 194 个协议签字国的承诺加在一起，也无法在 2100 年将温度上升控制在 2 摄氏度以内，而这正是《巴黎协定》的目标。

气候变化已经影响了全世界的农业生产，加剧了洪灾、旱灾和风暴的频度和强度，造成海平面升高。去年是有记录以来最温暖的一年。

以前其前任奥巴马为首的全球各界人士对特朗普的行为大加谴责，他说：

“留在巴黎协定中的国家将从其创造的就业和新兴产业中大大获益，我认为美国应该站在这个行列的最前面。”

从目前的迹象来看，美国 50 个州中有很多将继续沿着奥巴马时期开启的清洁能源路线走下去。因此，尽管特朗普政府在联邦层面退出了《巴黎协定》，但可能并不会导致煤矿和火电厂的复兴。

气候研究遭受沉重打击

但是，退出《巴黎协定》将给美国的气候研究带来重创，因为其资金主要来自联邦拨款。这一事务由斯科特 · 普鲁伊特领导的美国环保局掌管，而这位局长在其参院任职听证会上说卫星数据表明全球变暖正在“趋于稳定”。

根据麻省理工学院、劳伦斯利弗莫尔国家实验室、西雅图华盛顿大学和科研企业遥感系统公司的一项研究，普鲁伊特的这个说法是错误的。而白宫已经宣布，建议将劳伦斯利弗莫尔国家实验室的经费削减 70%。

在《巴黎协定》下，美国承诺到 2025 年的排放将比 2005 年减少 26-28%。目前，美国的温室气体排放占全球温室气体排放总量的 15%，中国占 30%，欧盟占 10%，印度占 6%。

美国退出《巴黎协定》但还留在 UNFCCC 框架内，这样特朗普就可以按照《巴黎协定》的条款启动一个需要 3 年时间才能完成的程序。也就是说，2020 年这会成为美国总统大选的一个主要争论议题。

特朗普重视的显然是其（政权的）支撑基础，而其他国家领导人的看法对他并不重要。当然，有些外国领导人对他的批评非常尖刻。

《巴黎协定》重新谈判意味着什么？

欧盟委员会主席容克说特朗普并未“全面理解”《巴黎协定》的内容，尽管欧洲领导人在上周的峰会中曾试图用“简单明了的语言”向其解释退出程序。不过，“看起来这个努力失败了”。

UNFCCC 秘书处的措辞更加谨慎却同样坚定，它说：“《巴黎协定》是一个历史性的条约，获得了 194 个国家的签署和 147 个国家的批准。因此，绝不能出于一方（国）的要求而重新谈判。”

美国人民也怒了

就在特朗普宣布美国将退出《巴黎协定》后不久，美国 61 个城市和 3 个州组成联盟，宣布无论如何都将继续支持该协定。

就连美国国内也有很多人对美国退出巴黎协定的行为提出了措辞极为

严厉的批评。美国最大环保非政府组织塞拉俱乐部的负责人迈克尔·布伦说:“从今往后世世代代的美国人回顾特朗普退出《巴黎协定》的决策时,都会将其视为美国总统所采取的最无知、最危险的行动之一……特朗普让我们的国家在世界舞台上孤立,把我们在清洁能源领域的领导地位和经济优势拱手让给印度和中国。”

斯坦福大学的苏珊娜·默瑟说:“特朗普的支持者们之所以投票给他,是为了让美国成为一个更宜居的地方,能够养活家人、能够找到好的工作,能够看到子孙后代有一个更好的未来;而不是为了让洪水冲毁他们的梦想,让干旱萎缩他们的生计,让野火烧掉他们的家园,让上升的海平面淹没他们的社区,让污浊的空气给孩子们带来哮喘。”

他们的合法需求和满心期待却被滥用,不是“让美国再度伟大,而是让美国和其他所有人大受其害。”

耶鲁大学最近一项关于气候变化传播的民意调查表明,有 70% 的美国人支持美国参加《巴黎协定》,而在所有州支持者都占了多数。

中欧气候合作被寄予厚望

在美国宣布退出巴黎协定后,欧盟和中国表示将深化在气候变化上的合作。

在今年的第 12 届中欧工商峰会上,双方承诺将在从清洁能源到产品标准的广泛领域加强合作,加强对风险和适应的管控。除了加大减排力度,中欧还承诺共同探索适应气候影响的方法。

英国气候智库 E3G 的负责人尼克·马贝说:

“这是我见过的最强有力的双边气候声明。特朗普总统促使中欧走到一起,共同制定清洁经济的规则。”

绿色和平东亚分部的气候政策顾问李硕说:

“美国退出引起的负面效应要求所有其他各方加强气候领导力。今天,我们看到新的领导力量正在布鲁塞尔和北京之间形成。”

他还说:“为了展示中欧能够发挥真正的领导作用,双方都需要加速自身的气候行动。”

印度公民社会谴责美国此举

印度绿色团体的批判声音非常强烈。设在新德里的智库科学与环境中心(CSE)说:

“如果美国不进行实质性的减排,《巴黎协定》中将全球变暖限制在 2 摄氏度以内的目标就不可能实现。”

CSE 负责人苏尼塔·纳拉因说,即便在过去,“为了照顾美国的利益,各国一直在做着弱化气候协议的事情。京都议定书的目标很无力,同样的,为了让美国回到联合国气候框架下,《巴黎协定》设立了一个自愿性、自下而上的分散机制,没有让各国做出减排承诺,即便各国没有实现其目标也没有惩罚措施……退出《巴黎协定》意味着美国就连其本就非常低的承诺都不愿兑现”。

她还批评了美国资金“断供”的后果。“这意味着用来帮助发展中国家抵御气候变化的绿色气候基金将遭受灭顶之灾……美国不能继续绑架全世界。退出巴黎协定就表明美国用它占世界 5% 的人口继续危害其他 95% 的人口。美国的决策具有全球性影响,各国需要让它负起责任。”

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乔伊迪普·格普塔,中外对话第三极项目南亚总监

Trump bids farewell to Paris Agreement

The widely criticised decision is a setback for international efforts to deal with climate change

□ Joydeep Gupta

US President Donald Trump finally announced that the US would be pulling out of the Paris climate agreement. He also said the US would, "begin negotiations to re-enter either the Paris accord or a really entirely new transaction on terms that are fair to the United States, its businesses, its workers, its people, its taxpayers." The second part of the statement has graver implications for the world as this is exactly how the Kyoto Protocol was killed.

It would be a grave injustice if the US pulled out of the Paris Agreement and stayed out. It would mean that the country that has contributed the greatest amount of greenhouse gases to the earth's atmosphere since the start of the Industrial Age would not have to face any consequences. But staying in the negotiations will have worse consequences.

It will mean US delegates will be present in every room where negotiations under the UN Framework Convention on Climate Change (UNFCCC) will go on. If the Kyoto negotiations are anything to go by, the US will oppose the Paris Agreement clause by clause. Using the UN rule that every decision must be unanimous. This will effectively kill the agreement.

Trump said he could not "support a deal that punishes the United States" while imposing no "meaningful obligations" on the world's leading polluters.

In a statement on the Paris climate accord, issued on June 1, President Trump said:

"For example, under the agreement, China will be able to increase these emissions by a staggering number of years – 13. They can do whatever they want for 13 years. Not us. India makes its participation contingent on receiving billions and billions and billions of dollars in foreign aid from developed countries. China will be allowed to build hundreds of additional coal plants. So, we can't build the plants, but they can, according to this agreement. India will be allowed to double its coal production by 2020. Think of it: India can double their coal production. We're supposed to get rid of ours. Even Europe is allowed to continue construction of coal plants."

The world's leading polluters?

What Trump did not say is that the countries he described as "the world's leading polluters" have per capita carbon footprints a fraction of those in the US – China, less than one third, and India, less than one eighth.

Nor did he mention that though China has committed to peaking its greenhouse gas (GHG) emissions by 2030, it is expected to reach this target earlier, a move likely to be accelerated as Chinese Premier Li Keqiang reaches a major climate deal with the European Union today.

As for India, as part of the Paris Agreement it pledged to control its emissions through domestic efforts, and said it could do more if it received money from developed countries. India does have a declared goal of producing 110 gigawatts more of electricity by 2022 through coal-fired power plants, but rapid advances in solar and wind powered generation will likely reduce this figure significantly.

India has committed to produce 175 gigawatts from renewable energy sources within the same timeframe. As India's Prime Minister Narendra Modi toured four European capitals this week, he repeatedly said India would stay within the Paris Agreement and continue to fulfil its obligations under it.

Global isolation

Many critics of Trump's action pointed out that the pull-out placed the US in the same group as Syria and Nicaragua as countries that were not part of the Paris Agreement. What few pointed out was that Nicaragua had not signed up because it found the agreement too weak to combat climate change. That point of view has been endorsed by analysts who calculate that the pledges made by 194 countries will still fail to keep the average global temperature rise to within 2C by 2100 – as the agreement aims to do.

Climate change is already affecting farm production worldwide, making floods, droughts and storms more frequent and more severe, and raising the sea level. Last year was the warmest since record-keeping began.

Global condemnation of Trump's action was led by former US President Barack Obama, who said:

"The nations that remain in the Paris Agreement will be the nations that reap the benefits in jobs and industries created. I believe the United States of America should be at the front of the pack."

By current indications, many of the 50 states in the US will continue down the clean energy path they started when Obama was president. So, despite the actions of the federal Trump administration, the pull-out may not lead to a renaissance for coal mines and thermal power.

A blow to climate research

However, the pull-out will hit US climate research, which is largely funded by federal grants. This is under the control of the US Environment Protection Agency, led by Scott Pruitt, who said during his Senate confirmation hearing that satellite data shows a "levelling off" of global warming.

This claim is false according to a study carried out by scientists at the Lawrence Livermore National Laboratory, Massachusetts Institute of Technology, the University of Washington in Seattle, and science research company Remote Sensing Systems. The Lawrence Livermore National Laboratory faces a proposed 70% cut in funding in the budget released last week by the White House.

Under the Paris Agreement, the US commitment is to reduce its GHG emissions by 26-28% from 2005 levels by 2025. Currently, the US is responsible for 15% of global GHG emissions, China for 30%, the EU for 10% and India for 6%.

By pulling the US out of the Paris agreement but keeping it within the UNFCCC, President Trump has started a process that will take over three years to complete, under the clauses of the agreement. That means this will become

> " The nations that remain in the Paris Agreement will be the nations that reap the benefits in jobs and industries created."
>
> — Barack Obma

> If the White House won't lead, California will step up. We will continue our fight against climate change. #ParisAgreement #ActOnClimate
>
> —— Sen Dianne Feinstein (@SenFeinstein) June 1, 2017

a major topic of debate during the 2020 US presidential campaign.

Trump is clearly looking at his support base rather than global leaders, some of whom were scathing in their condemnation.

Explaining to Trump "in clear, simple sentences"

European Commission President Jean Claude-Juncker said Trump doesn't "comprehensively understand" the terms of the accord, though European leaders tried to explain the process for withdrawing to him "in clear, simple sentences" during summit meetings last week. "It looks like that attempt failed."

In more measured language, the UNFCCC secretariat was equally firm, saying, "The Paris Agreement remains a historic treaty signed by 194 and ratified by 147 countries. Therefore, it cannot be renegotiated based on the request of a single Party (country)."

Criticism from within the US

Soon after Donald Trump told the world that the US would withdraw from the Paris Agreement, a coalition of 61 US cities and three states vowed to uphold it anyway.

Even within the US, many critics of the pull-out used strong language. Michael Brune, head of the largest US environmental NGO, the Sierra Club, said, "Generations from now, Americans will look back at Donald Trump's decision to leave the Paris Agreement as one of the most ignorant and dangerous actions ever taken by any President… Trump has isolated our country on the world stage, ceding our leadership position and our economic advantage on clean energy to India and China."

Susanne Moser of Stanford University said, "Trump supporters voted for an America that is a great place to live, to raise a family, to find meaningful work and see one's grandchildren have a better future. They did not vote to have floods wash away their dreams, droughts wither their livelihoods, wildfires to make their homes go up in smoke, rising seas inundate their communities and dirty air give their children asthma.

Their legitimate needs and hopeful desires are being misused, not to make America great again, but to make America – and everyone else – suffer greatly."

A recent Yale Programme on Climate Change Communication poll found that nearly 70% of Americans, including a majority in all 50 states, support US participation in the Paris Agreement.

A new EU-China climate alliance

Following the announcement, the EU and China said they would deepen commitments on climate change.

At this year's 12th EU-China Business Summit, the EU and China pledged to work together on a range of areas from clean energy and product standards to managing risk and adaptation. Alongside redoubling efforts to cut pollution, the EU and China have committed to finding shared solutions for adapting to climate impacts.

Nick Mabey, chief executive of UK climate think thank E3G said:

"This is the strongest bilateral statement on climate I have seen. President Trump has driven the EU and China together to write the rules for the clean economy"

Li Shuo, climate policy advisor of Greenpeace East

Asia, said:

"The rapid backlash of US climate action requires enhanced leadership from all other countries. We are seeing new leadership taking shape between Brussels and Beijing today in concrete terms."

He added: "To demonstrate Beijing and Brussels can truly lead, both need to accelerate their domestic actions."

Indian civil society responds

Green groups in India were strong in their criticism. New Delhi-based think tank Centre for Science and Environment (CSE) said:

"Without the substantial emission cuts that the US is responsible for, the objectives of the Paris Agreement to restrict global warming to 2C cannot be met."

Sunita Narain, the head of CSE, said that even in the past, "To accommodate US interests, countries have worked towards making climate agreements weak. The Kyoto Protocol had weak targets. Likewise, to bring back the US under the UN climate framework, the Paris Agreement was made a voluntary, bottom-up decentralised regime with no emission reduction commitments for countries and no punitive measures if countries failed to meet their targets… The pulling out of the Paris Agreement means that the US will not fulfil its already weak commitments."

She also criticised the consequent shutting off of US funding. "This would mean that funding to the Green Climate Fund, meant to help developing countries to address climate change, would suffer tremendously… The US cannot continue to keep the world hostage. Pulling out of the Paris Agreement would mean that with 5% of the world population, the US, will continue to jeopardise the remaining 95%. Countries need to hold the US accountable for decisions that have a global impact."

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Joydeep Gupta is South Asia director of The Third Pole.

谁能扛起全球气候变化领袖大旗?

随着美国的后退，国际社会需要面对气候行动去中心化的现实。

□ 徐·安琪　卡琳·罗森加滕

近日，美国总统唐纳德·特朗普和中国主席习近平在美国海湖庄园举行会晤。会谈中，两人重点讨论了贸易和国家安全问题，对气候变化这一两国近年来的主要合作领域却避而不谈。

角色翻转

近几年来，中美在气候变化问题上的立场已经发生翻转。面对特朗普对气候议题放任不管的态度，现在已经换成中国呼吁“西方舆论……对特朗普政府施压，要求其直面气候变化。”

特朗普总统已经开始着手撤销前任留下的气候政策。他签署行政命令（本质上为总统备忘录），要求环保署重新评估奥巴马政府《清洁电力计划》，修改针对新建燃煤电厂的排放标准，取消减少甲烷排放的规定，重新计算碳排放的社会成本，允许公司在联邦土地上开采煤矿，并提出在制定其他领域的国家政策时无需考虑气候变化。

另一方面，中国正在为自己的全球气候努力寻求新的合作伙伴。习近平主席一直在积极地维护《巴黎协定》，他近乎直白地警告特朗普政府说，这一具有里程碑意义的气候协议决不能“脱轨”。

中国官员也纷纷通过大众媒体表达对特朗普的批评，提醒美国民众共和党在气候外交中一贯表现不佳。

如此讽刺的角色逆转没能逃过记者和政治评论员们的眼睛。“特朗普撤销气候政策后中国将成为全球气候领袖，”纽约时报近来一篇报道的标题如是说。而美国有线电视新闻网络（CNN）则提出问题：“中国能否收拾美国在气候变化问题上留下的烂摊子？”

根据中国方面的消息，答案是“不能”。中国一家官方报纸认为特朗普政府的态度“很自私”，并称“北京方面无论怎么努力，都无法承担起华盛顿撂下的所有责任。”

气候领袖责任重大

这些言论一方面是出于中国一贯的谦逊姿态和低调的行事风格，一方面则是因为中国政府希望降低外界的期待。但中国迟迟不愿接受全球气候变化领导者的头衔，引出了我们讨论领导地位时的一个非常重要的区分：即外交领导（即站在高处总领全局）与实际领导（即通过实际行动领导抗击气候变化）的区分。

特朗普总统已经完全放弃奥巴马在任期间树立的美国在气候方面的外交领导地位。奥巴马政府曾和中国等国家合作，壮大了应对气候变化的全球运动，而新政府却扬言要退出一切多边气候外交，并阻止本国的气候努力。

从最近的行政命令来看，特朗普政府还准备放弃美国在气候领域的实际领导地位。

但美国就像一艘大船，有着自身的动力和惯性，无法轻易改变航行的路线。其独特的联邦制形式限

制了总统在国内事务上的权力，且限制程度比大多数人认为的都要高。

虽然特朗普开始挑战奥巴马的车辆燃油效率标准，但加利福尼亚州却先他一步，制定了全国最为严格的尾气排放标准。尽管联邦碳排放限额近期出台无望，但基于市场的温室气体减排项目区域温室气体倡议已经扩大到美国东北部的 9 个州。在美国的 50 个州中，有 37 个实行了不同程度的可再生能源配额标准。

除此之外，全球经济趋势也在推动清洁能源在美国的发展。能源领域绝大部分新增就业都来自可再生能源生产；事实上，太阳能行业的用工人数要高于高度自动化的石油、煤炭和天然气行业用工人数的总和。特朗普只能竭力掩盖这些趋势，阻碍其进程，但正如前总统奥巴马为《科学》杂志撰写的文章所说，没有一位总统能够阻止清洁能源稳步前进的步伐。

中国也在帮助推动可再生能源的全球扩张，用实际行动承担起气候领导责任，而不仅仅停留在外交层面。今年，中国政府将建立全国碳交易市场，年碳排放配额在 30 到 50 亿吨之间，预计将成为全球最大的碳交易市场。

中国还计划在 2020 年之前投资 3610 亿美元发展可再生能源，中国的政治体制也确保了不会出现影响计划执行的政治风向变化。

但这些大手笔的气候举措并不能改变中国是一个中等收入发展中国家的事实。中国的人均收入仅为美国的七分之一。“中国在长时间内都将是全球最大的发展中国家，”一篇《环球时报》英文版社论近来写道，“怎么能指望中国为西方发达国家牺牲自己的发展空间呢？”

这种说法虽有些故作谦虚，但也是实话。中国在可再生能源方面的投资虽大，但也仍在投资和出口煤炭。未来 5 年中国的煤炭装机预计将增长 19%，而到 2020 年可再生能源将仅占全国一次能源消费的 15%。

政府制定了治理空气污染的计划，但如今中国的空气污染仍是全球最严重的——每年有上百万例过早死亡与空气污染有关。

中国能否脱颖而出、后来居上，担起领导大任？这对中国而言将是一个未知的领域，且不符合其向来低调的国际外交风格。

这就是中国面临的困境：在保持快速发展的同时填补气候领导的缺位。这一矛盾限制了中国领导气候事业的能力。“就气候变化而言，中国不是那种能够把其他国家团结起来的领袖，”绿色和平组织北京办公室的资深项目主任柳力表示。

事实上，没有一个国家或国家团体能够填补美国退出气候行动后空出的领导位置。中国只能在其力所能及的领域担任实际领导，例如可再生能源投资。

特朗普总统和习近平主席在佛罗里达州棕榈滩会晤时或许没有谈及气候变化问题，但随着海平面上升，海水不断拍打两国的海岸，地方辖区、非政府团体和先锋企业都将推进追求更好的气候未来。

由于美国仍然是这个世界上最强大的国家，直到有一个更具前瞻性思维的政府执掌美国之前，全球气候外交领域的领导地位都将处于去中心化的状况。

徐·安琪博士，耶鲁大学森林与环境学院研究员、讲师

卡琳·罗森加滕，耶鲁数据驱动组织研究员。

张姚琳（音）：耶鲁–新加坡国立大学学院以及新加坡国立大学法学生，对本文研究亦有贡献。

Climate leadership void

What happens if neither the US nor China is ready to take the lead

□ Angel Hsu Carlin Rosengarten

As the US retreats from its role as climate leader, don't expect China to take on all aspects of the role

At the recent meeting of presidents Donald Trump and Xi Jinping at Mar-a-Lago, climate change was sidelined in favour of trade and national security discussions despite it being a major area of cooperation between the US and China in recent years.

Switching roles

The stance of each country on climate change seems to have flipped in the last few years, and spurred by Trump's abandonment of the issue, the Chinese are now calling for "Western opinion...to...pressure the Trump administration on climate change."

President Trump has set about dismantling his predecessor's climate policies. Last month he issued an executive order, essentially a memo from the president to his cabinet, instructing the Environmental Protection Agency to rewrite Obama's Clean Power Plan, revise emissions standards for new coal plants, and undo regulations on methane emissions; to calculate a new Social Cost of Carbon; lift a moratorium on coal mining on federal lands; and to disregard climate change in other areas of national policymaking.

China, on the other hand, is searching for new partners in its global climate efforts, and President Xi has vigorously defended the Paris Agreement, saying, in a thinly veiled warning to the Trump administration, that the landmark climate agreement must not be "derailed."

Chinese officials have also used popular media to scold President Trump and remind Americans of the Republican Party's historic leadership in climate change diplomacy.

The irony of this role reversal is not lost on journalists and political commentators. "China poised to take lead on climate after Trump's move to undo policies," reported the *New York Times* recently. While *CNN* asked, "Can China pick up US slack on climate change?"

According to the Chinese, the answer is "no". Calling the Trump administration's attitude "selfish," a Chinese state-run newspaper recently declared, "No matter how hard Beijing tries it won't be able to take on all the responsibilities that Washington refuses to."

Words versus deeds

These statements are, in part, political deflection from Beijing, as the government tries to dampen expectations and downplay its own agenda with characteristic humility. Yet China demurring to accept the title of global leader on climate change points to an important distinction when discussing leadership: that of diplomatic leadership – leading from the pulpit – and actualised leadership – leading by doing.

President Trump has entirely ceded the US diplomatic climate leadership that Obama had carefully cultivated during his two terms in office. Whereas the Obama administration worked with China and other countries to nurture a global movement to tackle climate change, the new government promises to abandon all multilateral diplomacy and fight to impede local climate efforts.

The Trump administration is also endeavouring to abandon the US's actual leadership, as proved by the recent executive order.

America, however, is like a massive ship. It has its own momentum and inertia, and its course will not be easily changed. The country's distinct form of federalism limits presidential power on domestic issues to a greater extent than most people realise.

While Trump begins to roll back Obama's vehicle fuel efficiency standards, California is pushing ahead with the country's toughest tailpipe emissions standards. And while there is no near-term hope for a federal cap on carbon, the Regional Greenhouse Gas Initiative, a market-based programme to reduce greenhouse gas emissions, has expanded to nine northeastern states.

Among America's fifty states, thirty-seven have some sort of renewable energy or portfolio standard.

In addition to these political and legal realities, global economic trends provide tailwinds for clean energy in the US. Renewable energy production accounts for the vast majority of new jobs in the energy sector; in fact, solar power employs more people than the highly automated oil, coal, and gas industries combined. Trump can only try to hide these trends and slow their progress, but, as President Obama wrote in *Science Magazine*, no president can halt clean energy's steady march.

China is helping to drive renewable energy's global expansion, taking the country's actual climate leadership beyond mere rhetoric. This year, the government will

establish a national carbon trading market, which with three to five billion tonnes of annual carbon allowances, will be the largest carbon market in the world.

China also plans to invest US$361 billion in renewable energy by 2020, and its one-party system ensures that no shift in the political winds can prevent these outlays.

These climate leadership benchmarks belie the fact that China is a developing middle income country with per capita income about one-seventh that of the United States. "China will remain the world's biggest developing country for a long time," said a recent state-sponsored editorial. "How can it be expected to sacrifice its own development space for developed Western powerhouses?"

There is a bit of coyness in this statement, yet there is also a kernel of truth. Despite China's massive investments in renewable energy, the country is still investing in coal and exporting it. Coal power capacity in China is expected to increase by 19% in the next five years, and renewable power production will account for only 15% of the nation's energy consumption by 2020.

The government has plans to clean the air, yet China today has the deadliest air pollution of any country – one in five deaths attributed to noxious air.

Could China lead the world from the middle of the pack? Leading from behind would be uncharted territory for China and antithetical to its historically understated style of international diplomacy.

This is China's dilemma: needing to sustain rapid development while simultaneously filling a climate leadership vacuum. The tension limits the country's ability to lead on climate. "China is not the kind of leader in terms of climate change that will pull other countries along," said Lauri Myllyvirta, a senior member of Greenpeace in Beijing.

In truth, no country or group of countries can fill the leadership void left by a US retreat from climate action. China will lead only in the areas where it can practically do so – for instance in renewable energy investment.

Presidents Trump and Xi may not have discussed climate change at their meeting in Palm Beach, Florida but as the oceans lap at the shores of both countries in an age of rising seas, subnational jurisdictions, non-government groups, and pioneering businesses will push forward in pursuit of a better climate future.

This decentralised leadership will have to suffice until a more forward thinking administration takes the helm of the US.

Angel Hsu, PhD, is a research scientist and lecturer at the Yale School of Forestry and Environmental Studies.

Carlin Rosengarten is a researcher at Data-Driven Yale.

Yaolin Zhang, a joint Yale-NUS and NUS Law Student contributed research to this piece.

当美国后退时，中国应担起气候领导大任

特朗普政府会将中美双边合作议程推向何方？

□ 乔安娜·刘易斯　李 硕

美国总统特朗普与中国国家主席习近平预计将于今天在美国佛罗里达州的海湖庄园举行会晤。鉴于两国之间的紧张态势和特朗普政府的政治倾向，中美两国，这个全世界最重要的双边关系，在气候议程方面的合作正岌岌可危。为了维持合作，中国必须进行高级别外交策略的调整，并就可能的合作领域进行思考和评估。

八年合作

在评估习-特时代两国气候和能源合作的潜在可能时，我们有必要以史为鉴，吸取过去的几个经验。

首先，中美若不能携手前行，气候变化就无法真正解决。作为全球最大的两个碳排放国，中美两国曾展开合作，凭借自身的国家规模和政治地位动员其他国家采取行动。

特朗普总统将在他在佛罗里达州的马阿拉歌庄园会见到访的习近平主席

双边合作已经促进了多个多边政治协议的达成，这些协议跟中美两国都息息相关，包括巴黎大会上成功达成的全球气候协议，基加利会议上通过的《蒙特利尔议定书》氢氟烃减排修正案，以及国际民航组织（ICAO）通过的航空业减排新协议。

其次，中美两国当前在能源和气候方面合作的深度和广度，是投入了大量政治努力和时间才得来的。两国政府就气候变化和清洁能源开展合作已有数十年。

2009 年以来中美两国的合作有了大大的加强和扩大，两国有数千人在携手开展研究，分享经验和信息，并在清洁能源技术领域展开商业合作。截至奥巴马总统第二任期末，清洁能源合作已经成为两国双边关系的重要基石，是奥巴马政府环境遗产的关键部分。

因此，放弃当前的气候和能源合作将不利于中美两国关系的稳定发展。气候能源合作是奥巴马执政 8 年间中美两国最大的利益交汇点，

> 大多数情况下，中国都是在响应美国制定的议程，而不是居于主导地位来推动议程。今时今日，中国是时候转变外交策略，反客为主了。

两国都致力于减轻国内煤炭产业相关群体面临的经济影响，也都希望成为全球新能源产业发展的领袖。

共同利益促使两国就一系列更为广泛的问题展开对话，其中包括更具争议性的经济和安全话题。中美战略与经济对话作为此类交流渠道之一，不仅建立了新的参与模式，反映出双边关系日益增长的重要性，而且促进了“更高层、更直接、更全面的交流”，成为两国消除潜在冲突的外交渠道。

美国开倒车

特朗普特朗普执政即将接近百日，外界也愈发清晰地看到他对国际气候行动价值的怀疑。《联合国气候变化框架公约》秘书处执行秘书、联合国最高气候外交官帕特里夏·埃斯皮诺萨 2 月下旬访问华盛顿时没有得到特朗普政府官员的接待。

目前，美国国务院缺乏与中国等国际伙伴接洽的高级别气候官员。有传闻称，特朗普与德国总理默克尔会晤时因后者强调气候变化，而使两人不欢而散。而气候变化可能会是今年夏天在德国汉堡举行的 G20 峰会的重要议题。

这也许并不令人吃惊。特朗普 3 月 16 日发布的“美国优先”预算蓝图将取消对国际气候变化项目的资助，包括气候变化研究及伙伴项目、全球气候变化计划、以及支持联合国气候变化项目的资金。

此外，特朗普 3 月 28 日还签署名为“促进能源独立和经济增长”的行政命令，推翻了奥巴马政府包括《气候行动计划》在内的多条关键行政命令，并呼吁美国环保署（EPA）“暂缓、修改或废除”《清洁电力计划》这一美国达成《巴黎协定》中温室气体减排承诺的关键基石。

角色互换

美国的政治形势确实加大了双边合作的难度，但为了维持这种伙伴关系的深度和广度，中美两国既需要转变各自在国际气候外交中扮演的角色，也需要思考和评估双方在能源技术领域合作的首要任务。

鉴于华盛顿当前的政治气候，两国有必要研究确定可行的合作领域。能源技术合作就是潜在的合作领域之一。里根总统在任期间，两国签署了首个化石能源合作协议；小布什政府虽未签署《京都议定书》，但发起了包括亚太清洁发展和气候伙伴关系以及主要经济体会议等多个以国际清洁能源合作为核心的活动。这些伙伴关系为后来奥巴马政府继续推进国际清洁能源合作奠定了基础，催生了主要经济体论坛、清洁能源部长级会议以及近来的创新使命等大批合作。

类似中美清洁能源研究中心（CERC）和中美气候变化工作组（CCWG）这类技术层面的项目扩大了两国高校和国家实验室之间在研究领域的合作。这些项目虽然是双边的，但却推动了本国目标和优先项目的发展和落实。以中美清洁能源研究中心为例，成本由双方平摊，各国政府的资源都流向了本国的合作伙伴。

最后，为了保持国际气候外交的势头，中国必须调整其高级别外交策略，担起领导者的重任。纵观两国能源气候领域的合作史，大多数情况下，中国都是在响应美国制定的议程，而不是居于主导地位来推动议程。今时今日，中国是时候转变外交策略，反客为主了。

美国能否信守承诺对中国而言尤为重要。随着煤炭消耗的下降以及可再生能源产业的蓬勃发展，中国的国内环境正愈发有利于其采取更加积极的行动。

第一步已经完成。3 月下旬在纽约举行的一场联合国高级别气候会议上，中国驻联合国大使重申了本国立场，承诺将“坚决推进全球气候治理”，继续“参与能源效率、可再生能源、低碳城市以及碳交易市场等方面的务实合作。”

中国还将主办最初由美国政府发起的两场重要的国际清洁能源会议，第八届清洁能源部长级会议和第二届创新使命部长级会议都将于 6 月初在北京召开。这两次会议将是中国证明其在这些问题上继续发挥领导作用的绝佳机会，也是美国展示自己将继续与中国和国际社会开展能源技术合作的最佳场合。

乔安娜·刘易斯，乔治城大学埃德蒙·沃尔什外交学院科学、技术和国际关系副教授。

李硕，绿色和平中国区气候与能源项目主任

China must step up on climate leadership

Where has the Trump administration left the US-China bilateral cooperation agenda?

□ Joanna Lewis Li Shuo

Presidents Trump and Xi are scheduled to meet today at Mar-a Lago, Florida, and given the tense state of US-China relations and the political leanings of the Trump administration there is much at stake for cooperation between the countries on the climate agenda – the most important bilateral relationship in the world. To maintain it, both a high-level paradigm shift of China's diplomatic approach and a considered assessment of feasible areas of cooperation are needed.

Eight years of cooperation

In assessing the potential for climate and energy engagement during the Trump-Xi era, it's worth reflecting on a few lessons from the past.

First, there is no real solution to climate change without the US and China travelling in the same direction. Together the world's two largest emitters have leveraged their size and political significance to mobilise action from other countries.

Bilateral cooperation has led to political alignment on several multilateral outcomes in which both countries had a stake. This includes a successful global climate deal in Paris, a new amendment to the Montreal Protocol in Kigali to control HFC emissions, and a new agreement to address aviation emissions through ICAO.

Second, it has taken great political efforts and time to achieve the breadth and depth of the current energy and climate relationship. Washington and Beijing have been cooperating on climate change and clean energy for several decades.

Since 2009, this cooperation has been greatly enhanced and expanded, resulting in thousands of people from both countries working together to do collaborative research, to share experiences and information, and to develop commercial ventures to deploy clean energy technology. By the end of President Obama's second term, clean energy cooperation had become the cornerstone of the bilateral relationship, and a key part of the Obama administration's environmental legacy.

As a result, walking away from climate and energy cooperation could be destabilising for the broader US-China relationship. During the eight years of the Obama administration, there was no other issue on which the countries had greater common interest, ranging from their shared concerns about mitigating the economic impacts facing domestic coal communities, to their desire to be global leaders in the development of new energy industries.

This alignment of interests helped facilitate dialogue on a broader set of issues, including more contentious economic and security topics. One vehicle for such exchanges, the Strategic and Economic Dialogue, established a new model for engagement that reflected the growing importance of the relationship, providing "more senior, more direct, and more comprehensive communication," and providing a diplomatic channel for diffusing potential conflict.

Stepping back

As we approach the end of the first 100 days of the Trump administration, it is becoming increasingly clear that the president is sceptical of the value of international climate engagement. UNFCCC executive secretary Patricia Espinosa, the UN's top climate diplomat, was not received by Trump administration officials during her late February visit to Washington.

The US State Department now lacks a high-level climate official to engage with international counterparts, including from China. President Trump's meeting with German Chancellor Merkel reportedly turned sour when she emphasised climate change, which is likely to be a key issue when Germany hosts the G20 summit in Hamburg this summer.

Perhaps this is unsurprising. Trump's March 16 "America First" budget blueprint would eliminate funding for international climate change programmes, including climate change research and partnership programmes, the Global Climate Change Initiative, and payments to the UN climate change programmes.

In addition, the March 28 Executive Order "Promoting Energy Independence and Economic Growth" revokes key Obama administration executive orders including the Climate Action Plan and calls upon the EPA to "suspend, revise or rescind" the Clean Power Plan, the cornerstones of the US greenhouse gas reduction pledge under the Paris Agreement.

> "Ultimately, a high-level paradigm shift will be required to maintain international momentum on climate diplomacy, with China stepping into the leadership role."

Role reversal

The US political situation certainly makes bilateral engagement much harder. That said, both a high-level paradigm shift of the respective roles that China and the United States play in international climate diplomacy, and a considered assessment of energy technology cooperation priorities, may be needed to maintain the broad and deep partnerships at the heart of the most important bilateral relationship in the world.

It is worth examining areas of joint work that may be feasible given the current political climate in Washington. Energy technology cooperation is one potential area. Ronald Regan was president when the first protocol for fossil energy cooperation between the two countries was launched. While the George W Bush administration took the US out of the Kyoto Protocol, it launched several initiatives focusing on international clean energy cooperation, including the Asia Pacific Partnership on Clean Development and Climate, and the Major Economies Meeting. These partnerships laid a foundation for international clean energy cooperation that was continued under the Obama administration, including the Major Economies Forum, the Clean Energy Ministerial, and most recently Mission Innovation.

US-China initiatives like the US-China Clean Energy Research Center (CERC) and the Climate Change Working

Group (CCWG) are highly technical and have expanded collaborative research among our universities and national laboratories. These initiatives are bilateral but leverage national goals and priorities. For example in the case of the CERC, costs are split 50-50 between the United States and China, with all US government resources flowing to US-based partners and all Chinese government resources flowing to Chinese-based partners.

Ultimately, a high-level paradigm shift will be required to maintain international momentum on climate diplomacy, with China stepping into the leadership role. In much of the history of bilateral energy and climate engagement with the United States, China has primarily been reacting to a US-driven agenda, rather than being the primary driver of the agenda. The time has come for China to shift its own diplomatic approach from sitting in the backseat to holding the wheel.

China also holds a special stake in keeping the US accountable with its commitments. With its slowing coal consumption and a booming renewable energy industry, China increasingly has the right domestic conditions to take a more active role.

A first step has already been made. In a high level UN climate event in New York in late March, China's UN ambassador reaffirmed the country's position to remain "steadfast in its determination to advance global climate governance" and to continue to "engage in pragmatic cooperation in such areas as energy efficiency, renewable energy, low-carbon cities and carbon markets."

China is also hosting two key international clean energy meetings that were originally conceived by the US government. The 8th Clean Energy Ministerial and 2nd Mission Innovation Ministerial will be held in Beijing in early June. These events are a great opportunity for China to demonstrate continued leadership on these issues and for the US to show that it will continue to engage with China and the international community on energy technology cooperation.

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中印可弥补美国退出《巴黎协定》不利影响

最新研究预测，只要印度与中国实现各自的能源计划，就算美国退出《巴黎协定》也不会影响全球减排目标的达成。

□ 苏姆亚 · 萨卡尔

可再生能源价格优势日益凸显，意味着印度和中国的排放量可能会比预计的要低

一项本周发布的最新研究表明，虽然美国有可能退出《巴黎协定》，但如果印度与中国按计划大幅超出《巴黎协议》中制定的减排目标，将可保证全球气候行动顺利进行。

美国碳排放量居世界第二。在5月26-27日举行的七国领导人会晤中，美国或将决定退出《巴黎协定》。对此，美国内阁中也存在严重分歧。据众多媒体报道，美国高级总统顾问 —— 特朗普的女儿伊万卡及女婿贾里德 · 库什纳，以及美国国务卿雷克斯 · 蒂勒森都反对退出《巴黎协定》；而美国环境保护署署长斯科特 · 普鲁特及高级顾问史蒂芬 · 班农曾多次劝说特朗普退出气候协定。

相比之下，中国煤炭用量不断

减少，印度碳排放量到2030年也将减少20亿-30亿吨。据 气候行动追踪组织（CAT）的一项研究表明，考虑到中印两国在气候行动中发挥的重要作用，即便特朗普内阁气候政策“开倒车”，也不太可能对全球减排行动产生重大影响。CAT由气候分析组织及新型气候研究所两家非营利组织和可持续能源服务与创新公司 (Ecofys) 共同组建。

新型气候研究所的尼克拉斯·霍讷路在一项声明中说：“若无其他方面进行弥补和对冲，特朗普内阁在气候政策上的“反水”行为将会使美国碳排放结束下降趋势而进入平台期。”

新兴气候领袖闪亮登场

中国煤炭消耗量已连续三年下降（2013年至2016年），预计下降趋势还将延续。印度在《国家能源计划草案》中表示取消计划中建设的燃煤发电厂。据气候行动追踪组织分析，若印度能够严格落实近期发布的行动计划，未来十年间碳排放量将实现大幅下降。

气候分析组织比尔·黑尔说：“五年前，对于中国和印度这样的国家，燃煤发电厂是满足其能源需求的关键所在，想要停止、甚至减少煤炭用量简直比登天还难，不过，近来许多研究都表明现如今他们已经有能力应对这样的难题。”

气候分析组织称，中印两国在气候行动中取得的积极成果，将弥补特朗普气候政策“反水”带来的不利影响。如果特朗普如愿以偿，那么到2030年美国碳排放量将比原计划增加4亿吨左右。

根据2013年奥巴马政府推出的《气候行动计划》，美国期望通过大力推行清洁能源、提高能源利用率、改善机动车燃油标准以及实施《清洁电力计划》等，使其碳排放量到2025年比2005年降低26%-28%。据《华盛顿时报》报道，该计划的大多数政策都已停止。

中、印能源革命或将力挽狂澜

气候行动追踪组织分析称，中国和印度将会弥补美国在气候政策上的“反水”。在《巴黎协定》中，中国承诺二氧化碳排放在2030年左右达到峰值，将非化石能源占能源消费的比重提高至20%。印度也承诺在2030年前将非化石能源的比重至少提高到40%。分析称，中印两国能源结构的转型升级，尤其是可再生能源的发展，将会大大提高两国在气候变化行动中的领军地位。

Ecofys的伊冯娜·邓表示，世界能源市场在过去十年间不断转型升级，风能、太阳能等可再生能源价格大幅降低，价格优势日益凸显，其装机增速也远高于燃煤发电厂。

印度去年公布的能源计划中，明确表示在2027年之前，将燃煤发电装机增量从230GW降至50GW。作为世界第三大碳排放国，印度计划于2027年前将非化石能源发电比重提高至一半以上，远超于对《巴黎协定》的承诺。

作为全球最大的煤炭消费国和最大的温室气体排放国，中国的煤炭消耗已经连续三年实现下跌。伊冯娜·邓对《华盛顿时报》表示：“过去三年的下跌究竟是短暂的停滞，还是代表中国已经到达碳排放峰值，目前还很难说。若后者假设成立，且以目前的速度降低，那么到2030年碳排放量将比我们去年预计的值还要低10亿-20亿吨。”

CAT分析称，中国正加快限制和降低温室气体排放，虽然与目标仍有距离，但行动速度已经逐渐逼近实现巴黎协定长期目标需要的水平。

基于印度的《国家能源计划草案》》，CAT预计印度的碳排放量未来将大幅降低，截至2030年，将比2005年的水平低51%-53%，远超《巴黎协定》的预期目标。

苏姆亚·萨卡尔，新德里记者及编辑

India, China will offset Trump's climate backslide

The two major carbon emitters could ensure the global climate target is met, even without US action, predicts new study

□ Soumya Sarkar

With the US likely to fall short of its Paris Agreement pledge to reduce carbon emissions, a new analysis released last week claims that overachievement by India and China will ensure progress on climate action is not stymied.

The US, the world's second-largest carbon emitter, may withdraw entirely from the Paris deal. The decision will likely be taken after a meeting of G7 nations between May 26 and 27. President Trump's daughter Ivanka and son-in-law Jared Kushner, who are senior presidential advisers, as well as secretary of state Rex Tillerson are in favour of remaining, while Environmental Protection Agency chief Scott Pruitt and senior adviser Steve Bannon have urged Trump to withdraw, according to multiple media reports.

> "The recent rollbacks by the Trump administration are unlikely to have a major impact on global emissions"

However, lower coal use than expected in China and India is likely to reduce projected global carbon emissions by roughly two to three billion tonnes by 2030. This means the recent rollbacks by the Trump administration are unlikely to have a major impact on global emissions by then, according to a study by Climate Action Tracker (CAT), a joint project by non-profit organisations Climate Analytics and NewClimate Institute, and climate consulting agency Ecofys.

"The highly adverse rollbacks of US climate policies by the Trump administration, if fully implemented and not compensated by other actors, are projected to flatten US emissions instead of continuing on a downward trend," said Niklas Höhne of NewClimate Institute in a statement.

Knights in shining armour

The analysis expects a continued slow decline in China's coal consumption, which has fallen for three consecutive years (2013 to 2016). India has said in its draft national energy plan that its planned coal-fired power plants may not

be needed. If India fully implements recently announced policies, it would see growth of carbon dioxide (CO_2) emissions slow over the next decade, the CAT analysis said.

"Five years ago, the idea of either China or India stopping, or even slowing, coal use was considered an insurmountable hurdle, as coal-fired power plants were thought by many to be necessary to satisfy the energy demands of these countries," said Bill Hare of Climate Analytics. "Recent observations show they are now on the way toward overcoming this challenge."

The positive developments in India and China outweigh the potentially negative effects on emissions from Trump's proposed rollbacks in the US, estimated at around 0.4 gigatonnes of CO_2 by 2030, CAT said.

According to the Climate Action Plan outlined by the Obama administration in 2013, the US wanted to reduce its carbon emissions by 26% to 28% below its 2005 levels by 2025 by expanding clean energy, energy efficiency programmes and transportation strategies, and by implementing its Clean Power Plan. Much of this seems to have stalled, according to a report by the *Washington Post.*

Picking up the slack

The CAT analysis says that the slack by the US will be picked up by India and China. China promised in Paris to peak its carbon dioxide emissions by 2030 and increase the non-fossil fuel share of its energy consumption to around 20%. India pledged to boost its share of non-fossil fuel energy to at least 40% by 2030. New developments in both countries' energy landscapes, particularly in regard to renewables, have put them ahead of the game in terms of meeting their goals, the analysis said.

"In the last 10 years, the energy market has transformed. The price of renewable energy from wind and solar has dropped drastically," said Yvonne Deng of Ecofys. "Renewables are now cost-competitive and being built at a much faster rate than coal-fired power plants."

India's energy plan released late last year has significantly reduced its projections for additional coal capacity in the years to 2027 by reducing plans from about an additional 230 gigawatts to 50 gigawatts. The South Asian nation, which is the world's third-largest carbon emitter, expects more than half of its power capacity to come from non-fossil fuel sources by 2027, putting it far ahead of its Paris commitments.

In China, the world's biggest consumer of coal and emitter of greenhouse gases, there have now been three consecutive years of falling coal consumption. "It is unclear whether these last three years are merely a pause in a steady growth or whether this is a sign of China having reached its peak in coal consumption," Deng told the *Washington Post*. "But if it is a peak, and if coal consumption continues to decrease at a similar rate, then this could lead to emissions in 2030 being around one to two gigatonnes lower than our estimate last year."

China is accelerating its pace of limiting and reducing greenhouse gas emissions, and moving closer to what is necessary to achieve the Paris long-term temperature limit, although a gap still remains, the CAT analysis said.

Based on India's draft electricity plan, CAT calculates that the country will significantly reduce its emissions, and by 2030, its emissions intensity will be 51-53% below 2005 levels, exceeding its Paris target.

Soumya Sarkar is a New Delhi-based writer and editor.

德国将如何影响2017年国际气候议程?

G20峰会连着大选，2017年给了德国巩固其国际领导力的机会，而气候政策是默克尔至关重要的一颗棋子。

□ 苏珊·格策

去年11月的联合国气候大会召开时，正值美国大选尘埃落定。当特朗普获胜的消息在11月10日传至马拉喀什，与会代表们开始意识到：气候外交需要建立新的领导联盟。世界秩序已经改变，全球的目光开始投向中国。

中国政府能否拯救《巴黎协定》？他会选择谁作为自己的伙伴？中国之星正在冉冉升起，全世界都有目共睹。

几天之后，德国环境部长芭芭拉·亨德里克斯在谈判间隙赞扬了中国在此次峰会上的表现，并表示："欧盟和中国必须站出来弥补空缺。"

老牌欧洲气候领袖

多年来，德国和包括中国在内的多个国家合作，建立了欧盟碳排放交易体系（ETS）。作为全球首个大型碳交易市场，该体系为欧盟气候变化政策奠定了基础。中国将于今年启动全国碳排放交易计划。即便美国真的退出多边谈判，中德之间的紧密关系也将有助于构建新型气候合作伙伴的基础。

德国不仅是二十国集团（G20）峰会的新一任主席国，还代表《联合国气候变化框架公约》第23次缔约方会议的主办国斐济群岛在波恩组织了此次会议。作为欧洲大国，德国正在寻找一个强大的盟友。

德国政府将于今年9月迎来联邦议会选举，而6月中旬举行的G20峰会若未能取得实质性成果，或将对该国政坛产生重大影响。面对重重压力，德国能否推进其气候议程，建立新的联盟呢？

"气候总理"怎样布置G20峰会议程

一方面，德国以生态保护领导者自居，而安格拉·默克尔也继续在外交谈判中扮演着强有力的角色。如果默克尔把气候问题提上G20的讨论日程，与会各国就不得不重视。此外，适值选举年，政府会尽其所能在全国范围内塑造自己强大的形象，而气候政治向来是一招好棋。

另一方面，德国环境战略带来的变革或许并没有那么彻底；默克尔曾一度被称为"气候总理"，但事实上很多国家在这方面都已经赶超德国。默克尔政府前经济部长（近来被任命为国务秘书）西格玛尔·加布里尔多年来一直对煤炭产业维护有加，甚至在他卸任经济部长一职前的最后一个星期还在反对淘汰煤炭。因此在气候领导方面，德国当局并没有表面上看起来那么强大。

虽然德国联邦环境局（UBA）称，德国需尽快出台具体的方案以淘汰燃煤电站，但西格玛尔·加布里尔却表示自己不想确定具体的淘汰日期。德国目前有超过140座燃煤电站仍在运营中。环境局表示，煤炭淘汰虽极具争议，但如果不这么做，德国就无法实现其在《巴黎协定》中许下的2030年气候目标。近来政府更是承认，就连2020年的气候目标或许也无法实现。

德国是G20峰会的新一任主席国，将代表斐济群岛在波恩组织此次会议

而美国未来政策的不确定性则是另一大挑战。特朗普上台后，美国可能会彻底背弃先前的气候承诺。

在德国，很多人都在试图游说政府不要主办G20峰会。去年12月，数百名反对者齐聚汉堡举行示威活动。据组织者称，此次活动是汉堡历史上规模最大的示威活动之一。

尽管存在诸多不稳定因素，非政府组织和企业代表组成的联盟预计仍将会推动碳定价的进程，将其作为达成《巴黎协定》气候目标的手段之一。

有“牙齿”的国际碳定价机制

“我们希望德国政府能够把此前已经获得共识的碳定价机制提上G20日程，包括在中长期内逐步提高碳价格。此类国际统一的价格信号能够防止市场主要参与者之间出现恶性竞争，”德国工业联合会（BDI）的霍尔格·廖什说，BDI代表了德国37个行业协会。

德国环境部的一位发言人表示，他们支持全球层面的碳定价，目标是在全球范围内推广这种市场机制，促进国际碳交易市场的“和谐化”。

非政府组织德国观察（Germanwatch）的政治主管、联盟成员克里斯托弗·巴尔斯认为，激进的二氧化碳定价计划有助于揭示温室气体排放的真实成本，可以避免重蹈欧盟碳排放交易体系的覆辙。后者的震慑力过弱，没有对投资决策产生实质性影响。

化石燃料补贴预计是峰会议程上的第二大话题。G20成员国每年花费约4400亿美元支持化石燃料行业，为了在2020年之前彻底淘汰此种补贴，各国面临的压力也越来越大。

德国科学与政治基金会（SWP）气候专家苏珊·德勒格认为，各国在削减化石燃料补贴上达成承诺的可能性要比出台碳定价机制更高，因为这对大多数国家都更有益。

德国此次主办G20峰会是国际气候政策的推进的机会。气候话题理所当然会排上议程，但主要问题在于，政治领袖们是否会讨论具体行动，而不只是停留在想法层面？之后各国是否会达成一致的决议？现在的不确定因素仍是美国总统特朗普。在6月的峰会召开之前，只有强硬的外交才能确保峰会在气候政策上取得实质性进展。

苏珊·格策，德国气候和能源政策网络杂志www.klimaretter.de负责人

Germany's new climate alliances?

2017 will be a decisive year for Germany's political leadership. Can Merkel make climate the priority?

□ Susanne Götze

When the US election result was announced in November last year, the UN's climate conference in Marrakech was already underway. Within hours an idea started to spread among the delegations and observer offices: climate diplomacy would need new leading alliances. With the election of President Trump, the old world order looked to have changed and attention was shifting towards China.

Would the Chinese government safeguard the Paris Agreement? And which partner would it choose? China's star was rising and everybody knew it.

A few days later from the sidelines of the negotiations the German Minister of Environment, Barbara Hendricks, praised China's performance at the summit, saying: "The European Union and China have to bridge the gap."

A strong foundation

Germany has already been working together with other countries, including China, for years to establish the Emission Trading System (ETS), the world's first major carbon market and the cornerstone of EU policy to combat climate change. This year China will launch its own national ETS scheme. This close relationship could be helpful in forming the foundation of a new international climate partnership, even if the US stepped away from its role at multilateral negotiations.

Germany, as a European leader, is looking for a strong ally in this crucial year that sees it host the G20 presidency and organise the UN climate conference (COP23) in Bonn, on behalf of official hosts the Fiji Islands.

Since Germany's government has to face federal elections in September, an unsuccessful G20 in June could have a big impact on the country's political future. Amid these pressures, can Germany further the climate agenda and foster new alliances?

The climate agenda

On the one hand, the country presents itself as an ecological leader and Angela Merkel continues being a strong player in diplomatic negotiations. If Merkel puts climate issues on the table at the G20 her guests cannot ignore them.

Furthermore, as this is an election year the government will do everything it can to present a strong image nationally; and climate politics is always a good card to play.

On the other hand, Germany's environmental strategy may not be that transformative after all; there are many countries which have overtaken the "Klimakanzlerin" (Climate Chancellor) as she was once dubbed. Her former Minister for Economic Affairs (recently appointed Secretary of State), Sigmar Gabriel, protected the coal industry for years and until his very last week in office opposed the idea of a coal exit. Germany's authority when it comes to climate leadership might not, therefore, be a strong as it seems.

While the German Environment Agency (UBA) claims that Germany needs a quick and concrete plan to ban coal-fired power stations – there are still more than 140 stations in operation – Sigmar Gabriel declared that he doesn't want to fix an exit date. Without the disputed coal exit, says the UBA, Germany won't meet its 2030 climate targets according to the Paris Agreement. Even the 2020 targets won't be achieved, admitted the government recently.

Another challenge is the uncertainty over the future policy of the US, which could walk away from its climate commitments altogether.

In Germany, many people are lobbying against Germany hosting the G20. Hundreds of protesters met in Hamburg in December for one of the biggest demonstrations the town had ever seen, according to the organisers.

Despite these destabilising factors, an alliance of non-governmental organisations and representatives of business are expected to push for progress on carbon pricing as a means to achieve the climate goals set forth in the Paris Agreement.

Carbon pricing

"We hope that the German government will put the introduction of the agreed upon carbon prices on the G20 agenda, including the gradual up-scaling of those prices over the medium to long term. Such an internationally agreed price signal would prevent distortion of competition among the major players," said Holger Lösch, from the German BDI, which represents 37 German industry associations.

The German Ministry of Environment is in favour of carbon pricing on an international level, a spokesperson said. Their aim is to push ahead with this market mechanism worldwide and to "harmonise" international carbon markets.

Christoph Bals, political director of the NGO Germanwatch and member of this coalition, argues that ambitious CO2 pricing will help reveal the real costs of greenhouse gas emissions, instead of repeating the mistakes of the toothless EU ETS, which has failed to have a significant impact on investment decisions.

The second topic expected to be on the agenda are fossil subsidies. G20 countries spend around US$440 billion annually to support fossil fuel industries and face mounting pressure for a full phase out by 2020

A commitment to reduce fossil subsidies is more likely than CO_2 pricing as it is more beneficial for a majority of countries, suggests German climate expert Susanne Dröge from the foundation Stiftung Wissenschaft und Politik (SWP).

The German G20 presidency is an opportunity for international climate policy to progress. Of course, as a topic is will be formally announced at the table but the main questions are: will the political leaders discuss concrete actions over ideals? And will there be a collective resolution afterwards? The blind spot remains President Trump. Only tough diplomacy in the run-up to the summit in June can guarantee real progress.

Susanne Götze runs www.klimaretter.de a German web-magazine dedicated to climate and energy policy coverage.

中欧联手能保《巴黎协定》薪火不灭吗?

随着美国的退出，中国和欧盟成为了推动全球实现减排目标的中坚力量。四位中国专家分享了他们对这对新盟友的看法。

□ 中外对话

在美国总统特朗普宣布退出《巴黎气候协定》的24小时内，欧盟和中国的领导人共同承诺减少化石能源的使用，向不发达国家提供气候援助，并推动低碳技术的发展。

尽管当前欧盟一些成员国减排力度不够，其他国家也在勉力维持其应对气候变化的势头，但基于双方共同的经济利益和环境现实考虑，中国专家表示看好中欧合作。

徐晋涛　北京大学国家发展研究院副院长

"以目前的情况来看，也只能中国和欧洲合作推进了。国际贸易领域的谈判不会是中欧气候合作的障碍。在气候领域，中国的内在动力来自于国内环保减排的压力；而欧洲历来有环保积极的理念，很多欧洲国家非常绿色清洁。如果中国、印度等国排放量一直增长，其市场主体的相对竞争力会降低。因此，双方都有在气候领域合作的动力。"

邹骥　哈尔滨工业大学（深圳）经济管理学院特聘教授、中国人民大学环境学院兼职教授"

"中欧气候合作是必然的，也是一贯的，还会继续进行下去。巴黎协定的谈判成功，固然是中美合作的重要成果，中欧、中国和广大发展中国家的合作都功不可没、不可或缺，它是多边合作的产物。巴黎协定有190多个缔约方，绝大多数缔约方不会因美国退出而放弃巴黎协定，它们的贡献承诺是“国家自主决定”的，这个就是巴黎协定之生命力所在。美国缺席，音量音色会有缺失，但交响乐会继续演奏。"

张海滨　北京大学国际关系学院教授、商务部贸易与环境专家组成员"

“作为全球温室气体排放量第二大、政治经济影响力最广的大国，美国的退出将出现领导力的真空；而当前欧盟受制于英国脱欧谈判和其它多重危机，在领导气候变化的问题上心有余而力不足。种种因素，皆造成《巴黎协定》履约过程中面临的“领导力赤字”问题更加严重。”

“中国无力独自填补美国留下的真空，但可扮演粘合剂和协调者的角色，中国可以积极倡导欧盟和基础四国（巴西、南非、印度、中国）集体领导，在“一带一路”建设中，加大与《巴黎协定》和《2030年可持续发展议程》的对接程度，进一步推动南南气候合作，将美国特朗普政府消极的气候政策所产生的负面影响降至最低。”

李硕　绿色和平组织东亚气候政策顾问

“随着美国迅速退出巴黎协定，世界亟待其他国家来拿出更强的气候行动领导力。今天我们看到中国和欧盟正以实际行动肩负起新的领导使命。这充分显示了双方在特朗普时代开展合作的政治决心。不过，要真正主导全球气候外交，中欧双方还应加速各自国内的气候行动。超额完成各自的国际减排目标，进一步提高减排承诺将是双方发挥领导力的一个很好的开端。”

EU-China to lead Paris pact?

The world is moving ahead on climate targets with Europe and China at the helm but will it be enough? Chinese experts give their view

□ chinadialogue

China and the EU are moving ahead regardless

Within 24 hours of President Trump announcing a US withdrawal from the Paris Climate Accord, leaders from the European Union (EU) and China committed to curb the use of fossil fuels, provide assistance to poorer countries in reducing emissions, and push ahead with low carbon technologies.

Although EU members are struggling to maintain their own momentum on climate targets, with some member states falling behind on emission targets, Chinese experts are bullish on the prospects of stronger EU-China cooperation based on shared economic interests and environmental realities.

Xu Jintao, deputy director, National School of Development, Peking University

Given the current circumstances, China-EU cooperation is the only option for moving forward. International trade talks won't hamper China-EU climate cooperation – China has its own inherent motivation: domestic pressure to protect the environment and reduce emissions; while Europe has long held positive environmental ideals.

Many European nations are green and clean. If countries like China and India continue to increase emissions, their relative market competitiveness will fall. So both parties are motivated to cooperate on the climate.

Zou Ji, adjunct professor, School of Economics and Management, Harbin Institute of Technology

China-EU cooperation on the climate is inevitable and will be ongoing and sustained.

The success of the Paris talks was of course an important outcome of China-US cooperation, but cooperation between China and the EU and China and the wider developing world must be recognised and is essential, this is the product of multilateral cooperation.

There are over 190 signatories to the Paris Agreement, and the vast majority of them will not follow the US and withdraw – their commitments are voluntary, and that's what gives the Paris Agreement its vitality. The orchestra may play a little quieter without the US, but the music will go on.

Zhang Haibin, professor, School of International Relations, Peking University (quoted in Caixin)

The US is the world's second largest emitter of greenhouse gases and the most influential nation in terms of politics and economics, and so its withdrawal will leave a leadership vacuum. While the EU is willing to lead it cannot do so while dealing with Brexit talks and various crises. For various reasons, the "leadership deficit" facing the implementation of the Paris Agreement is worsening.

China cannot alone fill the gap left by the US, but it can bring people together and coordinate; it can advocate for joint leadership by the EU and the BASIC nations (Brazil, South Africa, India and China); increase alignment between its OBOR [One Belt, One Road] strategy and both the Paris Agreement and the 2030 Sustainable Development Agenda; and further promote South-South climate cooperation – all helping minimise the impact of the Trump administration's unhelpful policies on climate.

Li Shuo, climate policy advisor of Greenpeace East Asia

"The rapid backlash of US climate action requires enhanced leadership from all other countries. We are seeing new leadership taking shape between Brussels and Beijing today in concrete terms.

The new level of cooperation indicates their political resolve to work together in the age of Trump. However, to demonstrate Beijing and Brussels can truly lead, both need to accelerate their domestic actions. Recognising the overachievement of their respective international emission reduction targets and enhance these commitments is a good place to start."

全球变暖，节气都不准了？

当我们深陷气温不断攀升的“人类世”，节气还有多少意义？

□ 冯 灏

“谷雨前后，种瓜点豆”，按照二十四节气的排序，4月20日是谷雨——全年的第六个也是春季最后一个节气。

根据中国明代介绍栽培植物的著作《群芳谱》：“谷雨，谷得雨而生也。”谷雨时节，气温转暖，降雨适量，正适合播种。

二十四节气是中国古代的科学，起源于2000多年前的黄河流域。2016年11月，二十四节气被联合国教科文组织列入人类非物质文化遗产代表作名录。

在城镇人口已近六成的当代中国，节气作为农业生产指南的作用已经不复重要。但冬至吃饺子或汤圆、清明扫墓祭祖等与节气紧密相连的习俗依然是大多数中国人下意识遵守的生活习惯。

可以说，农耕文化的衰落并没有让节气过时，因为节气已经深深印刻在中国人的文化基因里。但工业时代带来的气候变化，却实实在在导致了节气的失准。

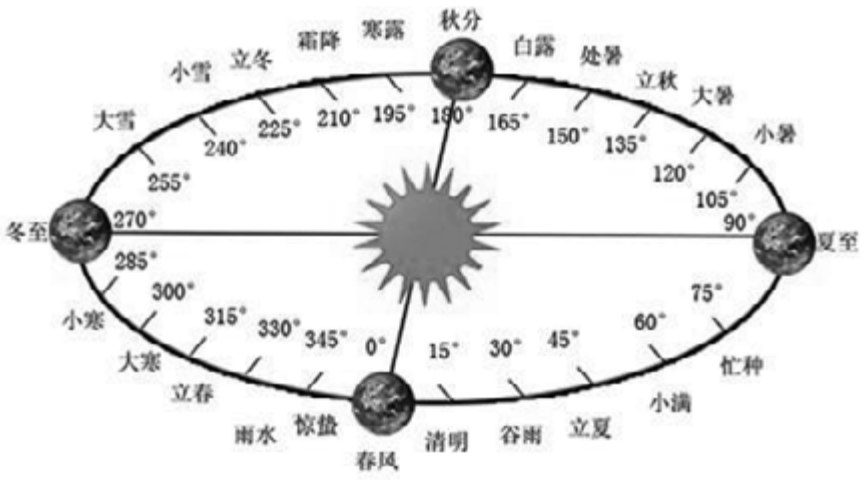
指导农事的二十四节气

古代中国人通过观察、记录太阳的周年运动轨迹，将其分为24个等份，每一等份15天，为一个“节气”。二十四节气以天象、气温、降水、物候的时序变化为基准，从黄河中下游地区逐渐推广到全中国各地。在国际气象界，这一时间认知体系被誉为“中国的第五大发明”。

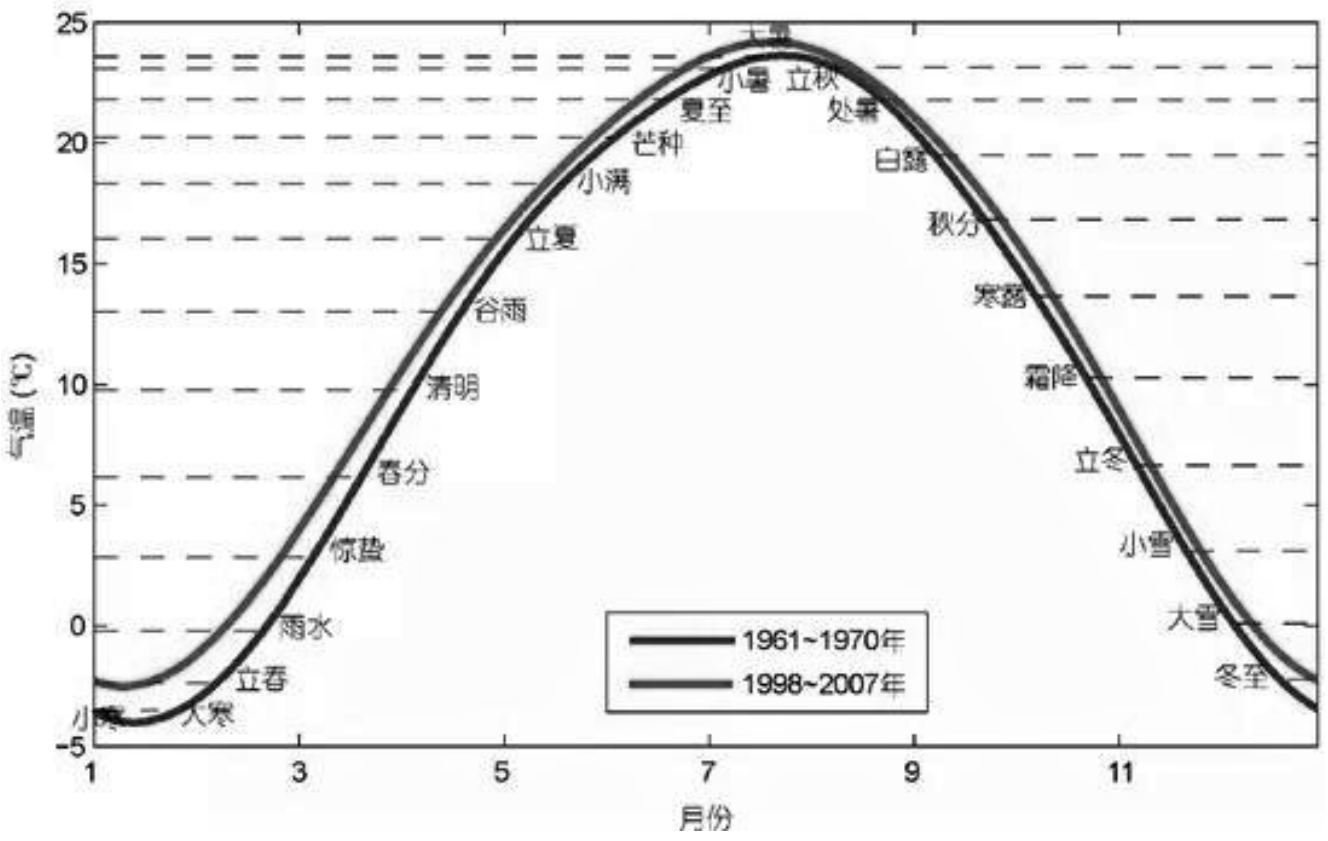
“惊蛰不耙地，好像蒸锅跑了气”，“小满割不得，芒种割不及”……这样包含了节气的农业谚语不胜枚举。在传统的农耕中国，二十四节气实实在在地指导着农业生产，播种、浇水、施肥、除虫、收割都有节气管着。

立夏提前，立冬推后

然而，在全球变暖的背景下，二十四节气反应物候和气候特征的



二十四节气与太阳角度对应示意图



中国平均气温季节循环明显抬升

来源：钱诚，严中伟，符淙斌：1960~2008年中国二十四节气气候变化

准确度正在不断降低。

根据中国科学院大气物理研究所副研究员钱诚等人的研究，因为整体变暖的趋势，以 1960~2008 近半个世纪的时间跨度来看，每一个节气的增温幅度都很显著。

季节循环整体趋于抬升，季节性升温阶段的节气——二十四节气中的前 12 个——所反应的物候整体提前，而降温阶段的节气——下半年的 12 个——则显著推迟。同时，满足某个节气气温标准的天数增减也呈两级分化趋势。

统计显示，符合小寒、大寒气候特征（平均气温达 -3.50℃及以下）的天数越来越少。1998 至 2007 年 10 年间平均的大寒天数为 14 天 / 年，而 20 世纪 60 年代为 32 天 / 年，减少了一半还多。与之相对应的，1997 年到 2008 年，符合大暑气候特征的天数为年均 36 天，而在上世纪 60 年代则为年均 20 天，增加了八成。原本用于指导农事的节气时令也因气候变暖多有失灵。

以“惊蛰”为例，其字面含义即春雷惊醒冬天藏伏土中、不饮不食的动物，历来被视为春耕开始的日子。但是由于惊蛰的物候及气候特征提前，中原地区的冬小麦需要较经验提前 12-16 天耙地。

在中国东北地区，原来农民被建议一定要晚耕种，农谚称“立夏到小满，种啥都不晚”。但近年来，随着气候的变暖，耕种时间可以被大规模提前。

节气体现了中国人顺应自然规律的古老哲学，但工业时代以来人类活动对自然的剧烈影响已经使得自然规律本身受到了巨大干扰。当我们深陷“人类世（Anthropocene）”，节气还有多少意义？

冯灏，中外对话研究员

Global warming has changed the “solar terms”

What is the place of China’s micro-seasons in a warming Anthropocene era?

□ Feng Hao

“At the grain rain, plant your gourds and beans,” so the saying goes in China.

Marking the end of April, the “grain rain” is the sixth of China’s 24 “solar terms” and the last of spring.

The 24 solar terms are recognised as an ancient Chinese method of following the seasons, essential for helping farmers make decisions in an agrarian society.

A farmer of the Hani minority, famous for planting rice in terraces in Yuanyang county, Yunnan

For centuries, they have offered a system of knowledge and guided social practices based on observations of the sun’s annual motion and the study of phenology. According to Chinese history, they originated over 2,000 years ago in the Yellow River Basin.

In November 2016 the system was added to United Nations Educational, Scientific and Cultural Organisation’s (UNESCO) list of Intangible Cultural Heritage.

According to a Ming dynasty (1368–1644) treatise on agriculture, the grain rain season offers warming temperatures and reasonable rainfall, which are ideal for planting.

Now that six out of every ten Chinese people live in cities, the solar terms are no longer valuable as an agricultural guide. But even if they don’t realise it, the traditions many Chinese people follow – eating dumplings at the “Winter Solstice” or sweeping tombs at “Clear and Bright” – are timed according to solar terms.

Urbanisation and the decline of traditional agricultural practices does not mean the solar terms are obsolete though,

as they are already deeply embedded in China's culture. But climate change means the solar terms are becoming less and less accurate.

The 24 Solar Terms

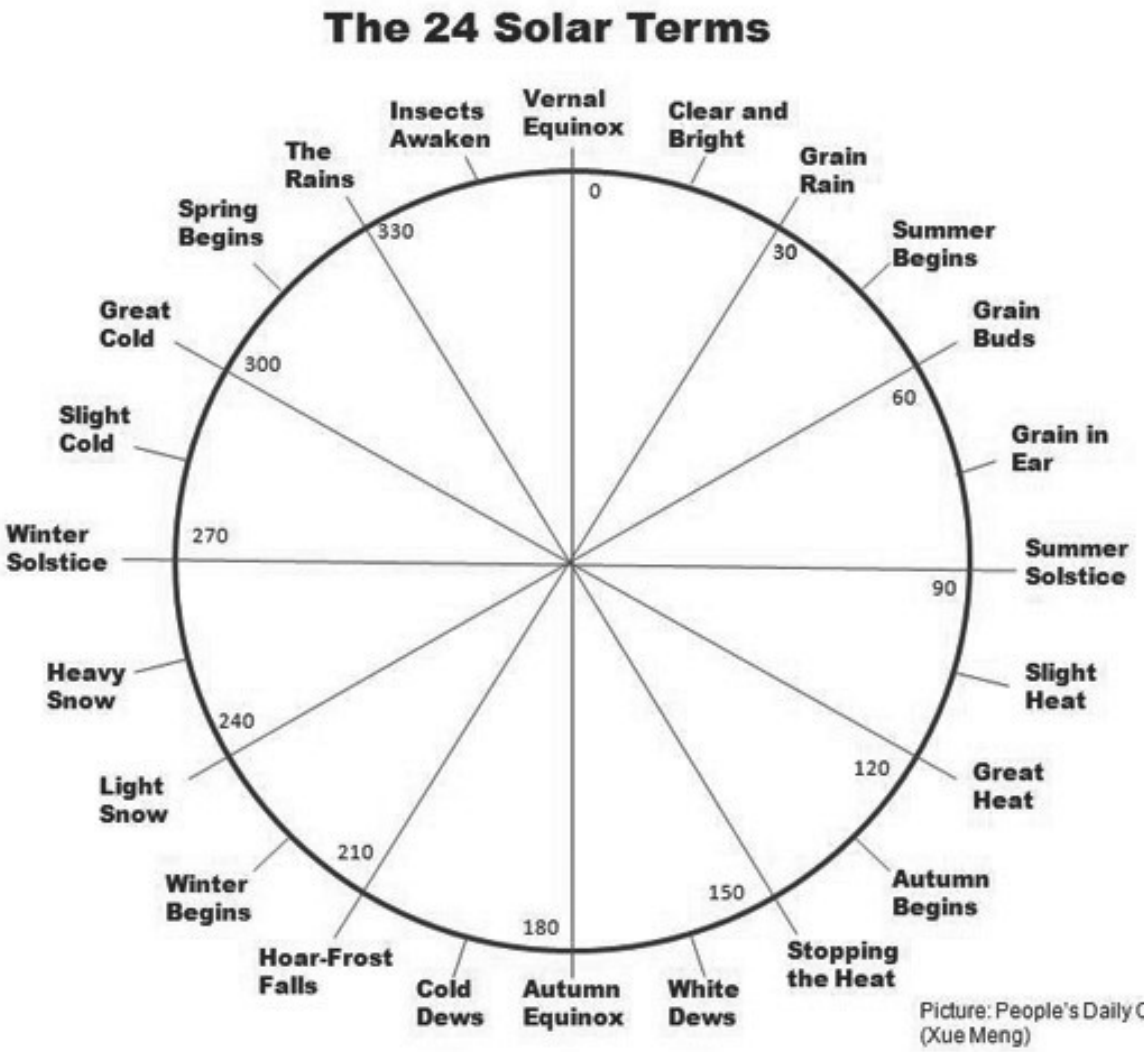
By observing and recording the passage of the sun through the sky, the ancient Chinese divided its path into 24 parts, each lasting 15 days (one solar term). These were associated with changes in temperature and rainfall and the behaviour of animals and plants. Originating on the lower reaches of the Yellow River, the practice spread throughout China, so the story goes.

Each term comes with a saying. "Insects Awakening" means it's time to plough. "Grain Full" that it's too early to harvest, and "Grain In Ear" too late. Historically, the solar terms provided real guidance on planting, irrigation, fertilising and harvesting.

Earlier summers, later winters

But global warming means the solar terms and the phenomena they are aligned with are drifting apart.

Research by Qian Cheng and others at the Chinese Institute of Atmospheric Physics, part of the Chinese Academy of Sciences, has found that the overall warming



Picture: People's Daily Online (Xue Meng)

trend means that annual temperatures have increased significantly.

The seasons overall have become warmer. Spring and summer terms occur earlier, and ones in autumn and winter occur later.

The number of days meeting the temperature condition for "A Bit Frigid" and "Most Frigid" (which have average temperatures of no more than 3.5C) are decreasing.

Between 1998 and 2007 there were an average of 14 such days each year, less than half that recorded in the 1960s when there were 32. Conversely there were 20 days classed as "Most Sweltering" a year in the 1960s, but this almost doubled to 36 a year between 1998 and 2007.

A warming climate means these solar terms are no longer helpful in guiding agricultural practices. The traditional time of year to begin planting spring seeds now occurs earlier. Winter wheat crops need to be planted 12 to 16 days earlier on China's central plains. Whereas, in the northeast, warming temperatures mean planting now happens much earlier.

The solar terms hark back to a time when traditional wisdom helped farmers act in accordance with the climate's natural rhythms. But the impact of human activity has interfered with those rhythms. The question now is what significance the solar terms will have in the Anthropocene era.

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中国正在“唤醒”公共环境数据

过去二十年，中国探索将沉睡的公共环境数据激活并运用到绿色金融中，这些经验将帮助中国经济加快绿色转型。

□ 郭沛源

工作人员在北京使用PM2.5检测仪读取数据。公共环境数据的运用将帮助中国经济加快绿色转型

公共环境数据（Publicly Available Environmental Data，简称PAED）的巨大潜力正受到全球政策制定者越来越多的重视。最近，它在绿色金融领域所能扮演的角色已经受到G20绿色金融研究小组的注意，并成为该小组本年度的研究重点。金融机构要实施环境压力测试，必然要构造一个或几个虚拟的未来情景，这些情景的构造就要参考环境政策量化目标、生态承载力等公共环境数据。过去，中国比较重视企业披露的环境数据，却忽视了公共环境数据，造成很多公共环境数据成为“沉睡的宝藏”。而现在，这些数据正在被“唤醒”。

四个阶段

过去二十年间，中国持续地进行公共环境数据运用到绿色金融中的探索。如果做一个归纳总结，从绿色金融的角度看，公共环境数据的运用可以分为四个阶段（如下表）。第一个阶段是数据缺失的，政府掌握一定的公

中国公共环境数据运用的四个阶段

	一	二	三	四
发展阶段	数据缺失	数据共享	结构呈现	风险定价
所处时期	2006年以前	2006年以来	最近几年	未来趋势
主要特征	政府掌握公共环境数据，但缺乏数据披露和共享的意愿，因此对用户来说，公共环境数据相当于缺失了	政府部门等（包括NGO）与其他机构或公众共享部分或全部公共环境数据，以原始数据为主	政府部门等（包括NGO）共享公共环境数据，并且以一种对金融机构来说更简单明了、用户友好的方式进行结构化的呈现	政府部门等（包括NGO）共享公共环境数据，并且数据与企业价值联动。金融机构有极高积极性运用公共环境数据
典型例子	——	环保部门与金融部门的环境信息共享机制	五种颜色的企业环境信用评价制度	企业环境信用与水电价格的联动机制

共环境数据，但缺乏数据披露和共享的意愿，大部分数据都在“沉睡”。第二个阶段是数据共享，在这个阶段，政府部门等（包括NGO）与其他机构或公众共享部分或全部公共环境数据，这些数据以原始数据为主。这些数据是有一定价值的，金融机构偶尔会运用，但用起来不是很方便。第三个阶段是结构呈现，这个阶段就是要解决方便易用的问题，公共环境数据要以一种更结构化的、更用户友好的办法呈现在金融机构面前。这些办法可以是评级、排行榜等。第四个阶段是风险定价阶段，公共环境数据被更深入植入到企业价值联动的领域，环境数据的价值被发挥到最大。

从无到有

上世纪九十年代，中国逐步建立各项环境管理制度。根据相关法规，不少企业要向环保部门报送各种环境数据，环保部门也会主动搜集一些数据。这些数据分散在不同的部门手中，譬如环境监测部门掌握企业排污数据、环评部门掌握项目环境数据、生态保护部门掌握自然资源数据。当时，中国还没有《政府信息公开条例》(2007年才颁布)，政府部门主动披露数据的意识并不是很强，所以很多数据并没有被公开，特别是关于企业排污、企业违规的数据。《环境年鉴》等资料通常只会发布一些总体的数据。因此，在这一阶段，公共环境数据是缺失的。

这种情况随着政府加强信息公开得以改观，互联网及移动通信技术的迅猛发展也客观上加快了政府信息公开的步伐。直观的进步是，在全社会或在特定范围内共享的环境数据逐步增加。其中，与绿色金融相关且具有里程碑意义的是中国人民银行、国家环保总局在2006年下发的《关于共享企业环保信息有关问题的通知》。通知要求，“环保总局向人民银行提供整治违法排污企业保障群众健康环保专项行动’形成的企业环境违法活动信息。待条件成熟后，将各级环保部门日常环保执法信息逐步纳入企业征信系统。”一年之后，国家环保总局、中国人民银行、中国银监会联合下发《关于落实环保政策法规防范信贷风险的意见》，要求“各级环保与金融部门要密切配合，建立信息沟通机制。”通过这些政策，我国初步建立了公共环境数据的共享机制，商业银行等金融机构可以参考这些信息对污染企业实施限贷、停贷等措施。

此外，值得一提的是，民间环保组织公众环境研究中心（IPE）也在这一时期（2006年）建立。IPE最早期的工作就是汇集已经公开的企业环境违规数据，搭建中国水污染地图。多数数据是各级环保部门公布或者通过媒体报道转述的。因此，倘若没有政府的信息公开（无论是主动还是被动），IPE的污染地图也难为无米之炊。

提高质量

环保部门的环境数据共享对推进绿色金融特别是商业银行绿色信贷的发展起到了非常积极的作用，但也面临不少挑战。主要表现在：共享信息主要是企业违规信息，通俗地说就是黑名单，但这些信息往往缺乏程度的描述；共享信息全是负面信息，缺乏正面信息，可以帮助剔除差的企业，却不能帮助甄别好的企业；有时候，金融机构拿到信息之后，缺乏专业知识读取、理解和运用这些信息。

为了解决这些问题，近几年，一

公众环境研究中心（IPE）通过7000多个观测点收集水质数据

些省地市的环保部门开始探索新的做法，用更简单明了的方式结构化呈现这些公共环境信息。如，江苏省环保厅设计了一套企业环境信用评价机制，用绿、蓝、黄、红、黑五种颜色来予以区分，金融机构可以根据不同颜色采取不同的措施：对绿色、蓝色企业鼓励贷款；黄色企业可以列入观察；红色、黑色企业则应收回贷款。也有一些省份采取更简单的方法，用绿、黄、红三种颜色来区分。

IPE 在结构化呈现公共环境数据方面也有许多探索，最早应用在绿色供应链的工作中。通过设计 CITI（企业环境透明度指数）撬动品牌力量改善制造企业的环境绩效。2015 年，IPE 推出了上市公司污染排行榜，通过分析上市公司污染物排放在线监测数据，将超标排放的上市公司从重到轻进行排序，借资本市场之力对上市公司间接施加影响。

未来方向

显然，从共享原始数据到结构化呈现，金融机构运用公共环境数据的成本下降、意愿提升，公共环境数据在绿色金融的运用得以极大加强。不过，要最大限度发挥公共环境数据的价值，还是要设法将数据运用和企业价值关联起来。江苏省在这方面走在全国前头。他们将五种颜色的企业环境信用评价机制与企业水、电价格联动起来。目前，红色、黑色的企业用水价格要在基准价格之上分别提高 0.6 元每吨和 1 元每吨。这样就对企业的经营成本产生更实质性的影响，金融机构也会因此更关注公共环境数据，并将之整合到风险分析及定价之中。

对国家政府或地方政府的政策制定者而言，充分发挥公共环境数据的作用，可以有效促进绿色金融的发展。政府应按照上述的四个阶段依次递进，渐次促进公共环境数据的共享，继而结构化呈现，最后整合到定价之中，最终实现整个社会和经济的绿色转型。

郭沛源，商道融绿董事长，中国金融学会绿色金融专业委员会理事

China leads green data sector

China is exploring how publicly available environmental data can be used to boost green finance

□ Guo Peiyuan

The enormous potential of publicly available environmental data (PAED) is being taken more seriously by policymakers worldwide. The role that this information could play in green finance has recently drawn attention from the G20 Green Finance Study Group and will be a focus of its research this year.

Financial bodies will need one or more hypothetical future scenarios to carry out environmental stress tests – and constructing those will require reference to PAED, such as quantified policy targets and environmental carrying capacities. In the past China focused on the release of environmental data by businesses, but overlooked PAED – meaning it became like "buried treasure". That treasure is now being rediscovered.

Four stages

China has been experimenting with the use of PAED in green finance for twenty years now. This process could be described as having four stages. The first was characterised by an absence of data; the government held some data but was unwilling to share it.

The second was one of sharing in which the government and other bodies (including NGOs) shared some or all of the data but mostly in its raw form. This data had some value and financial bodies would sometimes use it but it was not in a convenient form.

The third stage was one of structured presentation in which data was provided in a more structured and user-

> "Before freedom of information rules came into effect in 2007, government bodies were not inclined to release data so very little was made public."

Four stages of the use of PAED in China

Stage	1. Lack of data	2. Data sharing	3. Structured Presentation	4. Risk pricing
Period	Pre-2006	Since 2006	Last few years	Future trend
Characteristics	The government held PAED but did not share it. The data was not available for use.	The government and other bodies (including NGOs) increased availability of PAED but mostly in raw form.	The government and other bodies (including NGOs) shared PAED and structured it in a more user-friendly form. It was used by financial bodies.	The government and other bodies (including NGOs) shared PAED and tailored it to corporate needs.
Typical example		Mechanisms for sharing data held by the environmental authorities with financial authorities.	Varied types of corporate environmental rating systems	Companies' environmental ratings affects price paid for water and power.

friendly way that was more convenient for financial bodies to use. Examples include providing grade or ranking data.

The fourth stage is one in which PAED feeds back into company costs and the full value of environmental data is extracted.

No longer missing

In the 1990s China started to build up a system for environmental management. This included rules requiring companies to submit environmental data to the authorities, which also started gathering their own data. But this data was scattered across different departments: the environmental monitoring department held pollution data; the environmental impact assessment department held data on specific projects; the conservation department held data on natural resources, and so on.

Before freedom of information rules came into effect in 2007, government bodies were not inclined to release data so very little was made public, particularly on pollution released by businesses, and breaches of regulation. Only some aggregated data was presented in, for example, the China Environment Yearbook.

The situation improved when the government strengthened freedom of information rules, a process which was also speeded up by the spread of internet use. This was shown in the amount of information available to society as a whole, or being shared in specific circles.

Green finance milestones included the People's Bank of China and the State Environmental Protection Agency's (SEPA) notice on sharing of corporate environmental information in 2006. That saw the environmental authorities provide the bank with information on companies that had been punished for damaging public health through pollution, with plans for data to be fed from local environmental authorities to the bank for use in overall credit ratings.

A year later SEPA, the People's Bank of China and the China Banking Regulatory Commission issued a document on implementing environmental measures in order to avoid credit risks, requiring close cooperation and information sharing between environmental and financial authorities at all levels. These policies were the start of PAED sharing mechanisms in China, meaning information could be consulted by commercial banks and other bodies to limit or end lending to polluting firms.

It is worth noting though that the Institute of Public and Environmental Affairs (IPE), an environmental NGO, was founded in this period, in 2006. The earliest work of the IPE included gathering available data on corporate breaches of environmental rules to create a map of water pollution in China. Much of that data was published by the environmental authorities or in media reports. Without publication of information by the government the IPE's map would have been blank.

Raising quality

The sharing of environmental data by the environmental authorities has played a hugely positive role in the development of green finance, and in particular in green lending by commercial banks. But there are also challenges. The information shared is primarily lists of companies guilty of breaches of environmental law – the data is commonly referred to as a blacklist. But the data often lacks information on the gravity of the breach and is purely negative. Problematic companies can be filtered out, but there is no way to identify the companies that are doing well. Sometimes financial bodies acquire the information but lack the specialists to interpret and apply it.

To solve these issues the environmental authorities in some provinces have tried a new approach in recent years: structuring data in easily comprehensible ways. For example, in Jiangsu a corporate environmental rating system is used, with companies rated as green, blue, yellow, red or black. Financial bodies can treat companies accordingly, encouraging lending to green or blue companies, monitoring existing loans to yellow firms, and calling in loans to red or black ones. Some provinces make it even simpler, with only green, yellow and red ratings.

The IPE has experimented with different ways of structuring PAED, initially in its work on green supply chains, with a Corporate Information Transparency Index (CITI) that leveraged the power of major brands to improve the environmental performance of manufacturing firms. In 2015 the IPE ranked market-listed firms on their performance on pollution, by analysing online pollutant monitoring data. Those in breach of limits were ranked by severity, indirectly applying pressure via the capital markets.

Future directions

The shift from the sharing of raw data to the presentation of structured information reduces the costs for financial bodies using PAED and so increases demand and results in much greater use. But making the best use of PAED requires linking the data with company operating costs. Again, Jiangsu is taking the lead here – a company's rating on the five-colour scale directly affect the price it pays for water and power, with firms classed as red or black paying 0.6 yuan or one yuan more per tonne of water.1 This has a real impact, meaning financial bodies will pay even more attention to environmental data and incorporate it into risk assessments and pricing.

For policymakers at the local or national level, the full use of PAED can promote the development of green finance. The government should refer to the four stages described above and move through these as it promotes the sharing and then structuring of environmental data, on to its inclusion in pricing mechanisms, and ultimately achieving a complete social and economic green transition.

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中国严控船舶空气污染

中国正在逐步扩大对船舶燃油质量的监管范围，以改善港口的空气污染状况。

□ 冯淑慧　朱祉熹

据估计，2013年中国约有1.8万人的过早死亡与海运船舶造成的空气污染有关

中国是世界上船运业务最为繁忙的国家之一，然而进出中国港口和经过其水域的船舶却成为导致中国空气污染问题的原因之一。

中国港口每年处理的海运货物总量超过全球六成，集装箱运输量占全球三成。在全球十大港口中，中国就占有七席。因此，对于香港、深圳、上海等中国港口城市来说，船运已经成为空气污染的重要来源。据估计，2013 年中国约有 1.8 万人受海运船舶造成的空气污染影响而过早死亡。

2016 年中国政府颁布《珠三角、长三角、环渤海（京津冀）水域船舶排放控制区实施方案》（DECA）（以下简称《方案》），开始分阶段推行防治措施，要求船只在泊岸以及进入排放控制区时使用含硫量不超过 0.5% 的燃料。这一政策令人鼓舞：低硫油的含硫量比标准船用燃油低 80%，船舶在泊岸时使用这种燃料可以显著降低空气污染和公共健康风险。

实施排放控制区是降低船运污

图片来源：NRDC

染的重要一步。去年 4 月上海等四个长三角港口开始试行这套方案，10 月深圳开始推行。今年起，《方案》覆盖范围扩展至十一个核心港口，其中四个位于高度工业化的京津冀及周边地区。

但政策实施的效果取决于监管的力度。令人欣慰的是，中国监管力度很强。

2016 年 4 月至 11 月间，上海海事部门检查了 1858 艘船只，发现 55 艘船只存在违规情况，罚款共计超过 10 万美元（约合 69 万元人民币）。《方案》在渤海湾四个港口实施两个月后，已至少有两艘船因违反燃料规定而受到处罚，其中包括一艘外籍船舶。

中国成功抓获不少违规使用高硫燃料的船舶，这让人感觉执法监管似乎并不难，但事实并非如此。

登船采样难度大

国际海事组织要求船东必须保留燃油供受单证并留存加油时提取的 1 燃油样本，以显示其遵守了燃料监管规定。但燃油供受单证和燃油样本容易造假。

另外，作为《方案》的主要监管对象，远洋船一般会配备多个与发动机或者和锅炉房相连的燃料储罐。即使船上的燃料储罐储存着低硫燃料，也无法保证船舶只在港口使用的就是低硫燃料。

在靠近运转的发动机处提取燃油样本是最可靠的抽检方式，但这需要花费很多时间，而海事部门执法力量本就有限，很难检查足够多的船只、提取足够多的样本，因此无法保证执法的力度。

未来，海事部门在监管时还将面临更大的挑战。到 2019 年，《方案》的覆盖范围将拓展到中国海岸线以外 12 海里排放控制区水域内的全部船舶。国际海事法严禁拦截或者登上经过本国水域的外国船只。因此，如果外籍船只经过监管水域但不在排放控制区水域内的港口停靠，想要上船提取燃油样本几乎不可能。

缩小嫌疑船只范围

为了应对上述挑战，中国正在寻求更好的方法识别违规船只。好消息是欧盟、北美和香港在多年前就开展了类似的远洋船燃料含硫量监管，中国可以借鉴这些国家的经验。

监管部门遇到的挑战之一是人手有限，此外还承受着避免船只延误的压力。在这种情况下，锁定那些最有可能违规的可疑船舶，有选择

地进行登船检查才是合理的办法。执法人员可以通过遥测设备监测船舶废气排放而不是直接登船提取燃料样本，并查阅船舶的历史合规记录，筛选出停靠中国港口的高污染船舶。

欧盟的经验表明这种方式是可以起到很好的效果的。欧盟刚刚完成了一项为期两年的项目，测试是否可以使用安装在岸边、桥梁、飞机和无人机上的遥测设备在短时间内有效监测大批船舶的废气排放。

欧盟还建立了一个数据库，使成员国可以记录并分享船上抽验燃油含硫量的检测数据，并上传利用遥测所检测到的违规结果。中国可以采取同样的方式，在本国执法部门间共享排放控制区检查结果和记录，以便更好地针对有违规记录的船舶进行执法。中国还可以与欧盟监管机构探索共享检查记录的可能性，进一步加强监管威慑力。

提高分析速度

荷兰、瑞典、加拿大都在进行试点研究，试用可以在五分钟内估算燃料含硫量的检测系统。有了这套系统，监管人员就只需采集那些快速检测中显示含硫量高的燃料样本去送检。

快速检测不仅可以节省经费，监管机构更可以利用初筛结果作为暂扣船舶的理由，而这正是荷兰的通常做法。不必要的扣留会导致船舶延期，这会增加成本并导致船运公司的名誉受损。

保证低硫燃料的供应与确保船舶使用合规燃料同样重要。美国环境保护署就开展了一项综合燃料质量保障项目。香港环境保护署则定期从加油驳船以及油罐提取样本，对燃料质量进行监管。在这两地，船用燃料达标的情况都较好。中国也应该采取类似措施，保证船用燃料的质量。

虽然中国一直都在提升其监管能力，并针对排放控制区内的泊岸船舶进行了多次登船检查，但随着《方案》覆盖港口数量的增多、覆盖面积的扩大，预计监管的难度将越来越大。

鉴于达标燃料的价格比高硫燃料高出一半，不良企业能通过使用违规燃料得到经济利益。只有严格执法才能遏制其违法冲动。

好在其他国家和地区也在应对类似的挑战。在探索如何提升监管力度，实现空气质量和公共健康双赢的航程上，中国并不孤独。

《方案》实施进程表

开始日期	港口 / 地区	含硫量上线
2016年4月1日	▪ 上海 ▪ 南通 ▪ 宁波-舟山 ▪ 苏州	船舶在靠岸停泊期间应使用硫含量≤0.5% m/m的燃油
2016年10月1日	▪ 深圳	船舶在靠岸停泊期间应使用硫含量≤0.5% m/m的燃油
2017年1月1日	▪ 上海 ▪ 南通 ▪ 宁波-舟山 ▪ 苏州 ▪ 深圳 ▪ 广州 ▪ 珠海 ▪ 天津 ▪ 秦皇岛 ▪ 唐山 ▪ 黄骅	船舶在靠岸停泊期间应使用硫含量≤0.5% m/m的燃油
2018年1月1日	三个排放控制区内所有港口	船舶在靠岸停泊期间应使用硫含量≤0.5% m/m的燃油
2019年1月1日	所有排放控制区	进入排放控制区的船舶必须使用硫含量≤0.5% m/m的燃油

图片来源：NRDC

冯淑慧，自然资源保护协会顾问
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Crack down on shipping pollution

As the government expands its emission control area, enforcement is expected to get harder

□ Freda Fung Zhu Zhixi

China is the world's busiest shipping nation but all those ships entering its ports and plying its waters are contributing to the country's air pollution.

Every year, over 60% of the world's seaborne cargoes and 30% of the world's shipping containers pass through China's ports. The country is also home to seven of the world's top 10 ports, so shipping is becoming a major source of air pollution in its port cities, such as Hong Kong, Shenzhen and Shanghai. An estimated 18,000 premature deaths in China in 2013 were caused by air pollution from oceangoing ships.

So it's encouraging that in 2016 the government started phasing-in regulations forcing ships to use fuels with 0.5% sulphur content while at berth and near major Chinese ports. This low-sulphur fuel contains 80% less sulphur than standard marine fuels and using it at berth can dramatically reduce air pollution and public health risks.

The new Domestic Emission Control Area (DECA) regulations are an important step towards reducing shipping pollution. The government first implemented the regulations in Shanghai and three other ports in the Yangtze River Delta last April, then in Shenzhen in

Map of the Domestic Emission Control Areas

Source: NRDC

> But regulations are only as good as their enforcement. Promisingly, China has been vigorously enforcing them.

October. Beginning this year, fuel switching at berth was expanded to eleven core ports, including four in and near the heavily industrialised Beijing-Tianjin-Hebei (Jing-Jin-Ji) region.

But regulations are only as good as their enforcement. Promisingly, China has been vigorously enforcing them.

Between April and November 2016 Shanghai's enforcement agency inspected some 1,858 ships, caught 55 ships violating the rules and issued more than US$100,000 (690,000 yuan) in penalties. Two months after the regulations were phased in at four ports in Bohai Bay, two ships, including a foreign flagged ship, were caught using non-compliant fuels.

China's success in catching dozens of ships using high-polluting fuels makes enforcement look easy, but it's not, and it's going to get harder.

Getting access

The International Maritime Organization (IMO) requires ship operators to keep bunker delivery notes on board and maintain samples of fuel collected during refueling to demonstrate compliance with marine fuel regulations. But these are susceptible to fraud or forgery.

In addition, oceangoing ships – the main target of the DECA regulations – are typically equipped with multiple fuel tanks connected to the engines and or boilers. Even if there are tanks storing low-sulphur fuel on board, there is no guarantee that such fuel is being used at port.

Taking fuel samples close to any operating engine is the most reliable way to monitor compliance but that takes time, and for port regions with limited enforcement resources it is difficult to inspect enough ships and collect enough fuel samples to establish a strong enforcement presence.

And enforcement is set to become even more challenging. By 2019, the regulations will be extended to cover all ships in the DECA waters out to 12 nautical miles. International maritime law prohibits stopping or boarding a foreign ship passing through a country's territorial waters. So it will be extremely difficult, if not impossible, for enforcement officials to take fuel samples from a ship that travels through DECA waters but calls at a port outside the DECAs.

Known waters

To tackle these challenges, China is searching for better ways to identify violating ships. The good news is that the European Union (EU), North America and Hong Kong have been enforcing marine sulphur regulations for years. Together, they offer some useful lessons for China.

Enforcement agencies have a limited number of staff and are under pressure to avoid causing vessel delays. It makes sense then to target onboard inspections at ships most likely to break the rules. By measuring emissions remotely rather than taking onboard fuel samples, and reviewing past compliance records, officials can screen for high-emitting ships visiting Chinese ports.

The EU has shown that this works. It has just completed a two-year project examining the feasibility of remote measurement devices fitted on the shore, bridges, planes and drones to effectively screen air emissions of a large number of ships in a short time.

The EU has also built a database allowing member states to record and exchange data from onboard sulphur inspections and to input remote measurement findings indicating non-compliance. China could do the same to record and share DECA inspection findings among its local enforcement teams to better target ships with a history of violation.

Phased implementation of China's DECA regulations

Start date	Port / region	Sulfur limit
1 Apr, 2016	▪ Shanghai ▪ Nantong ▪ Ningbo-Zhoushan ▪ Suzhou	0.5% for vessels at berth
1 Oct, 2016	▪ Shenzhen	0.5% for vessels at berth
1 Jan, 2017	▪ Shanghai ▪ Nantong ▪ Ningbo-Zhoushan ▪ Suzhou ▪ Shenzhen ▪ Guangzhou ▪ Zhuhai ▪ Tianjin ▪ Qinhuangdao ▪ Tangshan ▪ Huanghua	0.5% for vessels at berth
1 Jan, 2018	All ports in the three Domestic ECAs	0.5% for vessels at berth
1 Jan, 2019	Anywhere within the three Domestic ECAs	0.5% after vessels entering the Domestic ECAs

Source: NRDC

China could also explore exchanging inspection records with European counterparts to further strengthen its deterrent.

Faster analysis

The Netherlands, Sweden, and Canada are all piloting fuel testing systems that can estimate sulphur content in less than five minutes, meaning that regulators only have to send samples for lab testing when high sulphur levels are indicated.

As well as saving money, quick screening can justify detaining ships until lab results are confirmed, which is a protocol used in the Netherlands. Unnecessary detention causes delays, which increases costs and harms the reputation of shipping companies.

Ensuring that low-sulphur fuel is available is just as important as making sure that compliant fuel is being used. In the US, the Environmental Protection Agency manages a comprehensive fuel quality assurance programme. The Hong Kong Environmental Protection Department also regularly takes samples from bunkering barges and oil terminals to monitor fuel quality. Both the US and Hong Kong report a high compliance rate with their respective fuel quality standards. China should also step up efforts to ensure the quality of marine fuels.

Although China has been building its enforcement capacity and carrying out lots of inspections to verify DECA compliance, enforcement is expected to become harder as regulations are extended to cover more ports and bigger areas.

As the price of DECA-compliant fuel is more than 50% higher than high sulphur residual fuel, there is a cost incentive for unscrupulous companies to avoid compliance.

Luckily other regions are managing similar challenges, meaning China won't have to chart a course through unknown waters to enhance its enforcement and realise the benefits to its air quality and public health.

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中国需面对工厂化养殖真实成本

每年产出90亿只肉鸡的中国养殖业，造成了巨大的环境和气候负担。

□ 米亚·麦克唐纳　周晚晴

中国90亿只肉鸡每年耗水量高达1750亿升，相当于100万北京居民一年的用水量。图为中山市家畜市场

中国是全球最大的鸡肉和鸡蛋生产国，年肉鸡存栏量 90 亿只、蛋鸡 27 亿只，产蛋量近 5000 亿枚。中国人口数量庞大，个体消费叠加起来给环境带来了巨大的压力。不过由于中国禽类养殖厂多为中、大型的“工厂化养殖场”，公众没有机会看到这些鸡和养殖它们的代价。

值此鸡年之际，中国是时候正视工厂化养殖和鸡肉过度消费的真实成本了。

鸡肉蛋白质吸收率高，被认为是全球广泛食用的主要动物蛋白质来源，但它的水足迹却相当大。世界

自然基金会（WWF）在中国开展的一项针对鸡肉生产者的研究显示，每饲养一只肉用仔鸡需耗水19.4升，这就意味着中国90亿只肉鸡每年耗水量高达1750亿升，相当于100万北京居民一年的用水量。

然而，世界自然基金会的估值还不包括饲料生产用水，这往往是养殖业耗水的大头。中国是全球最大的饲料原料消费国，除了国内生产的之外，还严重依赖拉丁美洲、澳大利亚、东欧和美国的进口。2015年，美国大豆对华出口总额超过100亿美元，其榨油后剩下的豆渣被用来制作饲料。

中国生产的肉鸡每只平均产肉1.4公斤，美国的则是2公斤。为了提高产肉率，并降低资源耗用强度，中国正在加强集约化和工业化生产，这一举动也带来了一系列环境问题，其中最突出的问题就是动物粪便堆积，禽流感（同样也困扰着美国家禽业）等传染病肆虐，在常规养殖周期中过量使用抗生素，遗传多样性降低，以及动物福利恶化等。工业化生产同时降低了小型生态养殖者的竞争力，把他们挤出了市场。

全球禽、蛋产业年温室气体排放量为71亿吨二氧化碳当量，约占畜牧业总排放量的9%。中国作为全球最大的禽肉和禽蛋生产国，其国内消费对全球排放总量有着重大影响。过度消费动物蛋白可导致肥胖、糖尿病和心脏疾病的发病率增高，尤其在城市地区，这一问题已经愈发成为威胁中国医疗体系以及人民生活质量和寿命的一大挑战。

养鸡场造成的环境影响也开始引起公众的关注。越来越多的消费者开始购买生态友好的“绿色”食品，认为这种食品更有益健康和环境。这一消费需求也让一些生产者开始采用有机散养法。一些政府机构也意识到了肉类生产造成的各种影响，开始鼓励民众控制肉类消费。

商界也行动了起来。商界名人维诺德·科斯拉、比尔·盖茨、李嘉诚以及美国禽类企业泰森已经投资数千万美元，开发以植物蛋白为成分的人造肉类和鸡蛋替代品。

类似的变化自然是令人喜闻乐见，但我们还需更多利益相关方的行动，特别是政府决策者的参与，确保人们能够正确认识和处理与动物产品生产消费相关的环境、社会以及公共健康成本。这样一股合力，能否在这个鸡年形成呢？

农业部预测，至少到2024年之前，鸡肉和鸡蛋消费还将进一步增长，同时鸡肉生产也将向规模化转变，且极有可能以工厂化养殖场为主。

通过提高技术和管理技巧能够减少淡水消耗、完善废物处理、减轻水污染、温室气体排放等环境影响，并且改善笼养封闭性和密集度过高的问题，降低流行病爆发的风险，减少不必要的对动物身体的粗暴对待，从而改善动物的生活条件。但产量不断增加也意味着必须扩大饲料生产，这需要扩大大豆等饲料原材料的生产，从而导致森林和草原毁坏、化肥和杀虫剂使用增加、淡水资源遭到污染。

政府能否认识到大规模工业化鸡肉生产造成的后果，并采取行动确保负责任的生产，目前还有待观察，中国有机会领导其他国家朝着正确的方向前进。

政府应削减那些与农户签订限制性合同（农户需在合同期内按企业要求养殖）的大型肉类加工企业的补贴，加大对小规模家庭养鸡场的扶持，帮助他们管理风险、与消费者建立联系，并加强废物处理和水质量相关法律法规的执法工作。此外，政府还应在学校、政府机关和其他大型机构内部推广可持续的食品采购，切实执行减少肉类消费的相关政策。

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Factory farming has hidden costs

With nine billion chickens, China's poultry industry poses serious environmental risks

□ Mia MacDonald Zhou Wanqing

China is the world's top producer of chickens and eggs. Each year, a staggering nine billion chickens are raised for meat and 2.7 billion laying hens produce nearly 500 billion eggs. Given the country's huge population, individual consumption translates into enormous pressures on the environment. But these costs are mostly hidden as most of China's chickens are locked inside medium to large scale "factory farms" that are inaccessible to the public.

In the Year of the Rooster, China should take the opportunity to assess the true costs of industrial factory farming and the overconsumption of meat.

Chicken is considered the most resource-efficient source of widely-eaten animal protein in the world but its water footprint is considerable. A World Wildlife Fund (WWF) survey of chicken producers in China estimated that every "broiler" chicken raised for meat requires 19.4 litres of water. This means that China's nine billion broilers need an eye-popping 175 billion litres of water annually, enough for one million people living in Beijing.

WWF's estimate excludes water used in feed production, which is usually the biggest consumer of water in animal farming. China is the world's largest consumer of feed ingredients, and relies heavily on imports from Latin America, Australia, Eastern Europe, and the US, to supplement its domestic production. In 2015, US soybean exports to China were valued at more than US$10 billion.

On average, one broiler in China yields 1.4 kilogrammes of meat whereas in the US it's two kilos. To catch up on the production efficiency and reduce resource intensity, China is intensifying its chicken production but this creates a number of environmental problems; not least the concentration of animal waste; epidemic diseases like avian flu (a problem that bedevils the US poultry sector); overuse of antibiotics in routine production cycles; the loss of genetic diversity; and poor animal welfare. Industrial production also makes

> "China's nine billion broilers need 175 billion litres of water annually, enough for one million people."

it difficult for small and ecologically-oriented producers to compete, crowding them out of the marketplace.

Greenhouse gas emissions from poultry and egg production worldwide account for 9% of the livestock sector's overall emissions: 7.1 gigatonnes of carbon dioxide equivalent a year. As the top producer of chickens and eggs, China's domestic consumption has a significant effect on total emissions. Increasing rates of obesity, diabetes, and heart disease due to overconsumption of animal protein, principally in urban areas, are a growing challenge for China's health system and individuals' quality of life and longevity.

The environmental consequences of chicken farming are also beginning to attract public attention. More consumers are demanding ecologically produced "green" foods that are considered safer for human health and better for the environment. This demand is encouraging some producers to shift to organic and free-range practices. Aware of the various impacts of meat production, some government agencies are also encouraging the public to eat less meat.

Businesses are also getting involved. Vinod Khosla, Bill Gates, Li Ka-shing, and US poultry business Tyson, have invested tens of millions in plant-based alternatives to meat and eggs.

Such changes are welcome but more action is needed to ensure that the environmental, social, and public health costs associated with production and consumption of animal products are recognised and dealt with. Could the Year of the Rooster see the birth of such an effort?

The Ministry of Agriculture foresees further growth in the consumption of chicken and eggs at least through 2024, along with a shift to large-scale production of chicken, most likely in factory farms.

The use of more technology and better management skills may cut down on freshwater usage, improve waste management and lessen environmental impacts such as water pollution and greenhouse gas emissions. It could also improve conditions for chickens by reducing routine mutilations, extreme confinement, and the crowding that increases the risk of epidemic outbreaks. But increasing production also means pressure to expand feed production, which can displace forests and grasslands, increase the use of fertilizers and pesticides, and contaminate freshwater sources.

In the Year of the Rooster, it remains to be seen whether the government will acknowledge the consequences of mass industrial chicken production and take action to ensure responsible production. China has an opportunity to lead in a direction that other countries could follow. It should cut subsidies for large meat processing companies that operate through restrictive contracts with farmers, increase support for small scale family farms to help them manage risks and connect to consumers, and enforce laws and regulations on waste treatment and water quality. It should also pursue concrete implementation of the policy on reducing meat consumption by promoting more sustainable food purchasing in schools, government offices, and other large institutions.

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中国已成为南极治理关键力量

南极离中国不再“遥远”，而中国的介入亦会给国际社会对南极的保护治理带来重大影响。

□ 刘能冶

2016年NASA工作人员在飞机上拍摄到的拉森C冰架裂隙

随着经济实力的增长，中国为应对全球挑战贡献自己一份力量的意愿也空前强烈。但是当经济利益之争成为潜在冲突的根源，中国会做出怎样的权衡？随着气候变暖，极地逐渐成为人类经济活动新的疆域。而中国对极地的治理方式将是对其全球领袖地位的一大检验。

气候变化已经对极地产生了明显影响。南极半岛东部沿海巨大的拉森冰架中的两块——拉森 A 冰架和拉森 B 冰架已经分别于 1995 年和 2002 年崩塌，而最后一块拉森 C 冰架如今也出现了一条 175 千米长的可怕裂隙。

拉森 C 冰架上的裂隙生动地证明了“人类世”（Anthropocene）环境危机的严重性和全球性。温室气体排放等导致环境变化的因素如今已经对这个地球上最偏僻的角落产生了显著的影响。反过来，极地融冰的加速将导致海平面上升，未来将给上海等沿海经济中心带来巨大威胁。

在此背景下，中国显示出对南极的强烈兴趣。在其“十三五”规划（2016-2020）中，中国宣布要积极参与网络、深海、极地、外太空等“新领域”的国际规则制定。迄今，中国已经进行了 33 次南极考察，在南极设立了 4 个考察站，第 5 个正在建设之中。

此外，中国也开始建造一艘新的破冰船，计划将于 2019 年下水。2017 年 5 月，中国还将首次主办南极条约协商会议，即《南极条约》所有缔约方的年会。

但是，目前我们对中国在南极的目标以及如何实现这些目标还不清楚，潜在路径有很多。

南极条约体系的构成

目前南极和南大洋的治理依据的是一个名为“南极条约体系”（ATS）的包罗万象的机制。这个机制的核心是 1959 年签署的《南极条约》，规定南极大陆仅用于和平及科学研究目的。ATS 还包括 1972 年的《南极海豹保护公约》、1980 年的《南极海洋生物资源养护公约》、1991 年的《关于环境保护的南极条约议定书》（《马德里议定书》），以及在这些文件下生效的各种措施。《马德里议定书》确立了南极采矿活动的禁令。

ATS 被广泛视为现代国际法和外交领域的成功案例。但是，我们的地球和我们对它的理解已经与上述条约签署时大不相同了。

中国成南极谈判新力量

气候变化事实上拉近了人类与南极的距离，人们已经在极地开展了航行、捕鱼、旅游和生物勘探等多种活动，而这些活动又与世界第二大经济体中国的崛起密不可分。因此，有关南极治理的国际法律制度也必须有所发展，以应对这些环境和政治变化。

南极治理如何才能应对这些变化呢？南极海洋生物资源保护委员会围绕在南大洋建立海洋保护区的谈判就是一个现成的例子。另外，国际海事组织新通过的《极地水域船舶航行国际准则》（《极地准则》）也改变了南极附近海域的海事活动规则。

所有国家都必须对南极进行可持续管理。作为一个正在崛起的大国，如果中国希望能够积极地扩大在南极体系中的影响并深化参与，那么，推动国际法向着更好保护南极环境的方向发展将是一个很好的切入点。

此外，如今中国已经成为世界最大的海洋捕捞国和第三大船东国，尽管远离南极，但其国内活动也将对国外产生明显影响。比如，2009 年以来中国在南极的 磷虾捕捞量大幅增长，2014 年达到 5.43 万吨。

中国渔船在南极海域发生的多起事故（如 2013 年的“开欣轮”事故）也引发了其他国家对于海洋污染的担忧。同时中国旅游市场对南极的兴趣也日渐浓厚。因此，如果中国想在南极发挥积极作用，最关键的就是要对国人在南极的活动进行有效的规范。

中国政府有多个部委机构参与南极事务，包括：条约法律司、外交部、国家海洋局极地考察办公室（负责中国极地科学考察）、中国海事局（负责航运管理）和农业部渔业局（负责渔业管理）。为了实现有效执法，中国必须更好地协调这些机构对南极事务的管理。

南极正在快速变化之中。这意味着南极治理机制必须不断演进以应对这个原始大陆面临的重重挑战。如果中国能够推动南极治理机制朝着更好地保护南极洲独特风貌的方向发展，同时对自身的南极活动进行有效规范的话，必然能发挥良好的引领作用。

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Antarctica: a test of China's leadership

How China responds to the opening up of the polar regions will determine what kind of global leader it will be

□ Liu Nengye

With its growing economic power China is willing, more than ever before, to contribute to addressing global challenges. But what happens when competing economic interests are a source of potential conflict? One such test for China's role as a global leader will be its approach to governance in the polar regions, which are becoming more open to economic activity as a result of a warming climate. Climate change has significantly impacted the polar regions. Two segments of the giant Larsen Ice Shelf along the east coast of the Antarctic Peninsula – Larsen A and Larsen B collapsed in 1995 and 2002, while the last piece Larsen C now has a dreadful crack 175 kilometres long.

The crack in Larsen C provides a vivid illustration of the seriousness and global nature of environmental crises in the Anthropocene. Drivers of environmental change such as greenhouse gas emissions now have a demonstrable impact on the most remote corners of the planet. In turn, accelerated ice-melt in the polar regions will contribute to sea level rise. This could hit coastal economic hubs such as Shanghai in the future.

> "Drivers of environmental change such as greenhouse gas emissions now have a demonstrable impact on the most remote corners of the planet."

Against this backdrop, China has signalled a strong interest in Antarctica. In its 13th Five-Year Plan (2016-2020), the government declared its political intention to be involved in the governance of "new" fields, including cyber security, the deep seabed, polar regions and outer space. To date, China has undertaken 33 national Antarctic expeditions and runs four research stations in Antarctica with a fifth station under construction.

China has also started the construction of a new icebreaker, which is scheduled for her maiden voyage in 2019. And in May 2017, China will host the Antarctic Treaty Consultative Meeting (ATCM) for the first time. This is the annual meeting for all parties of the Antarctic Treaty.

However, it is still unclear what China's Antarctic

ambitions are and how the country plans to achieve them. There are a number of potential avenues.

Existing protections

The Antarctic and Southern Ocean are governed by an extensive regime called the Antarctic Treaty System (ATS). At its centre is the Antarctic Treaty, which was adopted in 1959, and devotes the continent to peace and scientific research. The ATS also comprises the 1972 Convention on the Conservation of Antarctic Seals, the 1980 Convention for the Conservation of Antarctic Marine Living Resources, the 1991 Environmental Protocol to the Antarctic Treaty (Madrid Protocol), and the measures in effect under these instruments. The Madrid Protocol established a moratorium for mining in the Antarctic.

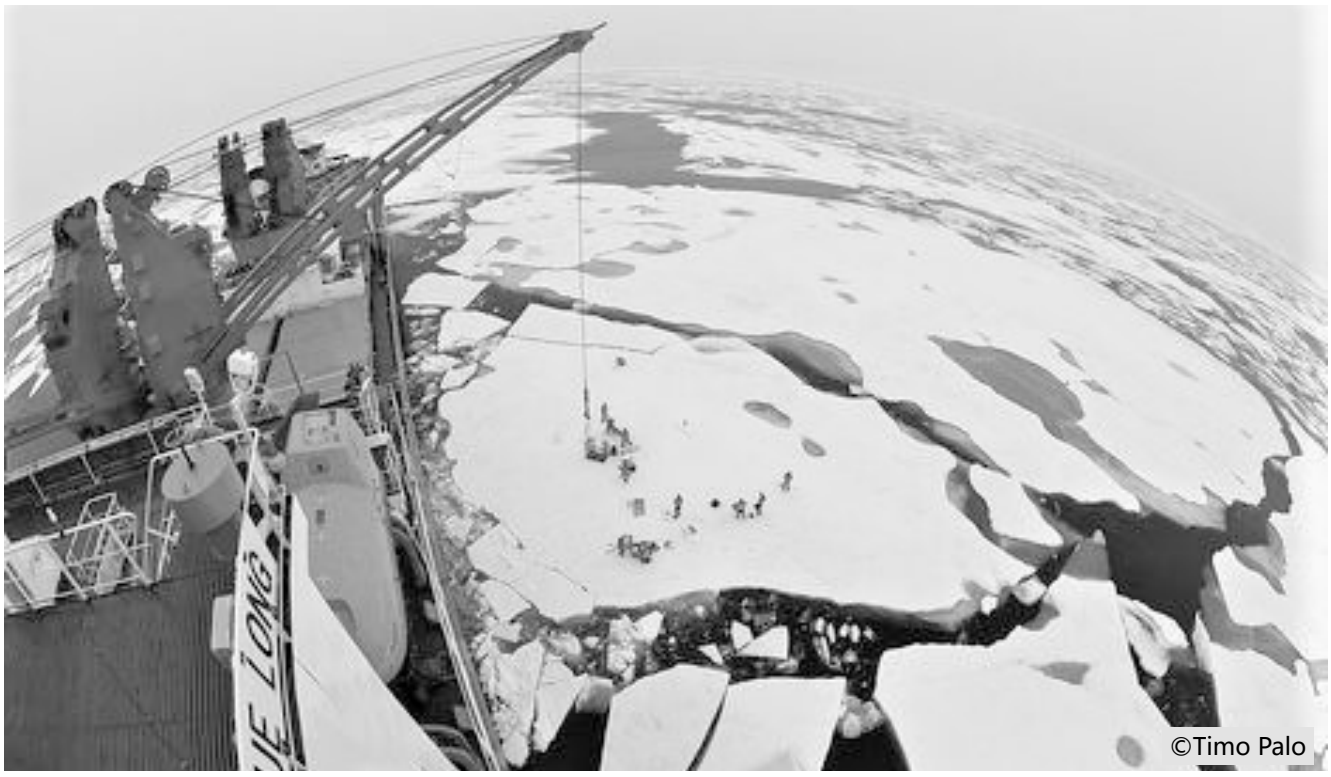
The ATS is widely seen as a success of contemporary international law and diplomacy. However, our planet, and our understanding of it, is vastly different from the eras in which many of the Antarctic instruments were concluded.

A new frontier

Climate change is making Antarctica more accessible to human activities, such as shipping, fisheries, tourism and bio-prospecting. This is entwined with the rise of China, which is now the second largest economy in the world. The international legal regime that governs the Antarctic needs to evolve to respond to these environmental and political changes.

A current example of how governance is responding is the negotiations within the Commission for the Conservation of Antarctic Marine Living Resources on the establishment of marine protected areas in the Southern Ocean. Another development of the current regime is the regulation of maritime activities through the adoption of the International Code for Ships Operating in Polar Waters (Polar Code) in the International Maritime Organization.

The Antarctic needs to be sustainably managed by all countries. If China, as a rising power, were eager to expand its influence and deepen its participation in the Antarctic regime, shaping international law towards better



Arctic Ocean drift ice seen from Chinese icebreaker Xue Long (Snow Dragon)

protection of the Antarctic environment would be a good place to begin.

Furthermore, China is now the largest producer of marine capture fisheries and the third largest ship-owner in the world. China's internal activities could cause significant impact outside the country, and even as far away as Antarctica. For example, Chinese krill fishing in Antarctica has grown significantly since 2009, reaching 54,300 tonnes in 2014.

There have also been accidents of Chinese fishing vessels (e.g. Kai Xin, 2013) in the Antarctic that have generated marine pollution concerns. And there is a growing interest in Antarctica in the Chinese tourism market. Therefore, effective regulation of Chinese activities in Antarctica is essential if China is to play a positive role in the Antarctic.

There are several departments of the Chinese government involved in Antarctic affairs, such as the Department of Treaty and Law, Ministry of Foreign Affairs; the Chinese Arctic and Antarctic Administration, which is in charge of China's scientific research in the polar regions; Maritime Safety Administration – the competent authority for shipping, and the Bureau of Fisheries that is responsible for fisheries management. In order to achieve efficient law enforcement, China needs to better coordinate how these departments manage Antarctic affairs.

The Antarctic is changing fast. This means the Antarctic governance regime needs to evolve to meet the challenges facing this pristine continent. China could play a leading role if it shapes the Antarctic governance regime towards better protection of the globally unique landscapes of Antarctica, and regulates its Antarctic activities effectively.

Dr Liu Nengye is a senior lecturer in Adelaide Law School at University of Adelaide in Australia.

气候变化或影响雄安新区的“雄心”

气候变化对华北空气污染的加剧效应意味着，即将落地于空气污染重灾区的特区需要更强势的气候行动。

□ 唐大旻

毫无预兆但迅速传播，并且影响力巨大，雄安新区的突然设立，满足一条爆炸性新闻的所有条件。

4月1日，中共中央、国务院忽然下发通知，决定在距离北京120公里左右的河北省保定市辖区内的雄县、容县和安新县建立一个新的特区。在中国，特区意味着更宽松和优惠的经济政策，相对独立于地方政府的特殊政治地位，以及由此带来的迅速发展和城市化。此前，1980年设立的深圳特区和1992年设立的浦东新区皆走出了相似的发展道路。

图片来源：Bxxiaolin

发改委主任何立峰解释，建立新经济特区的初衷是北京已无力承担2100万人口谋生、居住和通勤的压力，需要向周边分流。而选择雄县、容县和安新县的一大原因是那里有较大的环境承载力，且坐拥区域内最丰富的水资源——华北平原最大的淡水湖白洋淀。

但问题是保定的空气质量在过去三年中有两年排名全国垫底，还有一次倒数第三。在中国空气污染最严重的地带大搞经济发展，甚至期望苦于空气污染已久的北京居民移居于此，中国政府有信心持续提高京津冀地区空气质量，把雄安打造成宜居之城吗？

科学家：全球变暖加剧京津冀雾霾

中国政府的确正在用各种措施缓解北京及周边地区的空气污染：北京刚刚关闭了最后一座煤电厂；从今年开始，河北的几个钢铁重镇在冬季采暖期间被要求产量直接减半。然而一项新的科学研究显示，除了污染排放，北京空气污染发生的频率还受到气候变化的极大影响。

3月21日发表于《自然·气候变化》的一篇中国和澳大利亚科学

家合著论文显示，如果温室气体的排放持续增加，21 世纪下半叶（2050 年—2099 年），北京冬季的重污染天气与 1950 年—1999 年时相比，发生频次或将增加 50%，每次持续时长或将增加 80%。

这一研究的结论并不难懂，甚至人们早已用自己的感官感知到了：温室气体的大量排放导致气候变暖，变暖的气候影响局部地区的气象条件和天气。在北京及周边地区，这一变化体现为冬季气温上升和风速降低，使污染物更加难以扩散。刚刚过去的这个 55 年来最暖冬季，京津冀地区空气质量就差于上一年度同期。

面对媒体解释 2016 年冬季的污染回升现象时，环保部长陈吉宁明确表示：“这几年连续下来，冬季的污染气象条件变得越来越差，超过了我们的减排速度。这就是我们的问题所在。”

可以说，这项新研究只是以数据验证了这一人们深有体会的现象。

同时它也间接说明：鉴于气候变化的全球性，华北地区治理空气污染的战争也就不只是一个区域，甚至一个国家的战争。雄安新区乃至整个华北城市群的环境治理成败也将取决于人类在应对气候变化上取得的进展。

雄安新区：气候政治的新因素

然而，在气候变化问题上，未来正变得不明朗。在地球另一边，特朗普政府的初步预算案计划砍掉本国环保署近 1/3 经费，仅 EPA 研发办公室就将失去近一半经费，内政部则将批准更多污染性能源项目。

如果这一方案获得通过，毋庸置疑，作为世界第一大经济体、第二大温室气体排放国、国际气候合作的关键力量，美国的减排努力将大打折扣。

与此同时，中国自身在削减燃煤和重工业过剩产能等方面的努力也正经历反复，河北钢铁重镇唐山的产量“反弹”已经引起了政府的警觉。

可以预见的是，雄安新区的设立会令华北地区对空气质量的要求变得更高。而除了“头痛医头”的空气治理措施之外，中国政府可能会更加重视气候变化这一间接影响空气质量的重要问题。

正如环保部长陈吉宁今年数次提及的，在京津冀重工业增长已被冻结的背景下，这一区域空气质量改善趋势的反复不定已经令中国政府认识到了外在气候因素对大气治理的巨大干扰。

唐大旻，中外对话北京办公室资深编辑

Climate change and Xiong'an

Efforts to improve air quality in Xiong'an cannot ignore global warming

□ Tang Damin

The sudden announcement earlier this month of the Xiong'an New Area has caused a huge stir in China and plenty of news coverage but improving air quality in the area will be a major challenge to the scheme.

On April 1 the Party Central Committee and the State Council unexpectedly announced a new special economic zone 120 kilometres from Beijing, in the counties of Xiong, Rong and Anxin, which are all under the jurisdiction of Baoding city, in Hebei province.

Special zones develop and urbanise faster because they benefit from preferential economic policies and greater political independence from local governments. Other examples include Shenzhen and Pudong, founded in 1980 and 1992, respectively, both of which have developed along similar lines.

He Lifeng, chair of the National Development and Reform Commission, says the new zone has been established because Beijing can no longer keep pace with the pressures to provide jobs, accommodation and transportation for its 21 million people and needs to divert the pressures towards its surroundings. A major factor in the choice of location is Baiyangdian, the largest freshwater lake on the northern China plain.

But while Baoding has ample water, it has terrible air quality.

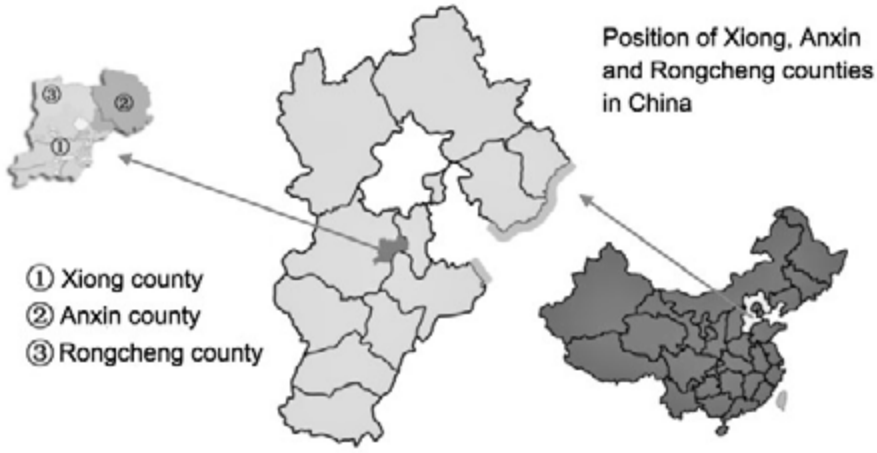


Image: Bxxiaolin

For two of the past three years it has been the worst in the country, and came third in the other year. This is a major drawback for a plan that aims to boost economic development in an area already suffering from polluted air. It may also inhibit migration from Beijing residents who already suffer from air pollution.

The success of the plan will depend in part on the ability of the Chinese government to increase air quality in the Beijing-Tianjin-Hebei region and make Xiong'an a pleasant place to live.

Global warming

The government is taking measures to improve air quality in Beijing and its surroundings. Beijing has just closed its last remaining coal-fired power plant and from this year several of Hebei's major steel-making towns will be ordered to cut production in half during winter. But research has found that climate change, as well as pollution, is having a huge impact on the frequency and duration of smog in Beijing.

A paper by Chinese and Australian scientists, published in Nature: Climate Change on March 21, found that Beijing may see a 50% increase in instances of heavy air pollution in the second half of this century compared to the period from 1950 to 1999. And worse, each instance could last 80% longer.

Although efforts are underway to reduce pollution, the research finds that further increases in greenhouse gases will increase temperatures and affect local climates. In Beijing and its surroundings this will result in higher temperatures and lighter winds in winter, which limit the dispersal of pollutants. Last winter was Beijing's warmest for 55 years; air quality in the region was worse than the previous year.

Chen Jining, China's Minister for Environmental Protection, was clear when speaking to the media about the problem in 2016.

"The meteorological conditions in winter have been worsening for years, outstripping the rate at which we're cutting pollution. This is the problem," he said.

So while the research appears to confirm what Beijing's residents have already observed, it also shows that dealing with air pollution in northern China is part of a global rather than regional or even national problem. The success or failure of environmental governance in Xiong'an and the entire northern China city cluster is linked to global progress to combat climate change.

Xiong'an: a new factor in climate governanc

The future of climate change governance is becoming more uncertain. Of particular concern is the Trump administration's preliminary budget plan, which proposes to slash funding for the Environmental Protection Agency (EPA) by almost one third, remove half the funding for the EPA research office, and would also allow the Department of the Interior to approve polluting energy projects.

If that plan is passed there is no question that efforts by the world's largest economy, second largest emitter of greenhouse gases, and key player in international climate cooperation would be greatly undermined.

Meanwhile, China is also experiencing setbacks in its efforts to reduce coal-burning and excess industrial capacity. Tangshan, a major steel-making city in Hebei has seen production rebound, causing government concern.

It can be expected that the founding of the Xiong'an New Area will mean tougher air quality requirements for northern China. But alongside dealing with sources of air pollution itself, the Chinese government may also focus more on climate change and its indirect but important impact on air quality.

As Minister for Environmental Protection Chen Jining has said repeatedly this year, the rebound in levels of pollution despite a freeze on industrial expansion in the region has made the government aware of the huge impact of external factors on management of air quality.

Tang Damin is Beijing senior editor of chinadialogue.

水资源成雄安新区“雄起”关键因素

缺水的现实决定了雄安新区首先应当是一个节水型城市。

□ 刘 琴

河北省保定市下辖的3个县组成了“雄安新区”，新区面积将是纽约的3倍

在距离北京 100 公里之外，河北省保定市下辖的 3 个县组成了“雄安新区”。这个远期规划面积 2000 平方公里的新城的首要任务就是缓解北京的“大城市病”。

尽管目前新区的具体规划方案还未出台，但国家主席习近平明确指出，绿色智慧新城和优美生态环境将是雄安新区最重要的特征。

然而新区所在的保定市空气质量在过去三年内有两年全国垫底，大气环境堪忧。而尽管坐拥白洋淀，但新区仍面临着水污染严重、水资源匮乏、地下水超采等环境问题。将雄安建成环境优美的绿色城市，难度不小。

多位专家告诉中外对话，基于其所处区域的水资源紧缺、水污染严重，雄安新区首先应该是一座节水型城市。

脆弱的白洋淀

此前，国家发展改革委主任何立峰介绍，新区选址在城市化程度

不高的雄县、安新和容城的重要原因，是该地区拥有华北平原最大的淡水湖白洋淀，生态环境优良、资源环境承载力较强。

但这片湿地湖泊的生态状况不容乐观：一方面，白洋淀水域面积已经从历史最高的1000平方公里缩小到了366平方公里。这是上游补水的减少和气候干旱造成的。从20世纪50年代开始，白洋淀上游陆续修建了100多个水库，导致流入白洋淀的水量锐减。1983年至1988年，白洋淀曾连续5年干淀，“华北明珠”差点在地图上消失。

近年来，白洋淀水位的维持越来越依赖周边水库的调水。据安新县白洋淀湿地保护管理处主任刘东臣介绍，1996年至2016年，白洋淀先后获得23次补水。

此外，白洋淀的水质状况也令人担忧。根据河北省环保厅2015年上半年水质数据，白洋淀水质为最差的劣V类，即重度污染的几无任何用途的脏水。

“整个白洋淀区域环境脆弱，”公众环境研究中心主任马军告诉中外对话。他指出，在公众环境研究中心收集的污染记录中，雄安新区规划范围内的这3个县，污染多集中在纺织、有色金属、造纸、塑料制品等行业，周边县城也存在很多散落的小污染源。而水体缩减又加剧了污染程度。

国家城市环境污染控制技术研究中心研究员彭应登告诉中外对话，白洋淀治理得好，就是新区的一道美景，治理不好，就是黑臭水。建设雄安新区，首当从治理白洋淀入手。他认为新区需要退出现有的传统污染型产业，把先进的环保的产业引进去。

马军认为，雄安新区的设立，将给白洋淀治理带来难得的机遇：“白洋淀污染以前没有得到足够重视，现在大家都在关注，政府肯定会投入更多的资金和技术来治理。”

地下水不堪重负

更重要的是，白洋淀自身已经需要靠水库补水来维持水位，无法负担水源地的作用。据彭应登介绍，白洋淀负担着泄洪蓄洪，补给地下水等重要生态功能，并不能作为水库给未来新区提供生活、生产用水。

目前，新区所在的保定市水资源绝大部分来自地下水。据《第一财经》提供的数据，2014年版的《保定市水资源公报》显示，2001年—2013年，保定市地下水开采量为28.37亿立方米，占总供水量的90.3%，并且实际开采量超过了可开采量47%。

彭应登指出，由于地下水超采，华北地区已经形成了一个地下大漏斗。“地下水水位下降还会给新区建设带来地质塌陷的风险，”他认为。

北京师范大学环境学院副教授陈贺认为新区用水主要得依靠外来调水，慎重开采地下水，因为地下水位下降，等于是与白洋淀抢水，会导致白洋淀下渗情况加剧。

目前新区所在的保定市每年可从南水北调工程获得5亿多吨水量。陈贺认为调水工程可调的水量充足，因此新区不会造成调水工程的负担，但需要警惕调水导致的物种迁移等生态风险。马军则认为，产业、人口若能从北京疏解到新区后，原本提供给北京的水可以部分转移到新区，因此调水量并不会增加。

精细化管理水资源

绿色智慧城市的图景虽然美好，但必须面对本地区水资源短缺的这一现实。据保定水文水资源勘测局的数据显示，雄安3县所属的保定市多年来人均水资源量在240立方米左右，远低于2200立方米左右这一全国人均水平。

针对缺水问题，专家们认为，建设新区首要的是建设一个节水型城市，精细化管理水资源。

环保组织自然之友总干事张伯驹认为新区整个产业的布局上应该把水资源放在第一位，而中水回用等节水技术手段也值得重视。

针对北京计划把一些高校资源搬迁到雄安的设想，彭应登认为，节水措施应当在学校中推广实施。另外，他认为新区建设中也要严控景观用水，不能因为追求景观效果而浪费宝贵的水资源。

陈贺说，北京也是缺水城市，但大家对于缺水的感受并不强烈，可以通过提高超额用水价格的方式来唤醒节水意识。

马军认为，中国目前还没有建成一个真正意义上的节水型城市，因此雄安有机会建设成节水城市的典范。他建议雄安新区向国际上的最佳实践学习，从以色列、新加坡、日本等国学习节水的技术、行政、法律、经济手段。

刘琴，中外对话研究员

Water scarcity affects Xiong'an

Xi's grand urban plan must overcome some major pre-existing resource pressures

□ Liu Qin

President Xi Jinping's ambitious plan to construct Xiong'an New District is intended, primarily, to relieve population pressure on nearby Beijing, which is just 100 kilometres away. The scale of the project is enormous – at 2,000 square kilometres it will swallow up three counties under the jurisdiction of Baoding city in Hebei province and be roughly three times the size of New York.

Detailed plans have not yet been revealed but President Xi has said Xiong'an will be a "smart and green city," with a "beautiful environment."

But even before the diggers move in, Baoding already has a problem that future residents should be concerned about. The city has ranked lowest in China for air quality for two of the past three years and there are worries about how the project will impact on the area's water availability.

A key resource that makes the project possible is Baoding's proximity to Baiyang Lake, northern China's largest freshwater lake, often referred to as the "kidney" of the north. But the spectre of water scarcity, water pollution, and the over-extraction of groundwater looms over the project and will make delivering on the promise of a beautiful environment no easy task.

Indeed, experts are saying that water scarcity and pollution problems mean Xiong'an will have to conserve water right from the start.

Vulnerable lake

He Lifeng, chair of the National Development and Reform Commission (NRDC), a central planning agency, has said that the relatively rural counties of Xiong, Anxin and Rongcheng were chosen for their proximity to Baiyang Lake, their clean environments, rich resources and environmental capacity.

But the outlook for Baiyang Lake and its wetlands is far from rosy. The lake area has already shrunk from a peak of 1,000 square kilometres to 366 square kilometres as a result of reduced upstream flows and a drier climate.

"President Xi has said Xiong'an will be a "smart and green city," with a "beautiful environment."

Since the 1950s over 100 reservoirs have been built upstream of the lake, sharply reducing the flow of water into it. Between 1983 and 1988 the lake virtually dried up. The "Pearl of Northern China" (as the lake is referred to in China) almost disappeared off the map.

In recent years, the water levels at Baiyangdian have been increasingly reliant on the supply of water from nearby reservoirs. According to Liu Dongchen, head of the Anxin county Baiyangdian Wetlands Protection Office, extra water was provided on 23 occasions between 1996 and 2016.

Water quality is also a cause for concern. According to data in the first half of 2015 from the provincial environmental protection office, Baiyangdian's water quality ranked as Class V. This is the lowest classification and means the water is so polluted that it has practically no use.

"The Baiyangdian region's environment is vulnerable," says Ma Jun, director of the Institute for Public and Environmental Affairs (IPE), an environmental non-profit organisation based in Beijing.

According to the IPE's pollution database, environmental concerns in all three counties spring mainly from the local textiles, nonferrous metals, paper-making and plastics industries, in addition to numerous other small pollution sources in the surrounding counties. As Baiyang Lake shrinks the pollution is becoming more concentrated.

Peng Yingdeng, a researcher at the National Research Centre for Technology for the Control of Urban Pollution, tells chinadialogue that Baiyang Lake could be a scenic spot or a cess pit, depending on how it is managed.

Management of the lake water must be at the heart of the construction of Xiong'an New District if the project is to succeed.

Peng suggests that polluting industries in the district should be closed down and replaced with more advanced and environmentally-friendly businesses.

Ma Jun believes that the new city is a precious opportunity to turn around the fortunes of the lake.

"Previously, pollution here was not taken seriously, now it's getting lots of attention. The government is bound to bring more funding and technology to bear."

> "The government is bound to bring more funding and technology to bear."
>
> – Ma Jun

Groundwater depleted

Baiyang Lake already relies on nearby reservoirs to maintain water levels so using it as a source of water in its own right makes little sense.

While it cannot serve as a reservoir to supply water for domestic and commercial use in the new city, the lake does have an important environmental role to play, says Peng Yingdeng – absorbing floodwaters and replenishing groundwater.

Currently Baoding's water needs are met almost entirely by groundwater. According to figures reported by Yicai, a Shanghai-based news platform, the 2014 Baoding Water Resources Bulletin showed the city extracted 2.837 billion cubic metres of groundwater between 2001 and 2013; a whopping 90.3% of the city's total water supply. Unfortunately, this was 47% greater than the sustainable maximum level.

Peng Yingdeng points out that over-extraction of groundwater is already causing subsidence across northern China. "Falling groundwater levels will put the new district at risk of subsidence," he says.

Chen He, an associate professor at Beijing Normal University's School of the Environment, thinks the new city will have to rely on imported water and use groundwater only sparingly because further extraction of groundwater will reduce Baiyang Lake's water levels even further.

Baoding currently gets over 500 million tonnes of water from the South-North Water Transfer Project every year. Chen says that project can supply the extra water the new city needs without a problem – but ecological risks, such as the transfer of invasive species, need to be guarded against.

Ma Jun says that as people and businesses relocate to Xiong'an from Beijing, some of the water currently bound

for Beijing could be redirected, avoiding the need to transfer additional quantities.

Careful management needed

Plans for a smart and green city are all well and good but the reality is that Xiong'an has limited resources and a legacy of environmental challenges that must be managed from the start.

Conserving water will be essential, say experts, because for years now Baoding has been getting by on less. The average per head water resource is just 240 cubic metres, which is far below the average of 2,200 cubic metres for China as a whole, according to data from the Baoding Hydrological and Water Sources Survey Bureau.

Zhang Boju, secretary general of environmental NGO Friends of Nature, says that energy-saving technologies such as the reclamation of grey water should be considered when planning the industrial structure of the new city.

Regarding plans to relocate university campuses to Xiong'an, Peng Yingdeng says that water conservation will need to be built into any new facilities and that using water for scenic features should be limited.

Ma Jun says that China is yet to build a city that effectively manages to save water and that Xiong'an is an opportunity to set an example. But China will need to use best international practices and so should look to the technologies, as well as administrative, legal and economic measures used by countries such as Israel, Singapore and Japan.

Whether this advice will be heeded remains to be seen.

Liu Qin is a researcher at chinadialogue.

核电站退役“身后事”成全球难题

60年的核电史给了人类累累伤痕，却还未教会人们如何妥善处理核废料。

□ 露比 · 罗素

今年 4 月 26 日是切尔诺贝利核事故的 31 周年纪念日，而距全球首座核电站在苏联投入使用，人类也已走完一个甲子。但尽管核电利用的历史已有数十年之久，大多数国家仍未就如何安全地存储核废料达成一致意见。

芬兰在这方面一马当先，计划建立全球首个永久性核废料存储场，将高放射性核废料埋藏在远离海岸的奥尔基洛托岛地下 400 米的花岗岩层中。实施者称核废料可以在那里安全地存储 10 万年。

总的来说，长期规划并不是政府的强项，这对于必须对未来数万年、甚至数百万年可能发生的意外做好规划的核工业而言，是一个大问题。

艺术家和哲学家甚至在讨论，正如今天的人类已经无法理解史前文明，我们要如何标记废料存储点才能让未来的人类看懂。

即便不把目光放得那么长远，核废料存储也会给技术、经济以及社会带来巨大挑战。芬兰将于 2020 年开始填装奥尔基洛托存储场，预计耗时 100 年。鉴于从 1919 年人类首次成功完成核反应实验至今还不到百年，用 100 年来填装废料听起来可真够长得了。

瑞典也在开发类似的技术，是除芬兰外唯一一个核废料处理规划接近完成阶段的欧洲国家。两国地质条件优越，核废料数量相对较少且种类单一，只需处理用过的燃料（又称“乏燃料”），没有需要后处理的废料，因而相比其他核国家更具优势。

> “鉴于从1919年人类首次成功完成核反应实验至今还不到百年，用100年来填装废料听起来可真够长得了。”

格林威治大学能源政策荣誉教授史蒂夫·托马斯说，大多数情况下，高放射核废料都是先存放起来再等待处置。

“放眼全球，大家的乏燃料存储规模和反应堆数量都在增加。随便找一个运营超过 20 年的反应堆，这个电站的乏燃料存储设备肯定扩容过，大家都一样。没地方放了。”托马斯说。

公众阻力

2011 年，德国总理安吉拉 · 默克尔宣布将在 2022 年之前全面关闭本国的核电站。欧洲最大的经济体成为了可再生能源发展道路上的开拓者。

1977 年两德尚未统一时，西德开始勘探位于北部的格尔雷本的一座废弃盐矿，为核废料存储选址。德国也因此一度被视为探索核废料问题解决之道的先锋。当地居民从一开始就提出强烈抗议，这场斗争持

高放射性核废料正从法国瑟堡港口卸下

续数十年，直到外界关于该选址在地质上是否适用于存储核废料的争论愈发激烈，才最终作罢。一些专家称，该选址靠近当时人烟稀少的东德边境，这种选择的政治意味要高于科学原因。政府于 2000 年中止了选址调查。

德国今年通过的一项法案让格尔雷本再次成为核废料存储候选地：按照法案新的选址调查将把整个国家视为一张“空白地图”，所有的盐穹、花岗岩和黏土层都在考虑之列。

官方计划在 2031 年之前选定地址，2050 年之前完成建造。但位于德国东部毗邻捷克的萨克森州已经要求将其排除在选址程序之外，一些专家也认为这一要求很有可能被采纳。

英国的选址勘探工作，则在英格兰北部塞拉菲尔德的核退役及后处理设施附近展开，那里是全英国核废料问题最为严重的地区。但在征询公众和学界的意见之后，选址工作被暂停，并最终取消。

在法国，目前比较成形的计划是将东北部一个叫布雷的村庄附近的黏土层作为核废料存储地。法国放射性废物管理机构（ANDRA）计划在 2035 年之前完成建设。但观察者说，这一决定没有征询公众意见，而决定该选址命运的议会投票即将举行，当前公众对此的抗议在不断升温。

成本未知

除了技术和政治问题，经济成本也是核废料处理的一大挑战。

在英国，核退役管理局根据现有数据预测当前的清理成本将在 8400 亿到 2 万亿人民币之间。而这方面 2017 至 2018 年度的计划总支出相当于 288 亿元人民币，其中 200 亿由政府和税收承担，剩下的 88 亿则由商业运营所得负担。

在德国，负责反应堆退役的主要是核电站运营商。这一过程涉及乏燃料移除和设施拆除，往往历时数十年。

根据去年达成的协议，核废料

处置现在变成了国家的责任。核电机构需向国家管理的基金支付相当于 1770 亿人民币的资金用于废料处置。但专家担心，最终为此买单的还是纳税人。

“我们对所有的废料管理和处置都没有技术上的概念，所以无法预估成本，”德国西鲁尔应用科技大学能源管理教授沃尔夫冈 · 艾瑞克说。事实上，基金额度是参考 20 年前选址格尔雷本的预算来计算的

长期临时存储

一些专家认为，现在谈一劳永逸的处置为时尚早。但即便是芬兰的奥尔基洛托项目，外界对其长期安全性也存在质疑。

“站在科学的角度，现在说我们找到了安全存储核废料数万年的方法是过于自大了，”独立核政策分析师、年度《世界核工业状况报告》首席作者迈克尔 · 施奈德说。“我不相信地质存储会永远安全，我还没见过有人下过这种定论，现在还言之过早。”

相反地，施奈德号召把关注点放到确保临时存储能够到位。大多数情况下，临时存储并不健全。

“处理废料出现问题的原因在于，我们以到一定时间进行永久存储为前提对废料进行暂时封存，但一旦超过期间还未掩埋，临时封存的包装就会开始退化，”托马斯说。

英法两国都选择湿存储的方法暂时处置乏燃料，即将其长期保存在水池里。施奈德说，欧洲核废料处理值得借鉴的是德国的方法，即用水将废料冷却后取出尽快进行干存储。

“干存储比水池存储更安全，这是毫无疑问的，”施奈德说。“因为一旦没了水，湿存储的燃料就会升温，问题就大了。燃料的年限不同，有的可能会引起火灾，造成比我们之前所经历过的核事故还要严重的事故。”

他提到说，福岛核电站事故发生之初，让大家提心掉胆的一个事情是无法确定是否有可能发生乏燃料火灾；如果真的发生了，至少有 1000 万周边人口需要疏散。（福岛事故最后疏散人口近 20 万。）

英国独立专家团体核废料咨询协会的安德鲁 · 布洛尔斯说，反应堆的规划所在地本身就有很大问题。

“很多危险的乏燃料都将存储在沿海地区（距离反应堆不远的）新建的设施中，这些地区极易受气候变化影响，如此日积月累，可能会成为下世纪人类面临的一大问题，”布洛尔斯说。

冰山一角

所有这些担忧都只是放射性核废料这个大问题中的一小部分。“高放射性废料只是最小的一部分。”施奈德说，“污染程度较低的废料才是数量惊人。单单像德国东部 Wismut 这样的一个铀矿，就能产生数亿吨废料。”

核设施退役会产生大量污染材料。德国放射性废料的临时存储场也饱受技术和公众抵触的困扰，英国更是出现退役成本失控的问题。

“英国是核电设施退役管理的反面典型，几乎每个可能的错误英国都犯了，最后只剩下一贫如洗的管理局。”专注能源政策的托马斯说。

德国已经决定彻底淘汰核电站。所需处理的废料数量是既定的，这确实是一大优势，但托马斯认为，人类现有的核退役经验还太少，不足以真正帮助确定德国将面临怎样的情况。

“全球已经退役的核设施数量少到可以忽略不计。我认为全球只有 6 座运营达到一定时长并且彻底退役的电站。”他说。

布洛尔斯认为德国还是做对了一件事：“在我们不确定如何处理现有废料的情况下，就不要再制造更多的核废料了。”

露比 · 罗素，柏林记者

No clear solution for nuclear waste

On the 31st anniversary of the Chernobyl disaster,
there is still no consensus on what to do about nuclear waste

□ Ruby Russell

It's been over 60 years since the first nuclear power plant was switched on in Russia and exactly 31 years since the Chernobyl nuclear disaster. Yet despite the decades-long history of nuclear power, most countries still haven't agreed on a way to safely store nuclear waste.

Leading the way is Finland with the world's first permanent repository for spent nuclear fuel. High-level radioactive waste is to be buried 400 metres deep in the granite bedrock of Olkiluoto Island off the Finnish coast, where its operators claim it will be secure for the next 100,000 years.

Governments, on the whole, aren't good at long term planning though. And this is a major problem for the nuclear industry where eventualities must be planned for in terms of hundreds of thousands, or even millions, of years.

Teams of artists and philosophers are even debating how to mark repository sites to warn off future generations who may be as removed from us as we are from the first homo sapiens to arrive in Europe.

Even the more easily grasped timescales involved in nuclear waste disposal pose huge technical, economic and social challenges. Finland is to start loading the Olkiluoto repository in 2020 and the process is expected to take 100 years. That may seem like a long time, and it is considering that the first observed nuclear reaction was made less than 100 years ago in 1919.

Sweden, which is pushing forward with the same technology as Finland, is the only other European country close to such an advanced stage of planning. Favourable geological conditions and relatively small quantities of just one type of waste – spent fuel, without the additional problems of reprocessed waste – mean both countries have advantages over other nuclear nations.

For the most part,says Stephen Thomas, emeritus professor of energy policy at Greenwich University, high-level radioactive waste is lying around waiting for a solution.

"Around the world, everybody is extending the spent fuel storage and reactors. Find me a reactor that's been in operation for 20 years and I'll find you a plant which has

> In the UK, the cost of nuclear decommissioning is between £95 billion (847 billion yuan) and £219 billion (2 trillion yuan)

had its spent fuel facility increased. Every one. There's nowhere to put it," says Thomas.

Public resistance

In 2011, German Chancellor Angela Merkel announced a full phase out nuclear power by 2022, making Europe's largest economy a trailblazer in renewable energy.

Back in 1977, Germany was seen as a pioneer of disposal solutions when it began exploring a former salt mine at Gorleben as a possible repository. From the start, locals protested vehemently. A decades-long battle ensued with intense debate over whether the site was geologically suitable. Some experts claimed that with its location in a sparsely populated area close to the then border with East Germany, the site was selected more for political than scientific reasons. In 2000 the government put a moratorium on the investigation.

A bill passed this year will see Gorleben back on the agenda as a possible waste site, in a search that views the country as a "blank map", with salt, granite and clay sites all to be considered.

Officially, a site is to be identified by 2031 and built by 2050. But the state of Saxony is already pushing to be excluded from the process and some experts say this bid looks highly optimistic.

In the UK, exploration of a potential site conveniently close to the Sellafield decommissioning and reprocessing site – home to by far the country's worst nuclear waste problem – stalled and was cancelled following a public and scientific consultation process.

In France, the plan for a clay repository near the village of Bure is more advanced than most. French nuclear agency ANDRA plans to have it ready by 2035. But observers say there has been a lack of public consultation and public protests are heating up ahead of an upcoming parliamentary vote over the site's future.

Unknown costs

Besides the technical and political issues surrounding final disposal there are also massive economic challenges.

In the UK, the Nuclear Decommissioning Authority forecast that the current cost of clean-up is somewhere between £95 billion (847 billion yuan) and £219 billion (2 trillion yuan), based on the data available. The total planned expenditure for 2017/2018 is £3.24 billion (28.9 billion yuan), of which £2.36 billion (21 billion yuan) will be funded by the government and the taxpayer; £0.88 billion by income from commercial operations.

In Germany, nuclear power plant operators are largely responsible for decommissioning reactors once they are switched off – this is where spent fuel is removed and sites dismantled – a process that takes decades in itself.

Under an agreement reached last year, waste disposal is now the responsibility of the state. Utilities are to pay 23.6 billion euros (177 billion yuan) into a state-administered fund to cover this. But experts worry that ultimately, taxpayers will be left footing the bill.

"For all the waste management and disposal of waste there is no technical concept and so you cannot estimate costs," says Wolfgang Irrek, professor for energy management at Ruhr West University of Applied Sciences in Germany. Instead, the calculation is based on 20-year-old estimates for the Gorleben site.

Long-term intermediate storage

Some experts say final disposal is a bit of a red herring in any case. As appealing as the idea of settling the matter once and for all might be, questions have been raised about the long-term security of even the Finnish project.

"It's very arrogant, scientifically, to say today we have safe disposal for tens of thousands of years," says Mycle Schneider, an independent nuclear policy analyst and lead author of the annual World Nuclear Industry Status Report. "I am not convinced geological storage is good forever – I have not seen the argument made conclusively. It's too early to say."

Instead, Schneider advocates a focus on ensuring that interim storage is up to the job, which, for the most part, it isn't.

"We have got into problems with waste because it has been packaged on the assumption that it would go in the ground at a certain time, and it hasn't, and the packaging has degraded," Thomas says.

The UK and France have used wet storage for spent nuclear fuel, meaning the waste is kept in pools for long periods of time. Schneider says if there is anything to be learned from the European experience with nuclear waste it's to take the German route of getting the cooled waste out of the water and into dry storage as quickly as possible.

"There is absolutely no doubt that dry storage is much safer and much more secure than pool storage," says Schneider. "If you lose the water you are in trouble because the fuel will heat up. Depending on the age of the fuel, you might get fuel fires that will dwarf the nuclear accidents we have seen so far."

He points to the Fukushima disaster, where it was initially unclear if a spent fuel fire was on the cards; a scenario which would have called for the evacuation of at least 10 million people.

In the UK, Andrew Blowers of independent expert group Nuclear Waste Advisory Associates says the locations of planned reactors pose their own set of problems.

"A lot of dangerous spent fuel is going to be stored on new-build sites which are in vulnerable coastal locations, which stacks up to a huge problem for the next century with climate change," says Blowers.

Tip of the iceberg

And all this concerns only a tiny fraction of the overall radioactive waste problem. "High-level waste represents the smallest volume," says Schneider. "The biggest volumes are [found] the lower you go in the contamination levels. A single uranium mine, like the German Wismut, can generate hundreds of millions of tonnes of waste."

Decommissioning generates huge volumes of contaminated material. Intermediate-level waste storage repositories in Germany have also been fraught with technical and public acceptance problems, while decommissioning in the UK has seen costs spiral out of control.

"Britain is an example of how to make provisions for decommissioning wrong – we have made every mistake it is possible to make and have ended up with a nuclear authority that has no money," Thomas says.

Germany has decided to phase out nuclear power altogether. Having defined volumes of material to deal with should give it some advantage, but Thomas says there is still too little experience of decommissioning to really know what the country is in for.

"The amount of decommissioning that has gone on in the world is negligible. I think there are six plants that have been fully decommissioned that operated for a decent amount of time."

Still, Blowers says Germany's got one thing right. "What we don't want is more nuclear waste created when we are not at all sure what we are going to do with what we've already got."

Ruby Russell is a Berlin-based journalist.

贝加尔湖“贝水兰调”提案惹争议

引贝加尔湖水入兰州的设想可行吗？

□ 尤金 · 西蒙诺夫

贝加尔湖贮藏了全球20%的淡水资源，25000多个在其他地区罕见的物种栖息于此

每到春季，城市规划者们总会提出新的大型调水工程，希望以此为干旱地区的城市“解渴”。今年，中国甘肃省兰州市城乡规划院的专家提出了“北水南调”方案，即铺设一条2000公里的输水管线，将俄罗斯贝加尔湖的水引入兰州，以解决这个西北重镇的干旱问题。

今年二月，兰州市城乡规划设计研究院公布了《中国 · 兰州2030城市规划愿景》（以下简称“《愿景》”），其中就包括贝加尔湖“北水南调”工程的规划。据《环球时报》报道，贝加尔湖是世界上最深的淡水湖，而兰州的海拔还比贝加尔湖面高1000米，若要将贝加尔湖的湖水引入兰州，不仅需要通过长距离的管道，还要用到水泵抽水。该计划一经发布便引发了广泛的争议，兰州市规划设计院随即从官网上删去了相关内容。相关专家也对该计划的环境影响、经济合理性、以及政治可行性提出了质疑。

其实，此前类似这样的调水工

程提案屡见不鲜。2015 年，俄罗斯农业部长亚历山大 · 特卡乔夫承诺将俄罗斯的水通过哈萨克斯坦引入新疆，解决当地干旱问题。2013 年，蒙古总统额勒贝格道尔吉也承诺向中国内蒙古地区供水。

一直以来，贝加尔湖不断作为水源输出地出现在各种横贯亚洲的大型调水项目提案中。贝加尔湖位于东西伯利亚地区，拥有世界 20% 的淡水资源和至少 2500 种生物物种，其中多数为贝加尔湖所特有。

中国企业家卞洪登是提出“北水南调”项目的第一人。早在本世纪初，卞洪登就提出从蒙古国北部的多条河流引水接济蒙古国南部的干旱地区并延至中国境内的想法，其中包括最后汇入贝加尔湖的色楞格河。

2005 年，卞洪登称他还在考虑从贝加尔湖调水的可行性。该计划未能得到中国水利部的认可，被迫搁置，但在 2007 年及 2010 年，这一设想又再次浮出水面。

环境隐忧

对于从贝加尔湖“调水入兰”的构想，中国专家提出了多方面的担忧，主要涵盖甘肃的工业用户是否愿意承担相关费用，及该项目对贝加尔湖生态环境的影响等。中国南水北调工程总设计师石维新称，实施此类工程项目须减少对环境的破坏。南水北调工程耗资 480 亿美元，是世界上规模最大的水利枢纽工程。作为该工程的总设计师，石维新提出的这一警告格外引人注意。

俄方专家的反对之声则没有那么强烈。贝加尔地区最大的城市伊尔库斯克的湖沼学研究所所长米哈伊尔 · 吉拉切夫说道，“好吧，可以。贝加尔湖水源充足，但是贝加尔湖与中国之间隔着崇山峻岭，中方如何将水运出去？”由此可见，俄方专家对调水工程带来的影响认识不足。利比亚的大人工河项目是当今世上最大的输水系统。该工程建设管道 1000 公里，每年将 13 亿立方米的水资源从努比亚砂岩蓄水层输送至的黎波里及其他几个城市。以同样规模的取水量计算，贝加尔湖调水规模仅占其水量的 2%，湖水水位仅降低 5 公分。吉拉切夫及其他学者认为这样的取水规模在安全范围内，对湖水生态影响较小。然而，对于取多少水才能保证生态环境的安全，尚未有过科学系统的研究。

据伊尔库斯克贝加尔湖生态研究中心的环保人士马克西姆 · 沃龙佐夫称，他更担心输水管道及其他设施建设对贝加尔湖湖岸线的影响，以及给所经之地的森林、河流造成的严重损失。

贝加尔湖是联合国教科文组织认定的世界遗产，然而该湖近年来面临的诸多紧迫威胁让当地的环保人士颇为头疼，其中包括持续了 23 年的罕见干旱天气使湖水水位降低至临界点；沿岸居民及景区污水处理不当导致的大规模赤潮现象；当地游客数量近年来增长了近十倍，湖岸周边宿营地和度假屋建设热火朝天；干旱、过度捕捞及污染等因素使得湖水中的鱼类大幅减少；2015-2016 年湖岸周边遭遇严重的森林火灾，严重破坏了当地生态环境。此外，在贝加尔湖的主要水源色楞格河上，蒙古国正在积极兴建的三个大型水库项目也给贝加尔湖带来了威胁。

前车之鉴

或许我们可以从附近一个规模较小的项目中借鉴些重要经验。在世界银行的资助下，蒙古国对鄂尔浑河大坝项目进行了可行性研究。鄂尔浑河是贝加尔湖的一条支流，蒙古国计划在该河上兴建一座大坝，将水从地下输送至 750 公里外的南戈壁地区的大型矿厂，为其提供水源补给。

当地的环保组织建议，在项目启动前，蒙古及俄罗斯方面应首先听取当地民众的意见，评估该项目的环境影响。三月底，项目首轮问询会在贝加尔湖畔的“布里亚特共和国”（俄罗斯自治共和国）举行。会上，当地居民强烈谴责了鄂尔浑河大坝项目，他们表示干旱天气已经影响了居民的生活环境，而俄罗斯建于安加拉河的大坝也对当地渔业、航运、水源质量和供给量造成了严重影响。考虑到贝加

“贝加尔湖是联合国教科文组织认定的世界遗产，然而该湖近年来面临的诸多紧迫威胁让当地的环保人士颇为头疼，其中包括持续了23年的罕见干旱天气使湖水水位降低至临界点。”

尔湖已濒临生态危机，当地民众呼吁政府在日后建设包括贝加尔湖“调水入兰”在内的项目时，应进行环境累计影响评估。贝加尔湖被当地人视为“圣地”，不顾预期环境影响而一味地试图将大型水利基础设施强加给当地群众的做法势必很难得到民众的支持。

此外，长距离的输水管道建设也不具备良好的经济效益。“2030年世界水资源项目组”近期发布的报告显示，相比建设鄂尔浑河 - 戈壁输水管道（该管道长度是计划中的贝 - 兰输水管道的三分之一），提高戈壁地区的用水效率更为经济。减少用水量，加强地下水的管理既可以满足戈壁地区的用水需求，年投资额只是管道建设成本的七分之一到六分之一（管道建设成本预计约 13 亿美元，每年的维修管理费为 7500 万美元，年输水量不到 8 千万立方米）。按照同样的输水规模计算，以贝加尔湖 - 兰州管道的长度，其预算至少是鄂尔浑河 - 戈壁输水管道成本的 5-20 倍。

水资源会成为俄罗斯发展瓶颈吗？

环保记者塞米扬 · 拉斯金曾乐观表示，相比出口石油、煤炭、矿石及木材，输出贝加尔湖的淡水资源可环保多了。

在 2015 年世界水资源论坛上，美国德州农工大学法学院教授加布里埃尔 · 埃克斯坦谈到了大型输水工程建设的话题，他表示此类工程“不利于经济上的可持续发展，还带来了难以处理的政治依附关系，同时也会加强水资源的商品化。在一些人看来，商品化是对人类水权的背弃”。

尽管调水工程会增强国际合作，促进人类健康和经济福祉的发展，但也引起了人们的担忧，比如，长距离的调水会“减少生态系统的保水量，增加能源需求和温室气体排放等”。基于油气输出输入国的情况对比，埃克斯坦担心水资源输出国的经济发展速度可能会低于水资源输入国。

很多俄罗斯的环保主义者、政治家及科学家都对此表示担忧。在“一带一路”框架下，中俄两国的合作使俄罗斯更加依赖于自然资源出口及其他不可持续的发展模式。新俄罗斯政治运动领导人尼基塔 · 伊萨耶夫对 Rambler Information Agency 表示，中方在俄罗斯的投资主要集中在资源开发项目，而非成熟的基础设施建设和消费品生产。

伊萨耶夫表示，很显然，中方将从贝加尔湖“北水南调”工程中获益，而俄罗斯方面能否受益尚未可知。因此，他认为俄罗斯应停止该项目的建设。中国在不适宜的地方投资兴建大规模项目已带来很多问题。比如，中方在西伯利亚铁路沿线后贝加尔省兴建的阿马扎尔纸浆锯木厂，就由于没有稳定的木材资源和劳动力供给而半途而废。建设这样的生产厂不可避免会破坏当地原生的针叶林，并给当地社区和规划的保护区带来损失。

贝加尔湖两岸的旅游业增长也将带来类似的威胁。2016 年，中国投资者表示要向当地度假旅游行业投资 110 亿美元，用以接待数百万的游客。然而，俄罗斯官方担心当地社区无法在保障可持续发展的情况下吸纳这么大体量的投资。

贝加尔湖的生态系统独特而又脆弱。尽管我们还不清楚大型调水工程对环境的影响，但是我们应该以更加创新和可持续的方式来开发西伯利亚的“神圣之海”。

尤金 · 西蒙诺夫，俄罗斯环保主义者、河流无国界联盟创始人

Lake Baikal threat

A proposal to divert Siberian lake water to China's arid northwest meets with opposition

□ Eugene Simonov

Every spring a new mega-pipeline is proposed to quench the thirst of arid corners of Asia.

This year, Chinese urban planners proposed building a 2,000 kilometre pipeline to pump water from Siberia to relieve shortages in the parched north-western city of Lanzhou.

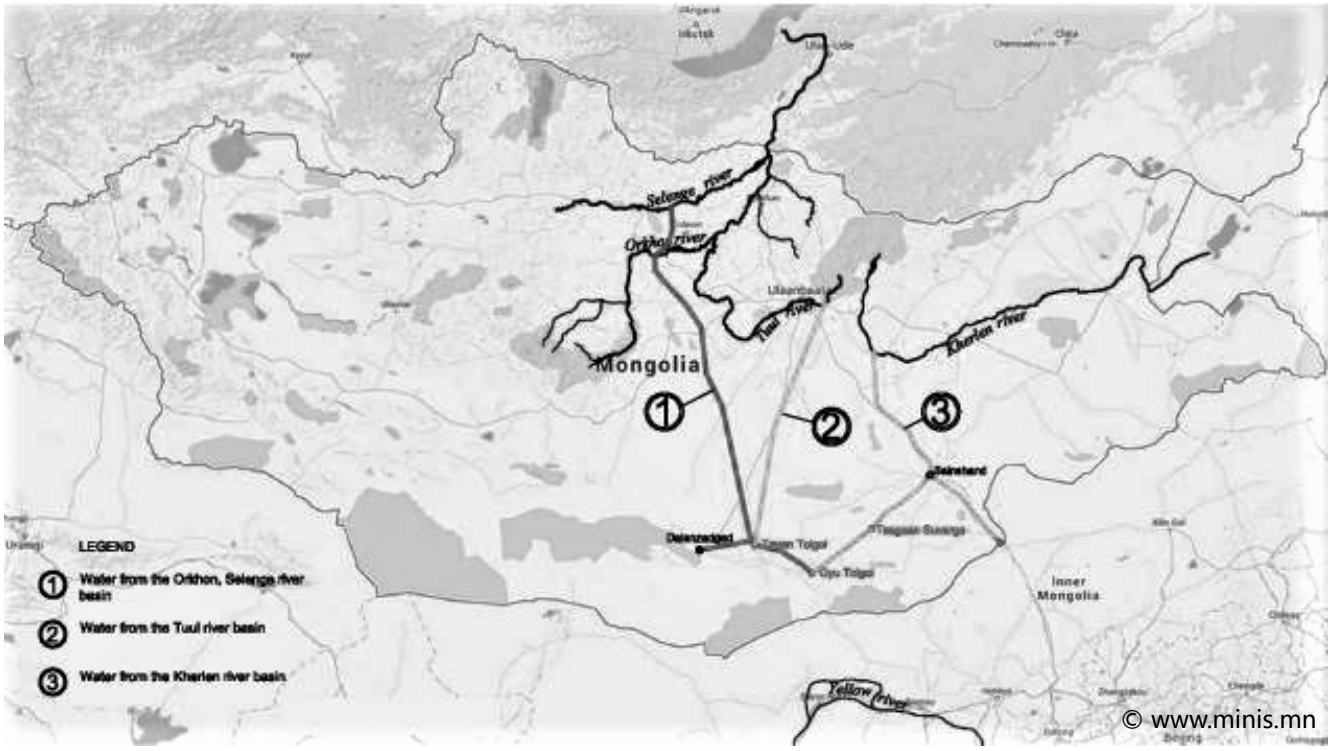
The Lanzhou Urban and Rural Planning and Design Institute released plans for the project in February as part of its "Vision for Urban Planning 2030". The scheme would divert water from Lake Baikal, the world's deepest freshwater lake, and pump it at least one kilometre uphill to the capital of Gansu province, reported the Global Times. The plan has been met with criticism and was later removed from the website of the Lanzhou institute. Experts have questioned the scheme's environmental impacts, economic rationale and political feasibility.

This is only the latest in a series of proposals to export surplus water from Russia and Mongolia to China. In 2015, Russian minister of agriculture Alexander Tkachev promised to divert water through Kazakhstan to Xinjiang, another dry area of north-western China. In 2013, Mongolia's president Taskhiagiin Elbegdorj pledged to supply water to Inner Mongolia.

Siberia's Lake Baikal has repeatedly been proposed as the diversion point for these trans-Asia water pipes. The lake holds 20% of the earth's freshwater supplies and harbours at least 2,500 species, most of them found nowhere else.

Chinese businessman Bian Hongdeng, who owns dozens of mines in Mongolia and Inner Mongolia, was the first to propose a diversion in the early 2000s. Bian's initial idea was to divert water from several rivers in northern Mongolia,

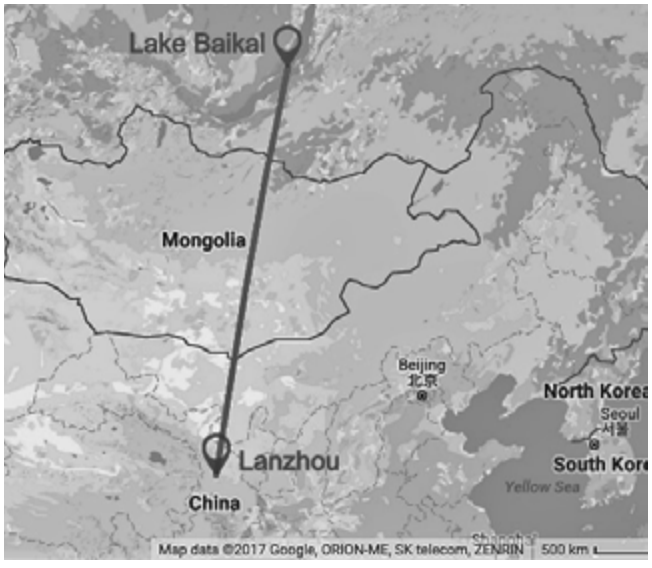
"Lake Baikal holds 20% of the earth's freshwater supplies and harbours at least 2,500 species."



Proposal to divert water from several rivers in northern Mongolia, including the Selenga River is still being actively considered by the Mongolia Government

including the Selenga River that flows into Lake Baikal, to arid areas of southern Mongolia and then on to China.

In 2005, Bian announced he was also considering the feasibility of diverting water from Lake Baikal to China although this was denied by China's Ministry of Water Resources and proponents were forced to drop the project. Nonetheless, the idea surfaced again in 2007 and 2010.



Pipeline of concerns

Chinese experts have raised concerns about the most recent Baikal-Lanzhou diversion, from questions over the willingness of industrial users to pay for the water in Gansu, to the ecological impacts on the lake itself. Shi Weixin, chief designer of China's South-North water transfer project has warned of the need to minimise environmental impacts. This caution is especially notable as Shi has worked on one of the world's biggest engineering feats – the US$48 billion (331 billion yuan) scheme to divert water from the Yangtze to the Yellow River.

Russian experts have fewer objections to the scheme.

"Ok, fine, there is plenty of water in the lake, but how will they transport it across the mountains?" said Mikhail Grachev, head of the Limnology Institute in Irkutsk, the largest city in Baikal Region.

This shows the lack of understanding of the impact of water diversions. The largest water-pipeline system in the world – the "Great Manmade River" of Libya – supplied about 1.3 cubic kilometres of water a year to Tripoli and

several other cities. It brought water through over 1,000 kilometres of pipelines from Nubian aquifers. A similar intensity of withdrawal from Baikal would take away only 2% of the lake's outflow, reducing the water depth by about five centimetres. Grachev and many other academics consider such levels of withdrawal safe for the Lake Baikal ecosystem, but there has been no systematic research on the ecologically safe limits of withdrawal.

An environmental activist from Baikal Interactive Ecological Centre in Irkutsk, Maxim Vorontsov, is more concerned with the impacts on the Baikal coastline from pipeline construction and other structures, as well as the heavy toll on forests and rivers that it would transverse.

Environmentalists in Baikal are dealing with more imminent threats to the wellbeing of Lake Baikal, which is a UNESCO world heritage site. These include an unprecedented 23-year long drought that led the lake to drop below critical water levels; massive algal blooms likely caused by untreated wastewater from coastal settlements and tourist resorts; haphazard development of tourist camps and villas that are partly fuelled by a ten-fold increase in tourists from China; a drastic decline of fish stocks caused by drought, overfishing and pollution; and disastrous forest fires along the lake shore in 2015-16. Mongolia's aggressive push to build three large reservoirs on the Selenge River system is also a risk because it's the main source of water for the lake.

Lessons from elsewhere

There are important lessons emerging from a much less ambitious project nearby. Mongolia has undertaken a feasibility study funded by the World Bank to build a dam on the Orkhon River, which flows into Lake Baikal, in order to pump water 750 kilometres underground to the massive mines of the Southern Gobi region.

Environmental groups insist that the public in Mongolia and Russia should be consulted on the plan for environmental assessment of the Orkhon-Gobi dam project before work is started. The first round of consultations took place in Buryatia Republic in Siberia at the end of March. At the hearings, local people condemned the project, arguing they were already suffering from drought, and that Russian dams on the Angara River had affected fisheries, navigation, and the quality and quantity of water supply. People called for an assessment of the cumulative impacts of any future projects – including the Baikal-Lanzhou pipeline – with the understanding that Lake Baikal is already on the brink of ecological crisis. Disregarding expected environmental impacts when trying to convince local populations – who believe the lake of be sacred – of the need for Baikal-related large water infrastructure will be a very hard task.

> A recent 2030 Water Resources Group report shows that increasing water efficiency in Gobi would be a cheaper alternative to the Orkhon-Gobi pipeline

On top of this, the economics of long-distance water pipelines don't add up. A recent 2030 Water Resources Group report shows that increasing water efficiency in Gobi would be a cheaper alternative to the Orkhon-Gobi pipeline, which is three times shorter than the proposed Baikal-Lanzhou pipedream. Reducing demand and improving groundwater management could satisfy water needs in the Gobi area with annual investment 6-7 times lower than the pipeline (estimated to cost US$1.3 billion (9 billion yuan) with annual maintenance costs of US$75 million (517 million yuan) and annual withdrawal less than 80 million cubic metres). Assuming a similar diversion volume, and given the greater length of the Baikal-Lanzhou pipeline, the project costs could be 5-20 times greater than the Orkhon-Gobi pipeline.

Is water the next resource-curse for Russia?

Environmental journalist Semyon Laskin once optimistically stated that exporting freshwater from Baikal is less environmentally harmful for Russia than exporting oil, coal, ore and timber.

Gabriel Eckstein, professor at the Texas A&M University School of Law, reviewing the subject of "bulk water transfers" at the 2015 World Water Forum, suggested these large scale projects "breed unsustainable economic development and create politically challenging dependencies, and may reinforce the commodification of water, which some view as anathema to the human right to water".

While water transfers may boost international cooperation and facilitate health and economic well-being, these schemes raise a variety of concerns, "including the de-watering of ecosystems and the energy needs and greenhouse gas impacts" of transporting water over great distances. Based on evidence from the oil and gas sectors, Eckstein raised the concern that countries selling water may face slower rates of development compared with those countries buying it.

Many environmental activists, politicians and scientists in Russia share this concern. So far Russia's cooperation with China in the context of its One Belt and Road Initiative has deepened the country's reliance on exports of natural resources and other forms of unsustainable development. China invests in resource extraction projects in Russia, rather than more sophisticated infrastructure and production of consumer goods, the "New Russia" political movement leader Nikita Isaev told Rambler Information Agency.

While China will clearly benefit from projects like the Baikal-Lanzhou pipeline, benefits for Russia are questionable and therefore Russia should stop developing this pipeline project, Isaev argues. Large scale Chinese investment in unsuitable localities has already led to problems. For example, the Amazar Pulp and Saw mill in nearby Zabaikalsky province was half-built in a tiny settlement on the Trans-Siberian Railroad, where there is insufficient wood to provide a sustainable supply, or local workforce. This inevitably results in destruction of intact boreal forests at the expense of indigenous communities and planned protected areas.

At Baikal's lakeshores, an anticipated growth in tourism poses similar threats. In 2016, Chinese businessmen pledged to invest US$11 billion (76 billion yuan) into several resorts catering to millions of Chinese tourists. However, officials fear that the local community does not have the capacity to absorb investments in a sustainable manner.

Baikal is a unique and fragile ecosystem. While we do not yet understand the environmental impacts of giant water diversion, "the Sacred Sea" of Siberia deserves a more innovative and sustainable approach to development.

Eugene Simonov is a Russian environmentalist who co-founded the Rivers Without Boundaries Coalition.

亚太自贸区会带来环境破坏吗?

美国的退出令TPP命运叵测，而自贸区协定的环境标准是否足够严格也令人担忧。

□ 罗伯特·苏塔

跨太平洋伙伴关系协定（TPP）是否已经名存实亡？中国是否在寻求替代这个摇摇欲坠的区域自贸协议，并取代美国成为亚太地区乃至全世界的自由贸易引领者？从跨太平洋伙伴关系协定（TPP）到区域全面经济伙伴关系（RCEP）和亚太自贸区（FTAAP），我们该怎么理解环太平洋区域这些令人眼花缭乱的贸易协定？

当中国高层代表团前往智利城市比尼亚德尔马，与 12 个 TPP 成员国及韩国就亚太经济一体化的未来进行探讨时，人们脑中不禁萦绕着以上诸多问题。中国拉美事务特别代表殷恒民清楚地表明了中国在贸易问题上的立场：“中国力促亚太经济一体化，同时也坚定地支持全球一体化”，并否认中国代表团此行的目的是为了替代 TPP 寻求支持。

美国总统唐纳德·特朗普一上台就发布行政命令宣布退出 TPP，这激发了人们对于中国或亚洲国家主导成立新的自贸区的猜测。美国新的保护主义将给全球经济带来何种影响，诸多太平洋贸易倡议中哪个会拔得头筹？在种种不确定因素之上，还有一个重要问题悬而未决：这一切对于 TPP 成员国的社会和环境标准将意味着什么？

TPP、RCEP、FTAAP 分别是什么?

在经历 7 年谈判之后，12 个成员国于 2016 年 2 月签署了 TPP 最终协议。除了经济增长和减贫外，美国前总统奥巴马还声称 TPP 将“提升透明度、促进良好治理以及更好的劳动和环境保护”。该协定涵盖了美国、日本、加拿大、澳大利亚和墨西哥等主要经济体（不包括中国），约占全球 GDP 的 40%，但如今却由于美国尚未批准而陷入瘫痪。

亚太自由贸易区（FTAAP）是由亚太经合组织（APEC）提出的一个比 TPP 更加简单、包容的倡议，并得到了中国外交部的大力支持。实际上这一倡议早在十多年前就提出了，但进展缓慢，各国将在 2020 年评估其成立进展。

最后是区域全面经济伙伴关系（RCEP）。这是一个由东盟（东南亚国家联盟）十国主导的倡议，也包括中国、日本、韩国、新西兰、澳大利亚和印度。该协议涵盖了全球 24% 的 GDP 和 46% 的人口，美国并不在其内。

奥巴马曾经这样 评价 RCEP：“它当然不会为了工人利益和环境考虑而制定和执行高的标准”，直指该协议缺少这些保护条款。

复旦大学国际政治教授郑宇对此表示赞同。他在接受中拉对话访问时说，至少在理论上，TPP 在劳动和环境方面的标准的确更高，“但成员国在多大程度上能够遵守这些标准又是另一回事”。

有人暗示说 RCEP 将陷入一场恶性竞争，或者那些被视为不完全遵守市场规则的成员国之间会进行标准上的“和谐”。但郑宇认为，标

抗议者手持“TTP等于气候灾难”的横幅游行

准的兼容性是一个可以实现的目标，能够增加国际条约的参与度和遵守度。他说：“毕竟，对条约的遵守比条约本身更重要。”

TPP：虾子里面拔将军？

尽管 TPP 的环境和劳动保护标准更高，但到底能够落实到什么程度仍然远不明朗，独立研究者兼“秘鲁人反对 TPP”负责人西罗 · 萨拉查 · 瓦尔迪维亚如是说。

萨拉查认为，TPP 协议中的“灵活”表述只是要求各国表达对落实国际环境协议的“承诺”，而非义务。他说：“众所周知，在国际贸易协议中，每个字都很重要。”

联合国环境规划署（UNEP）和世界贸易组织（WTO）的一份报告认为，通过多边贸易协议实现更广泛的贸易一体化会导致高碳货物的贸易增长，从而增加温室气体排放。

但该报告又说，扩大贸易开放度有助于推广那些能够降低产品及其生产过程中排放强度的技术，并引导生产方式朝能源强度更低的方向转型。

近年来，中国与秘鲁等拉美国家的贸易和投资关系不断增强，采矿行业在其中占了很大比重，但这一产业的环境标准却很薄弱。郑宇承认，东道国负有要求外资遵守自己国内法规的责任，但执行起来会是一大挑战。

郑宇说：“不管来自哪里，国际资本都有一个习惯，即压制东道国，要求东道国改变国内法规来服务外资。”

尽管环境标准看起来不算很高，但中国已逐渐走出了不计一切求增长的旧发展模式，这一点值得其他国家学习。郑宇说：“这其实就是在短期增长与长期发展间的一个权衡，中国高增长带来的一个最大的副作用就是环境破坏。这也是包括秘鲁在内的发展中国家应该吸取的一大教训。”

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

Pacific trade bloc's environmental impact

Chile meeting focuses on TPP's life after
Trump amid ongoing concerns about environmental standards

□ Robert Soutar

Is the Trans-Pacific Partnership (TPP) dead? Is China seeking to replace the faltering regional free trade bloc and supplant the US as a champion of free trade among Pacific nations and around the world? And just how does one navigate the "alphabetti spaghetti" of abbreviated Pacific trade deals on the table right now (see also the Regional Comprehensive Economic Partnership, or RCEP, and the Free Trade Area of the Asia-Pacific, FTAAP)?

Questions abound as China dispatched a high-level delegation to the Chilean city of Viña del Mar for talks with 12 existing TPP members plus South Korea about the future of Asia-Pacific economic integration. While Yin Hengmin, China's envoy on Latin American and Caribbean Affairs, was unequivocal about his country's position on trade: "China promotes the economic integration of the Asia-Pacific and we also firmly support global integration," he denied that China's mission was to seek support for an alternative to TPP.

> "China promotes the economic integration of the Asia-Pacific and we also firmly support global integration"
>
> – Yin Hengmin

Following US President Donald Trump's withdrawal from TPP by executive order shortly after taking office, speculation has mounted over what a China-led or other Asia-led bloc would look like. Amid the uncertainty of how the US' new protectionism will impact the global economy, and which of the many Pacific trade proposals will prevail, an important point remains unaddressed: What does all this mean for social and environmental standards among member countries?

TPP, RCEP, FTAAP: Spelling it out

Twelve countries (not including China) signed the final proposal for TPP in February 2016 after seven years of negotiations. Along with economic growth and poverty

reduction, former US president Barack Obama claimed TPP would "promote transparency, good governance, and enhanced labour and environmental protections". However the deal, which would account for around 40% of GDP and includes the major economies of the US, Japan, Canada, Australia and Mexico, is paralysed in its current form as it requires US ratification.

FTAAP is a proposal of the Asia-Pacific Cooperation Forum (APEC) that the Chinese foreign ministry endorses as a more inclusive, simplified version of TPP. The proposal has been around for decades and is progressing slowly, with countries due to review progress towards its realisation before 2020.

Then there's RCEP. This proposal is led by the 10 countries of ASEAN (Association of South-East Asian Nations) and also includes China, Japan, South Korea, New Zealand, Australia and India. It accounts for around 24% of global GDP and 46% of the global population. It excludes the US.

Obama wrote about RCEP: "it certainly won't enforce high standards for our workers and our environment," referring to the lack of protections written into the proposal.

Zheng Yu, a professor of international politics at Fudan University agrees that, in theory at least, TPP has higher standards for labour and the environmental. "How likely [it is that] member countries will comply with these standards is a different issue," he told Diálogo Chino.

There have also been suggestions RCEP would involve a race to the bottom, or "harmonizing" of standards among member countries not seen as fully compliant with market rules. However, Zheng argues that making standards compatible is a realistic goal that may increase participation and compliance in international treaties. "After all, it is compliance that matters more than the treaty itself," he said.

TPP: the lesser evil?

While TPP may imply greater environmental and labour protections, it is still far from clear about how it would achieve them, according to Ciro Salazar Valdivia, an independent researcher and director of Peruvians Against TPP.

Salazar points out the "flexible" language in the agreement that only requires countries to express "a commitment" to implementing international environmental accords – with no obligation. "As we know with international trade agreements, every letter is important," he said.

Based on its focus on high-carbon goods, greater trade integration through multilateral deals also has the effect of increasing greenhouse gas emissions, according to a report by the United Nations Environment Program and the World Trade Organization.

However, greater trade openness could facilitate the adoption of technologies that reduce the emissions intensity of goods and their production processes and lead to a transition to less energy-intensive production methods, the report says.

The growth in recent years of the trade and investment relationship between China and Latin American countries such as Peru, which has focused principally on mining, is associated with a slackening of the sector's environmental standards. While it remains the responsibility of countries in need of foreign investment to uphold their own domestic regulations, this can be a challenge, Zheng acknowledged.

"International capital, regardless of its origins, has a tendency to impose pressure on host countries to change their domestic regulations to accommodate foreign investors," said Zheng.

Instead of looking at its comparatively lower national standards, China also serves as an example of how not to pursue growth-at-all-costs: "It is essentially a trade-off between short-term growth and long-term development," said Zheng, adding: "one of the biggest side effects of China's high growth is environmental degradation. It is a huge lesson other developing countries including Peru should learn."

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Robert Soutar is Managing Editor of Diálogo Chino.

山河之间：清朝边疆地区的环境、帝国和身份认同

历史学家贝杜维的新书从一个鲜为人知的角度揭示，人与动物的关系怎样影响了中国边疆地区的历史进程。

□ 贝 · 杜维

1988年出台的《中华人民共和国野生动物保护法》第一条中规定了“保护、发展和合理利用野生动物资源”的法律义务。2016年，该法修正案第一条摒弃了“利用”一词，改为“维护生物多样性和生态平衡，推进生态文明建设”。但国内外批评者对修订后的法律仍然不满，认为新法仍然包括了一些为老虎养殖和其他商业行为提供了法律基础的条款，而这会刺激对野生动物制品的需求，无论其合法与否。

清军开疆拓土的军事技能并非与生俱来，而是通过大量练习围猎积累而来。图为乾隆皇帝打猎野鹿

对人类和野生动植物的关系进行反思，这在全球范围内都时间不长。二十世纪九十年代以来，地球正面临着第六次（而且是第一次人为因素造成的）物种大灭绝的观点已逐渐成为科学共识，于是那些把野生动物单纯作为一种资源而超出“合理利用”范畴的行为也开始面临压力。世界野生动物基金会的《2016地球生命力报告》用数字印证了这场史无前例的大灭绝的严重程度。据其估算，以1970年的种类数量为参考值，世界三分之二的野生动物都会在2020年之前灭绝。

人们已经越来越切身地体会到自己与动物相互依存的关系。正如中国的《野生动物保护法》修订所体现出来的，人们正对这种相互依存的概念进行深入的再思考。我们可以从这个新角度回顾16世纪初到19世纪末的中国人与动物关系的演变，而这会令我们对今天中国的生态状况和政治体制都能产生新的认识。

在统一了中原和亚洲内陆（包

括满洲、蒙古、新疆和西藏）后，清帝国获得了比如今的中华人民共和国更大的的疆土。这片广袤土地容纳的人文和生态多样性是新中国继承的一笔重要的环境遗产。

如果没有十七世纪中期满清南下入关，今天的中国不会拥有如此辽阔的国土。但人类的战争掩盖了亚洲内陆地区人与动物之间的战争：正是要围猎那些不想被捉住的动物，满人才成为了剽悍的骑射民族。

“人类的战争掩盖了亚洲内陆地区人与动物之间的战争，正是要围猎那些不想被捉住的动物，满人才成为了剽悍的骑射民族。”

从猎人到战士

清军开疆拓土的军事技能并非与生俱来，而是通过大量练习围猎积累而来，而猎场往往延伸到当时的国境线以外。

要培养和传承满洲弓马骑射的技能就必须进行围猎，一个很好的证明就是绥远将军补熙乾隆十四年（1749 年）的奏折。他担心，如果不进行围猎，年轻的士兵们就会丧失弓马骑射之技。但是，只有长城以北的蒙古草原才具备围猎所需的场地和野物。与补熙出征的中国南方不同，那里野兔、狐狸和羚羊仍然满布于野。傅恒希望带着他的部队参加每年一度的秋狝，因为“若只操练而无狝猎，则难以弓马娴熟。”

游牧者的“经济特区”

满、蒙地区的游牧技能是人与动物数千年的相处累积下来的。清政府顶住了汉族移民的压力，极力维持这种游牧生活方式，从而难得地保存了农耕文明无法容纳的人类多样性。清政府对游牧者的保护不仅包括调停蒙古各部之间的矛盾，也包括在草原发生天灾时对牧民予以赈济。雍正十二年（1734 年）冬，暴雪冻死了七成牛羊，正是清廷的钱粮赈济拯救了数千家乌拉特部众的生命。数年后，一份乾隆六年（1741 年）的上谕体现出清政府对游牧生活方式危机的认识。文件指出，惟赖朝廷钱粮维生恐非长久之计，游牧者原有的生活方式必须有所改变。

清政府出于战略原因而努力维护草原上的人畜依存关系。在新中国的内蒙古自治区，这种依存关系直到今天仍然维持着。如今中国正试图从历史经验中找到解决草场退化的切实可行的办法，同时解决国家现代化过程中不可持续的农业生产带来的问题，但采矿已经成为威胁畜牧业的新问题。

败给了蚊子的清军

除了人与牛羊的关系，蚊虫也在某种意义上决定了清帝国的国界。比如，携带疟疾的蚊子让大波易受感染的汉族移民远离云南的荒僻地区，那里直到今天还存在致命的疟疾——同时也是中国民族多样性受汉族影响最小的地区。直到 1900 年前后科学研究才揭开蚊子与疟疾之间的联系，而直到二十世纪三十年代疟疾的区域分布才被人类认知。

疟蚊阻止了清朝在这一地区的扩张，这一地区的政治和人口局势也因此走上了不同的道路。1766-1769 年间，乾隆帝派精兵强将征缅。然而，在两国战争中，他的精兵却由于疟疾而伤亡惨重。1780 年，乾隆帝不得不宣布停止征缅。因此，当地的土司制度比中国其他地方维持的时间都要长。汉人移民与当地人之间对疟疾抵抗力的强弱差异产生了重要的历史后果。

笔者的《山河之间：清朝边疆地区的环境、身份认同和帝国》是一部环境历史著作，从 21 世纪的视角阐释了 17 到 19 世纪人与动物的关系。本书聚焦于人与动物的关系的历史意义，特别是这种关系怎样深刻地影响了满洲、内蒙古和云南等中国边疆少数民族地区的历史足迹。

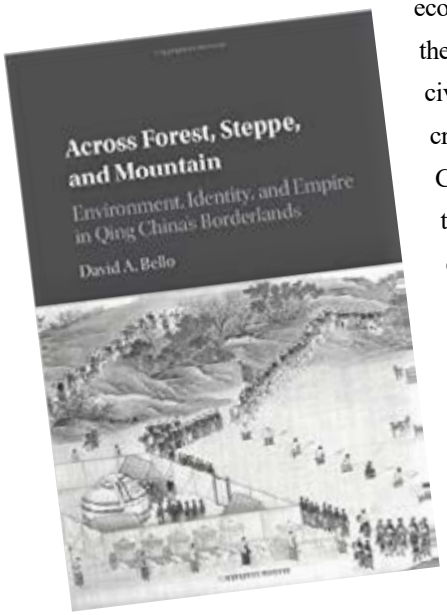
贝·杜维，美国华盛顿和李大学历史系副教授、东亚研究主任

The Qing Borderlands

How the history of animal-human relations in the Qing dynasty shaped modern China's borders and diverse sense of identity

□ David Bello

Since 1988, the People's Republic of China (PRC) has recognised its legal obligation to "protect, develop and rationally utilise wildlife resources" in the first article of its Wildlife Protection Law. Now in 2016, the language of the law's first article has dropped "utilisation" of wildlife from its revised commitmentto "maintain biodiversity and ecological balance, and promote the establishment of ecological civilization." Nevertheless, critics inside and outside China remain dissatisfied that other articles of the law continue to constitute a legal basis for tiger farming and other commercial practices that stimulate demand for wildlife products, legal or not.



Serious reconsideration of wildlife exploitation is a relatively new global historical trend. Pressure for measures that transcend "rational utilisation" of wildlife as simply resources to be managed has been exerted by a growing scientific consensus since the 1990s that earth is facing a sixth mass extinction – the first demonstrably driven by human actions. The ongoing quantification of this unprecedented event proffers its most recent and arresting calculation in the World Wildlife Fund's "Living Planet Report 2016," which estimates that two-thirds of the world's wild animals could be extinct by 2020 in comparison with 1970 population levels.

Awareness that people and animals are interdependent has reached an existential level. As the revisions of China's wildlife law indicate, conceptions of this human-animal interdependency have been undergoing profound reconsideration. From this new perspective, it becomes possible to look back and see formative relations between humans and animals during China's imperial period (ca. 1500-1900) that have shaped the existing ecological and political contours of China's current map.

The unification of China and Inner Asia (i.e., Manchuria,

Mongolia, Xinjiang and Tibet) by the last imperial dynasty, the Qing (1644-1912), resulted in a territory larger than today's People's Republic of China. The human and ecological diversity encompassed within this expanse is the primary environmental legacy of the PRC's imperial predecessor.

It is unlikely that this legacy would have existed without the Manchu bowmen, who rode south to conquer China proper in the name of the Qing during the mid-seventeenth century. However, warfare between humans obscures a tie between Inner Asian people and animals even more fundamental to the Qing conquest: Manchus only learnt to be soldiers by chasing animals that did not want to be caught.

Military tactics

The Inner Asian military skills that expanded China during the seventeenth and eighteenth centuries up to, and beyond, its present-day size necessitated chasing wild animals through ecosystems that China proper lacked.

A fine testimony to the pursuit of game for the basic formation and preservation of Manchu identity comes from a 1749 report by Buhi, a senior Manchu cavalry commander. Buhi worried that young troopers would lose their military skills unless they could hunt "wild animals . . . from horseback." The requisite habitat and animals, however, existed only in the Mongolian steppe north of the Great Wall. Here, unlike in Buhi's garrison to the south in China proper, animals like rabbits, foxes and gazelles "still" ran wild. Buhi wanted to take his troops on annual forays because "if they are only familiar with the archery on the training field and do not hunt, it will be difficult for them to attain excellence."

Pastoral lifestyles

Inner Asian pastoral skills, formed over millennia between Mongols and livestock, were also maintained by the Qing against Han immigrant pressures during the Qing period to preserve human diversity unsustainable in agrarian China proper. The Qing preserved herds and herders not only by mediating between competing Mongol groups, but also by providing disaster relief from extreme steppe weather that could shatter their coherence. Qing relief, in the form of grain and silver, saved several thousand Urad households when fierce winter storms killed off 70% of their livestock in 1734. A few years later, a 1741 imperial edict recognised the pastoral lifestyle was an existential but threatened component of Mongol identity: "relying only on our grants [of grain and silver] for a livelihood cannot be a permanent strategy, and must result in the loss of [the Mongols'] original way of life."

"China is now looking back to past historical practices for a more viable pastoral solution to grassland degradation and to replace unsustainable industrial agricultural practices."

Qing authorities worked to preserve human-livestock interdependencies on the steppe for strategic reasons. Such interdependencies continued to define the political status of Inner Mongolia as an autonomous region into the PRC. China is now looking back to past historical practices for a more viable pastoral solution to grassland degradation and to replace unsustainable industrial agricultural practices imposed by the modernizing state, although mining has emerged as a new threat to herding.

Mosquitos as agents of history

Other human-animal relations during the Qing have left a perceptible legacy. Malarial mosquitoes, for example, kept large waves of susceptible Han settlers out of indigenous areas in southwestern Yunnan, where potentially lethal falciparum malaria and some of the greatest PRC ethnic diversity still exist today. The connection between mosquitos and malaria was not understood until around

1900 and was not regionally identified until the 1930s.

Malarial mosquitos impeded direct Qing expansion into the region, leaving territorial and demographic legacies. The Qianlong emperor (1736-96) admitted as much in 1780 when he declared that he would never again fight Myanmar because of the casualties caused by disease among his elite troops during the 1766-69 war between the two dynastic states. Consequently, indigenous autonomy, conventionally termed "native chieftainships (tusi), was left relatively intact for a much longer period of time than in other parts of China. The differential disease resistance between more vulnerable Han settlers and hardier indigenous peoples thus had significant historical consequences.

My book, Across Forest, Steppe and Mountain: Environment, Identity and Empire in Qing China's Borderlands, is an environmental history that examines human-animal relations between the seventeenth and nineteenth centuries from a twenty-first century perspective. It focuses on the historical significance of these interdependent relations in the formation of the dynastic borderlands of Manchuria, Inner Mongolia and Yunnan that are integral parts of China today. One of the most enduring legacies of these relations is the extensive diversity that can now be mapped across the PRC.

David Bello is associate professor of History and director of East Asian Studies at Washington and Lee University.

皮草装点的世界：清王朝统治之下的野生生物、原始地带以及自然边缘

清王朝平定边疆使得自然资源遭到了史无前例的争抢，但同时也奠定了现代自然保护的基础。

□ 乔纳森·施莱辛格

美国自然历史博物馆位于曼哈顿上西区，那里收藏着一件拥有两百年历史的马甲。该藏品完工于19世纪初期，由阿拉斯加锡特卡原住民特林基特人的工匠用中国古钱币制作而成。这件马甲是早期全球时代的遗物：钱币用云南产的铜铸造，被卖给了波士顿来的运货商，又在阿拉斯加海岸用来交换海獭的皮毛。特林基特人的酋长把中国钱币穿在身上；中国消费者身披海獭的皮毛。事实上，这一阶段中国对皮草的需求量巨大，以至于截止到1840年，海獭、紫貂等物种不仅在锡特卡附近被猎杀至几乎灭绝，全世界范围内都是如此，从蒙古到墨西哥的加利福尼亚半岛，无一幸免。

美国自然历史博物收藏的特林吉特马甲

我们应该怎样理解早期的这场猎杀活动？那时候的人们怎么理解环境危机？从海獭的角度出发，中国的过去又会有怎样的不同？

我们可以在北京、台北和乌兰巴托的档案馆找到意想不到的答案。现如今，这三个地方的历史学家们正在细细研究着档案馆里的文档，不仅是中文的，还有蒙古语和满语的记录。我为了写《皮草装点的世界》这本书，进行了3年的研究，发现这些记录深刻地挑战着我们传统上对中国的过去以及全球环境史的整体理解。

历史学家早就意识到，18世纪到19世纪初期中国资源需求的快速增长改变了这个国家。那个时代的增长是前所未有的。1700年之前，中国人口翻倍花了大约1500年的时间，而1700-1850年间，中国人口增加了两倍。与此同时，随着自耕农

向中国边疆地区迁徙，东北、蒙古、西藏、西南和台湾等地的耕地面积增加了一倍。

除了这些新定居点之外，清王朝统治之下，一场前所未有的自然资源争夺战随即也在森林、草场和高地打响。到1800年，在北京的街头可以买到边疆来的产品，且数量种类多得惊人。典当行记录、日志条目、游记以及其他记录都可以证明这些物质的丰富性：夏威夷产的檀香木、婆罗洲产的燕窝、菲律宾产的珍珠母、云南及东南亚高地产的金属铜、新疆和缅甸来的玉、苏拉威西岛的海龟、斐济的海参、蒙古的蘑菇、吉林的人参和珍珠、西伯利亚的黑貂皮、还有北海道、阿拉斯加、太平洋西北部以及加州沿海产的海獭皮毛。1700年代后期，这些资源的需求量不断上升，市场蓬勃发展。但到了1830年代，一切就都会崩溃：动物数量骤减；森林被洗劫一空；海滩也已经被掘地三尺，再没有珍贵的野生物了。

农业扩张的故事一直是我们理解中国前工业时代发展的核心所在；黑貂、海獭、以及中国经济边缘区的故事则不是关注的焦点。

大多数教科书的内容继续把自然相关的东西归为中国历史长河中无足轻重的一小部分。传统历史学认为，自然是一种外力；瘟疫、洪水和旱灾爆发之时，或者是在文明开始之前的史前阶段，自然才是重要的。

中国的帝国疆界在宏大的历史叙述中扮演着类似的角色。例如，史学家将蒙古族等草原游牧民族刻画成一支不受文明控制的未驯化的力量，对蒙古人和满族人的描述也都是他们在等待适当的统治和发展。

直到最近，历史学家才开始对这种陈旧刻板的描述提出质疑。例如，环境历史学家已经展示了人与自然的关系如何在历史发展中持续发挥自己的作用。我们还学会了从各种角度看待边疆：我们不再局限于中文材料，也会读一些蒙古文、满文和藏文的材料。这些新材料揭示了中国历史复杂的新维度，也让我们看到了中国历史和更广阔的世界之间的相互联系。

清王朝满文和蒙古文的档案展示了一幅极为生动又与众不同的清朝环境史图景。19世纪初，令人震惊的消息传入北京城：东北的珍珠蚌已经没有踪迹；蒙古的蘑菇采摘者正在破坏那里的草原；针叶林里最后的毛皮动物正在遭到猎人的捕杀。

打下绿色根基

清政府强烈的反应让人惊讶：朝廷下令保护满蒙两族人民家园的自然环境，以维护帝国统治。

在蒙古，清王朝因此推行了所谓的“净化”运动来遣返采摘蘑菇的汉人，调查与其合作的蒙古人，并让土地恢复“纯净”的原始状态。

在吉林和黑龙江，清政府尝试打击珍珠偷猎，对移民和贸易进行控制，让贻贝床能够恢复；与此同时，清政府还捣毁了人参农场，以保持这种植物的自然形态。这些行动带来的结果喜忧参半。圣山博格达汗（位于今天的乌兰巴托城外）等一些地方的保护工作取得了成功。如今，博格达汗已经成为联合国教科文组织划定的生物圈自然保护区，受蒙古国政府保护。但在其他地方，保护工作失败，资源被洗劫一空。

清政府以这种方式控制了一场跨越帝国边境的困境。类似的资源争夺正在改变西伯利亚、东南亚以及大太平洋地区。在这个更加广泛的区域内，各国应对环境压力的方法各有不同，但驱动这些国家政策的政治和理念却常常不谋而合。

中国的经济边缘区不断发展，那里首先建立的自然保护区位于清朝的蒙古和满洲，地址选在博格达汗和长白山这样的地方，建立的国家自然保护区在清王朝拥有相对较深的根基。事实上，和这一时期欧美浪漫主义者开始重新想象原始自然的意义一样，清王朝的臣民也在做同样的事情。在这两种情况下，自然保护都成了挽救国家不可分割的一部分。

清政府明白，当时的环境危机已经真正威胁到了满蒙两族臣民在帝国中的地位，以及他们家园公认的纯净。19世纪初，清政府官员认识到保护自然就是保护国家，说明他们正在形成一种环境意识，这和一代人之后在19世纪中叶美、德等国人民的觉醒极其类似。

至此，是时候将清王朝计入对原始自然的憧憬和保护史之中了。和文章开头提到的钱币马甲一样，今天的纯净是那个黄金时代的创造和遗产。

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A world trimmed with fur

China's conquest of its borderlands under the Qing Empire led to an unprecedented rush for resources but also laid the roots for modern conservation

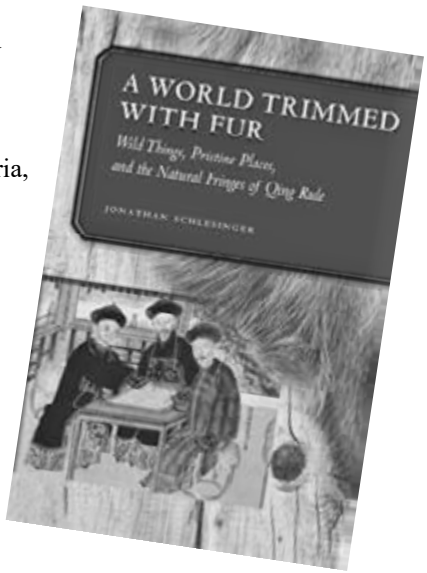
□ Jonathan Schlesinger

In the American Museum of Natural History, on the Upper West Side of Manhattan, there is a two-hundred-year-old vest made entirely of Chinese coins. Tlingit artisans, natives of Sitka, Alaska, crafted it in the early 1800s. The vest is a vestige of an earlier global age: The coins were minted in Yunnanese copper, sold to shippers from Boston, and exchanged for sea otter pelts off the Alaskan coast. Tlingit chiefs wore Chinese money; Chinese consumers wore otter fur. China's demand for fur in this period was so pronounced, in fact, that by 1840 sea otters, sables, and other species were being hunted to the brink of extinction not only around Sitka, but across the world from Mongolia to Baja California.

How should we understand this earlier age? How did people understand its environmental crises? And how might China's past look different from the vantage of a sea otter?

Unexpected answers can be found in the archives of Beijing, Taipei, and Ulaanbaatar, where today historians are sifting through documents written not only in Chinese, but in Mongolian and Manchu as well. After three years conducting research for my book, A World Trimmed with Fur, I found that these records pose profound challenges to our conventional understanding of both China's past and global environmental history as a whole.

Historians have long recognised booming demand for resources transformed China in the eighteenth and early nineteenth centuries. The era's growth was unprecedented. Before 1700, it had taken roughly 1,500 years for China's population to double. Then, between 1700 and 1850, the population tripled. At the same time, the area of land under cultivation doubled, as homesteaders set off for China's frontiers: Manchuria, Mongolia, Tibet, the Southwest and Taiwan.



Beyond these new settlements, in the forests, grasslands and highlands of the Qing Empire, an unprecedented rush for natural resources ensued.

By 1800, one could find a staggering array of frontier products for sale on the streets of Beijing. Pawnshop records, journal entries, travelogues, and other records attest to the abundance of these materials: sandalwood from Hawaii, birds nest from Borneo, mother-of-pearl from the Philippines, copper from Yunnan and upland Southeast Asia, jade from Xinjiang and Burma, sea turtle from Sulawesi, sea cucumber from Fiji, mushrooms from Mongolia, ginseng and pearls from Jilin, sable from Siberia, and sea otter from Hokkaido, Alaska, the Pacific Northwest and the California coast. As demand for these resources grew in the late 1700s, markets boomed. By the 1830s, however, all would go bust: animal populations were exhausted; forests had been cleared; beaches had been combed for valuable wildlife.

The story of agricultural expansion has been central to how we understand China's development before the industrial age; the story of sables, sea otters, and China's economic periphery has not been.

Most textbook accounts continue to relegate the stuff of nature to a bit part in the drama of Chinese history. In conventional histories, nature is an external force; it is significant during bouts of plague, flood, and drought, or in prehistory, before civilization began.

China's imperial frontiers play similar roles in the grand narrative. Historians write of Mongols and other steppe nomads, for example, as an undomesticated force beyond civil control. Mongols and Manchus, too, are described as awaiting proper rule and development.

Only recently have historians begun to challenge the older, stereotyped accounts. Environmental historians, for one, have shown how the human relationship to nature is constantly at work in history. We also have learned to see frontiers from multiple perspectives: We no longer restrict ourselves to Chinese-language sources, but read Mongolian, Manchu and Tibetan sources as well. These new materials reveal complex new dimensions of China's past and its interconnections with the wider world.

The empire's Manchu and Mongolian archives paint a particularly vivid and different picture of Qing environmental history. Stunning reports poured into Beijing in the early nineteenth century: Pearl mussels were already disappearing from the Qing Northeast; mushroom pickers were destroying the Mongol steppe; fur trappers were killing the last fur-bearing animals in the Qing taiga.

Laying green roots

Perhaps even more stunning was the Qing court's dramatic response: The court declared a mandate to protect the nature of the Manchu and Mongolian homelands to maintain the empire.

In Mongolia, the state thus pushed a so-called "purification" campaign to repatriate Chinese mushroom pickers, investigate Mongol collaborators, and restore the land to its "pure" and pristine form.

In Jilin and Heilongjiang, the Qing state attempted to quash pearl poaching, establish controls on immigration and trade, and allow mussel beds to recover; at the same time, it destroyed ginseng farms to preserve the plant in its natural form. Results were mixed. Conservation succeeded in some places, such as on the holy mountain of Bogd Khan (outside modern Ulaanbaatar), which today the Mongolian government continues to protect as a UNESCO Biosphere Reserve; others were stripped bare.

The Qing state, in this way, was managing a dilemma that transcended imperial boundaries. Similar rushes for resources were transforming much of Siberia, Southeast Asia and the greater Pacific. Throughout this wider region, states confronted environmental pressures in distinct ways, but the politics and ideas that drove state policies often converged.

"In Jilin and Heilongjiang, the Qing state attempted to quash pearl poaching, establish controls on immigrationand trade, and allow mussel beds to recover."

The Qing declared Bogd Khan a protected area in 1783, making it the oldest legally protected natural area in the world

The first nature preserves in China's growing economic periphery were in Qing Mongolia and Manchuria, at sites like Bogd Khan and Changbaishan, a National Nature Reserve with comparably deep roots in the Qing. Indeed, just as Romantics in the Americas and Europe reimagined the meaning of pristine nature in this era, so too did Qing subjects. In both cases, nature protection became inextricable from a politics of national redemption.

The Qing court understood the environmental crises of the age posed a real threat to the imperial status of its Manchu and Mongol subjects and the putative purity of their homelands. In identifying the preservation of nature with the preservation of the state in the early nineteenth century, Qing officials were framing environmental concerns much as Americans, Germans, and others would do a generation later in the mid nineteenth century.

It is time, then, to include the Qing Empire in the history of imagining and preserving pristine nature. Like money coats, today's pure places are inventions and vestiges of a global age.

This is the second article in chinadialogue's environmental history series.

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帝国寻羊记：日本侵华的环境影响

时至今日，内蒙古草原上的苜蓿和羊群依然带着日据时代留下的基因。

□ 樱·克里斯马斯

村上春树1982年发表的小说《寻羊冒险记》带领读者走上了一段寻怪之旅，追寻一只背上有星形胎记的变种羊。随着上世纪30年代日军大举入侵中国东北，这只羊也从百年沉睡中苏醒，试图找到一个完美的人类宿主，完成自己统治世界的大业。它首先在蒙古边境控制了一位日本科学家的心智，这位科学家正在1932年成立的伪满洲国发展畜牧项目。一年后，羊的宿主又从农业专家换成了一个战犯，这个战犯后来成了东京一个右翼黑帮的老大。

对村上而言，这只羊代表着一股潜在的邪恶力量，这股力量将1931-1945年间日本入侵中国和战后日本右翼势力的死灰复燃联系在了一起。然而鲜为人知的是，羊的确与日本帝国主义在中国内蒙古地区的扩张历史息息相关。并且直到今天，这段历史的影响依然还在。

20世纪初，羊的确占据了内蒙古东部（当时伪满洲国的一部分）日本科学家们的大脑，这些农业专家们声称当地草原的环境条件已经恶化，需要日本帝国的介入来振兴这片土地。他们企图培育羊毛更细的杂交羊，希望这种羊毛带来的收益能够将他们眼中日渐衰落的游牧边疆转变成日本帝国固定的羊毛产区。

殖民者眼中的土地退化

1905年，随着日本帝国的势力在中国东北的南满洲铁道沿线不断扩张，日本首次在内蒙古东部遭遇了草原游牧部落，也第一次见识了他们的牧场。殖民政府的看法和先前中国管理者对这片草原的描述一样，认为这是一块荒原，那里的蒙古族牧民不过是个“垂死的种族”。此外，日方的报告还认为游牧民族过度放牧是造成土地退化的罪魁祸首。

除了“草原退化”，日本研究人员还认为内蒙古当地的牲畜也在退化。上世纪二三十年代日方发行的农业手册都用“矮小”和“退化”来形容内蒙古的羊、牛和马。牲畜无疑是对人的隐喻：对日本专家而言，当地牲畜的退化反映的正是游牧民族这个“垂死种族”的发展轨迹。

这种说法意在为日本以科学进步为名插手“振兴”蒙古土地的行为提供正当性。但归根结底，是最大限度开采自然资源的渴望，而非环境保护，推动了日本的畜牧业改革试验。

> “为了合理管理牧场，培育杂交羊和苜蓿，五年计划还提出了一个重新安置计划，大搞归屯并户，蒙古族游牧人口被迫定居牧场彻底改变了当地环境。”

苜蓿与杂交羊

为了给内蒙古东部的畜牧业开发扫清障碍，南满洲铁道株式会社建立的农业实验站可谓一马当先。这些中心的研究人员找到了农业潜在的提升领域，并为当地社区提供培训。20 世纪初，此类农业实验站开始在中国迅速扩散，但只有日本人经营的站点在科学畜牧原则的名义下迫使草原游牧民在固定的牧场上安顿下来。1913 年南满洲铁道株式会社在原本属于科尔沁部的土地上建立了公主岭实验站，引入美利奴羊和苜蓿种子，试图复制理想中的澳大利亚和北美边境的风貌。

公主岭的日本专家们为帝国设计了新品种杂交羊，用当地的肥尾羊和进口的美利奴羊以及其他从澳大利亚、新西兰还有美国进口的品种杂交，以增大羊的体型，提高它们的繁殖能力。随着繁殖技术的推进，每一代杂交羊都会比上一代更高、更大。专家们希望这些杂交品种会和当地的羊一样，能够抵御冬天的寒冷，但毛却比它们细 3 到 6 倍，更加柔软。这样一来，日本的羊毛贸易就无需依靠进口。1924 到 1936 年间，日本育种者为蒙古牧民提供了 3000 只这样的杂交羊，之后到 1945 年又陆续提供了数百只。

日本侵华战争加剧了军队对羊毛的需求，杂交羊的繁育扩大到了蒙古全境。伪满政权 1936 年制定的五年计划提出在 18 年内将羊的数量从 1 百万只增加到 1 千万只。但蒙古牧民很快就发现新毛发过细的杂交羊不仅无法抵御严寒，还不会刨开雪层找草吃。因此冬天的时候牧羊人不得不把羊圈养起来，人工喂食饲料，但草原游牧民却不具备这样的条件。

为了解决杂交羊的饲料供应问题，公主岭的日本农学家在草原上引入苜蓿，并将其誉为“绿色肥料”。他们称苜蓿是未来草原自给自足、可持续稳定发展的关键。这种豆科植物能够补充土壤中的氮素，扭转土地退化，因此能够改善草原土质，有助于日后农业的发展。通过这种方法，有可能把草原改造成农田。日本经济学家希望在 1941 年之前能够在蒙古境内开拓 7 万公顷土地和 4 万公顷游牧草场，生产超过 10 万吨苜蓿。因为高产，同等种植面积的苜蓿喂养的羊群数量是野草的 12 倍。牧民还能把苜蓿晒干，储存起来作为冬天的饲料。这样一来，冬天就可以将羊群圈养在一个地方，而游牧民也不得不安顿下来。

为了合理管理牧场，培育杂交羊和苜蓿，五年计划还提出了一个重新安置计划，大搞归屯并户，将常驻性和季节性蒙古包整合为南满洲铁道株式会社口中的“集团部落”。虽然“集团部落”在五年计划之前就已经存在，但 1935-1938 年间蒙古全境此类聚居地的数量从 300 个左右增长至 2600 个。

蒙古族游牧人口被迫定居牧场彻底改变了当地环境。日本人大量单纯种植苜蓿，然后开拓农用土地的行为也改变了草原的生态。

环境遗产

1949 年新中国成立后，也希望利用农业技术，把游牧民改造成牧场主和农民，他们认为游牧生产方式阻碍了国家进步以及科学和经济发展。

国营农场和牧场延续了扩大和“改进”羊群的努力。1955 年，中国技术人员从苏联引进盖茨羊，利用人工受精技术培育了 2 万只杂交羊。日本人留下的美利奴羊的杂交工作也一直持续到今天：21 世纪初，内蒙古自治区每年培育杂交羊 1 千万只，其中很多的血统起源都能追溯到日据时代。

2003 年，中国实施“退牧还草”工程，涉及地区不仅有内蒙古，还有甘肃、宁夏、青海等。正如地理学家叶蓓之前为中外对话撰写的一篇文章所说，这一广泛实施的项目同样将土地退化归咎于牧民和他们的牲畜，因此要求暂停放牧甚至禁牧。除此之外，政府还采取了包括为定居家庭提供补贴、建立牲畜棚以及种植冬季饲料等一系列举措。这些重新安置计划以保护环境的名义，把成千上万的牧民从草原迁到了城镇住宅区。

村上春树的寻羊之旅从未真正离开内蒙古的荒原。今天，内蒙古的牧民依旧面临着类似的，由草场退化、畜牧业发展以及社区安置造成的环境问题，而定居者和游牧者、中心与边疆之间的张力也从未消失。

这篇文章是中外对话环境史系列报道之一
樱·克里斯马斯，鲍登学院助理教授，

Sheep chase

Japan's struggle to resettle Inner Mongolian nomads left a profound legacy on northern China's rangelands

□ Sakura Christmas

In his 1982 novel *A Wild Sheep Chase* (《寻羊冒险记》), Haruki Murakami takes his readers on the hunt for a mythological beast, a mutant sheep with a faint star-shaped birthmark on its back.

Set in the 1930s, the sheep emerges from centuries of hibernation as Japan aggressively expands its empire into northeast China in search of the perfect human host to carry out its own agenda for world domination. The sheep first possesses the mind of a Japanese scientist on the Mongolian border, who is setting up a livestock breeding programme in Manchukuo, the Japanese client state founded in 1932. A year later, the sheep jumps host from this agricultural expert to a war criminal, who goes on to become a right-wing mob boss in present-day Tokyo.

For Murakami, the sheep represents the underlying malevolent force that links the Japanese occupation of China (1931-1945) to the right-wing resurgence in Japan's postwar society. Yet the sheep also signifies the biological legacy of imperialism still present in China's Inner Mongolia Autonomous Region today, one with surprising and long lasting environmental consequences.

In the early twentieth century, dreams of sheep did in fact possess the minds of Japanese scientists in eastern Inner Mongolia, then a part of Manchukuo. These agricultural experts claimed that environmental conditions on the steppe had deteriorated, requiring imperial intervention to revitalise the land, its people and animals. They sought to create new hybrid species of sheep with finer wool, whose profitable fleece would transform what they saw as a declining nomadic borderland into a sedentary, productive part of the Japanese empire.

Colonial perspectives

As Japan extended its informal empire in northeast China along the South Manchuria Railroad in 1905, it encountered pastoral nomads and their rangelands in eastern Inner Mongolia for the first time. Colonial authorities, echoing earlier descriptions by Chinese administrators, saw the steppe as a wasteland populated with a "dying race" of

“The desire to extract natural resources – not environmental conservation – ultimately drove Japanese programmes in pastoral experimentation.”

Mongol herders. Furthermore, Japanese reports blamed pastoral nomads for causing land degradation through overgrazing.

Alongside this “deterioration of the steppe,” Japanese researchers believed that the native livestock of Inner Mongolia also languished. Agricultural handbooks of the 1920s and 30s described Mongolian sheep, cattle, and horses as “undersized” and “degenerated.” As a metaphor, livestock reflected human hierarchies of the empire: for Japanese experts, the decline of native livestock reflected the trajectory of the “dying race” of nomads.

This narrative legitimised Japanese interventions to “revitalise” the Mongolian territories in the name of scientific improvement. The desire to extract natural resources– not environmental conservation – ultimately drove Japanese programmes in pastoral experimentation.

Hybrid sheep in the Alfalfa Empire

Experimental farm stations founded by the South Manchuria Railroad Company led the charge in rationalising the livestock industry in eastern Inner Mongolia. People at these research centres studied potential agricultural improvements and headed training programmes for local communities. These stations proliferated throughout China in the early twentieth century but it was the Japanese-run farm stations that pressured pastoral nomads to settle in sedentary ranches under the scientific principles of stock-farming. In particular, the South Manchuria Railroad Company’s Gongzhuling (公主岭) farm station, built in 1913 on the former lands of the Khorchin (科尔沁)Mongols, introduced Merino sheep and alfalfa seeds in an attempt to emulate the idealised frontier landscapes of Australia and North America.

At Gongzhuling, Japanese specialists designed a new hybrid sheep for their empire. They increased the physical size and productive capacity by breeding the local fat-tailed sheep with imported Merinos and other breeds from Australia, New Zealand and the United States. With each generation these hybrids grew taller and heavier. The hope was that, like the local sheep, they would be able to withstand the cold winters and yet also grow a soft fleece.

The coats of the new hybrid sheep were three to six times finer than the original Mongolian variety, which allowed Japan to sever its trade dependency on wool from abroad. Japanese breeders distributed three thousand such sheep from 1924 to 1936 to Mongol herders, and then hundreds more through 1945.

As Japan’s war with China intensified the military demand for wool, the breeding of hybrid sheep expanded throughout the Mongolian territories. Under its 1936 Five Year Plan, the Manchukuo administration projected increasing the number of sheep from one to ten million within eighteen years. However, Mongol herders quickly discovered the new hybrid sheep had wool too fine to tolerate cold weather and did not know how to scratch through the snow to feed on grass. Caretakers had to house animals during the winter and hand-feed them dried fodder from storage, neither of which seemed like viable options for pastoral nomads.

To solve the problem of food supply for hybrid sheep, Japanese agronomists at Gongzhuling introduced alfalfa to the steppe. They heralded this legume as a “green fertiliser”, the key to a self-sufficient, sustainable and sedentary future. This legume could replenish nitrogen in the soil and reverse land degradation thus enhancing the quality of the steppe for farming at a later point.

In this way, alfalfa helped convert rangeland into potential

farmland. Japanese economists expected to reclaim 180,000 acres of land and another 110,000 acres of nomadic pasture in the Mongolian territories to produce over 100,000 tonnes of alfalfa by 1941. Because of its robust yield, alfalfa could support twelve times the number of sheep as wild grass could with the same surface area. Herders would be able to dry the alfalfa and store it as livestock fodder for the winter. Such an arrangement would keep animals in one location during the cold season and force pastoral nomads to settle down.

In order to rationalise pasture management with hybrid sheep and alfalfa, the Five-Year Plan called for a resettlement scheme that would consolidate permanent and seasonal gers (a Mongolian yurt) into what the South Manchurian Railroad Company called "concentration-villages" (归屯并户, Ja. 集团部落). Although these had existed prior to the Five-Year Plan, the Mongol territories experienced a 600% increase of such settlements between 1935 and 1938, from approximately 300 to 2,600 sites.

Forcing the nomadic Mongol population towards sedentary ranching utterly transformed the local environment. The Japanese occupation also altered the steppe ecosystem by mono-cropping alfalfa and then reclaiming the land for agricultural purposes.

Imperial legacies today

After the 1949 Revolution, Communist cadres also hoped to convert nomads into ranchers and farmers through agricultural technology. They viewed pastoral livelihoods as an obstruction to national progress, scientific rationalism and economic development.

State farms and ranches resumed the work of Manchukuo's experimental stations to multiply and "improve" the herds. Chinese technicians imported Tsigai sheep (盖茨羊) from the Soviet Union to produce 20,000 hybrids via artificial insemination in 1955. Crossbreeding continued with Merinos as well. The genetic inheritance of imperialism exists to this day: at the beginning of the twenty-first century, the Inner Mongolia Autonomous Region was breeding ten million hybrid sheep every year,

Japanese pastoral experiments in the 1930s transformed Inner Mongolia's steppe ecosystem

many whose earliest lineages date back to the Japanese occupation.

Beyond these entangled biological links between Imperial Japan and China, however, exist parallels between these two states and their relationship to nomadic populations in the borderlands. In 2003, China introduced a new campaign to "retire livestock and restore the grassland" not just in Inner Mongolia but also in Gansu, Ningxia, Qinghai and Tibet.

As the geographer Emily Yeh wrote previously on chinadialogue, this extensive programme blamed herders and their animals for land degradation and, as a result, temporarily halted and, in some areas, completely banned grazing. Other initiatives have included subsidising permanent homes, building livestock shelters, and planting winter fodder. In the name of environmental conservation, this resettlement scheme has removed thousands of herders from the steppe into apartment compounds in towns and cities – far exceeding the numbers moved under the Japanese.

Herders still face similar environmental concerns over steppe degradation, livestock development, and community resettlement. Murakami's A Wild Sheep Chase has never truly left the rangelands of Inner Mongolia, as the state struggles to realise its dream to rationalise the borderlands and its denizens – both human and non-human – even today.

This article is part of chinadialogue's environmental history series.

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南满洲铁道株式会社将常驻性和季节性蒙古包整合为“集团部落”

Manchurian authorities consolidated permanent and seasonal gers (a Mongolian yurt) into "concentration-villages" resulting in the forced settlement of many Inner Mongolian nomads

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日本科学家引入美利奴羊以及苜蓿种子，试图复制澳大利亚和北美边境的风貌

Japanese scientists introduced Merino sheep and alfalfa seeds in an attempt to recreate the agricultural landscapes of Australia and North America

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谁将扛起全球气候变化领袖大旗

The Leadership Void On Climate Change

美国总统唐纳德·特朗普打着“美国优先”的旗帜大幅削减气候变化预算，并于近期正式宣布退出巴黎协定，此举遭遇国际社会广泛舆论批评，此前已有 20 万民众在华盛顿特区发起气候大游行声讨特朗普。美国放弃在气候领域的实际领导地位，中国被寄予重望，欧盟也表示要承担起气候大任。欧盟和中国联合呼吁加强合作，以共同应对美国退出后的气候局势。美国退出巴黎协定后，全球气候格局走向如何，谁将扛起全球气候变化领袖大旗，本期杂志为你做出深度解读。

For US President Donald Trump saving the planet seems to be in the way of saving America. Massive cuts on climate research and adaptation funds, followed by a much-condemned withdrawal from the hard won Paris Agreement, suggests that Trump is indeed serious, at least this time. This inevitably puts China under pressure for filling the void in climate politics left by the US, and now hopes are high that a new Sino-EU “green alliance” will to some extent steer the world along the track set by the Paris Agreement. How will the earth’s climate fare in the Trump era? Who can take up global climate leadership? Find out how experts from around the world think in this issue of the China Dialogue Magazine.

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