



中国化学品环境管理的 挑战与机遇

CHINA'S CHEMICAL CHALLENGES

总编辑 Chief Editor

伊莎贝尔·希尔顿 Isabel Hilton

责任编辑 Editors

马天杰 Ma Tianjie

克里斯多夫·戴维 Christopher Davy

翻译 Translator

罗迪·弗拉格 Roddy Flagg

设计 Design

深目及工作室 Shenmuji Studio

封面图片摄影 Front cover image

邱波 / 绿色和平 Qiu Bo/Greenpeace

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“隐形污染”：中国环境治理下一站？

被雾霾、黑臭河所困扰的中国，是否准备好了应对那些看不见的化学品“隐形杀手”？

马天杰 / 冯灏



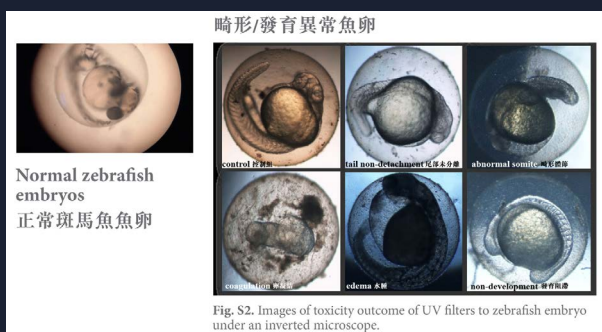
中国已急速成长为全球最大的化学品生产国，对于市场上流通使用的数万种化学品，无论监管者还是普通民众都知之甚少。
图片来源：Yan Cong/Greenpeace

海水蔚蓝，沙滩细软。人们悠闲地涂抹防晒霜，享受日光浴，并不时下水嬉戏。

这幅美好画面的背面却让人不寒而栗：奇形怪状的畸形鱼类胚胎。这是香港浸会大学的一份最新研究展示的画面。该研究发表在权威的《环境科学与技术》上。科学家认为，造成这些鱼类胚胎变异的，正是海水中的防晒霜成分。

二苯甲酮 3 (BP-3)、乙基己基甲氧基肉桂酸酯 (EHMC) 和八氯乙烯 (OC)，这些普通人闻所未闻的化学品被作为紫外线吸收剂使用在防晒霜中。在人类皮肤表面，它们阻止紫外线的伤害，可一旦进入水中，它们却会导致斑马鱼的后代畸形，并通过食物链累积，最终可能回到人类体内。研究作者呼吁对此类化学品进行监管。

与困扰中国的雾霾、黑臭河等显性的环境问题相比，这种隐藏在日用品中的污染看不见摸不着，其危害也不会立时显现。但中国已急速成长为全球最大的化学品生产国，对于市场上流通使用的数万种化学品，无论监管者还是普通民众都知之甚少。与“隐形污染”有关的环境健康问题也已呈上升之势。专家认为，以“显性”污染和安全事故为着眼点的管理体系并不适应对“隐形污染”的风险管理，改善化学品监管已刻不容缓。



发育异常的斑马鱼胚胎，图片来源：Li, Adela Jing, et al. "Joint Effects of Multiple UV Filters on Zebrafish Embryo Development." *Environmental Science & Technology* 52.16 (2018): 9460-9467.

显性 vs. 隐性

在过去数年中，中国一定程度上扭转了一度极为严重的雾霾问题，让人看到其不断增强的环境监管体系的威力。被2015年新版《环境保护法》和中央高层“生态文明”理念赋予更大权力的环境监管者可以对污染企业课以重罚，限制乃至关闭其生产，甚至将违法者关进监狱。2017年的北京，空气中的PM2.5水平比2013年下降了约35%，完成了被认为是极其困难的三年行动计划。

显性的污染得到了控制，隐性的污染却还总体上处于监管空白状态。

中国市场上已知正在流通的化学物质超过45000种（实际存在的化学物质可能远高于这个数字），但受到一定程度监管的只有约3000种。这些受监管的化学品大多属于易燃、易爆和剧毒的化学品，具有明确的显性危害性。而根据环保组织绿色和平的统计，45000多种化学物质中，约50%具有潜在的危害性，可能对人体或环境造成长期负面影响。

“中国目前化学品管理的重点在于具有确定危害、且主要是急性危害的危险化学品，”绿色和平项目主任王衍表示，“对于具有慢性环境和健康危害的化产品的监管较弱，尤其是在流通、加工使用和环境排放环节。”王衍介绍，长期以来，中国化学品管理侧重于劳动生产过程安全和化学事故防范，较少考虑人类健康安全和生态环境安全。

防晒霜中的BP-3，早已在2012年就被丹麦认定为一种潜在的内分泌干扰物，在个人护理用品中的使用受到欧盟法规限制。但是，和很多类似的化学品一样，它并没有进入中国法规的监管视野。

北京大学环境科学与工程学院副教授刘建国曾撰文指出，一些高污染、高风险的落后化学品生产或使用工艺正逐步从发达国家转移到中国等化学品技术和管理水平相对落后的发展中国家。化学品环境管理形势严峻。

监管盲区

中外对话访问的专家均认为，对化学品潜在危害的监管同时处于两个监管“盲区”：在环境监管中，重心在治理雾霾、黑臭水体这样显性的污染问题上，管理隐性污染的动力和优先级都不高。而在化学品监管中，因为传统上中国化学品管理的出发点在职业安全防范，因此重视的是易燃、易爆和剧毒等“急性”危害，对隐蔽的、长期性的环境健康风险重视不足。

公众环境研究中心（IPE）主任马军指出：“目前化学品环境监管存在的‘空白’，一方面是相对隐性，另一方面是环境执法部门面对多重挑战但资源有限。”

目前中国还没有制定国家层面的化学品管理专门法律。最高位阶的化学品管理法规是2011年修订的，由原国家安监总局（现应急管理部）牵头的《危险化学品安全管理条例》，对列入“危险化学品目录”的约3000种化学品进行规管。该条例脱胎于1987年的《化学危险物品安全管理条例》，此前已执行20多年，监管的化学品范围主要以易燃易爆和剧毒品为主。

2011年的修订首次将“对环境有害”列入“危险化学品”定义中，给化学品的环境管理开启了一定的空间。环保部在这一修订的基础上，于2012年推出《危险化学品环境管理登记办法（试行）》，尝试对大约84种具有环境危害的化学品进行额外监管，要求企业上报这些化学品的生产和使用数据。

遗憾的是，由于该法规层级很低（部门规章），执行乏力，已于2016年被废止，成为中国环境监管史上较罕见的一



2015年天津化学品仓库爆炸后的现场。长期以来，中国化学品管理侧重于类似事故防范，较少考虑人类健康安全和生态环境安全。
图片来源：Wu Hao/Greenpeace

次“折戟”。行业媒体 REACH24h 在报道这一变化时透露：“环保部曾多次举办研讨会及相关培训，极力推进法规实施，但因缺乏相关配套文件及行业抵制等原因”导致法规“难以为继。”

王行认为：“中国化学品环境管理无论在整个化学品管理体系中，还是在环保系统内部，目前都比较边缘化。

环境健康危机

监管滞后之时，环境健康危机却若隐若现。

中国国家癌症中心今年发布的中国癌症负担显示，乳腺癌位居女性癌症发病率首位。数据同时显示，在 2000 年到 2013 年之间，中国乳腺癌的年平均增长率约为 3.5%，在世界范围内增速位列首位。北京、上海、广州等城市的乳腺癌发病率已接近欧美发达国家水平。

在世界卫生组织和联合国环境署最近的一次对内分泌干扰物质（EDC）的科学评估报告中，将世界范围内某些疾病的发病率上升部分归因于一些“尚未识别的环境因素”。这些疾病包括一些内分泌系统癌症（如乳腺癌和睾丸癌）以及生殖系统疾病和不孕不育等。而该研究也注意到：“工业化地区的人们所接触的一些化学品能够干扰激素的生成、运作和新陈代谢。”

曲折前行的监管

中国的环境监管者一直有意将化学品的环境管理纳入其管理体系。不幸夭折的《危险化学品环境管理办法（试行）》可以说是一次“带着镣铐的舞蹈”，在有限的授权范围内，它尽可能地搭建了一个化学品环境管理机制的雏形，包括一个动态筛选和更新的“重点环境管理危险化学品名录”，考虑了持久性和生物累积性等“隐性”危害；要求生产和使用这些化学品的企业向主管部门登记，并每年填报重点化学品的释放和转移申报表。

其中最后一点被普遍认为是对于化学品环境管理意义重大的 PRTR 制度的雏形，对于促进企业减少乃至替代这些化学品具有激励作用。无论是美国的 TRI 制度还是欧盟的 PRTR 制度均被认为对有毒有害化学品的管理起到了促进作用。

马军认为：“从国际经验来看，PRTR 制度不但能够让媒体、环保组织和公众利用公开信息施压高排放企业减排；而且能协助政府更加全面和精准的掌握企业有害化学品排放与转移情况。”

该法规废止之后，化学品环境管理的政策制定者一度调低了目标，不再追求一步到位地建立整个化学品环境管理体系。一位接近政策制定的人士曾表示：“将化学品的管理融入到水、土壤、大气的治理中，是当前比较现实的方向。”

2017 年，环保部发布“优先控制化学品名录（第一批）”，就是借助国务院的《水污染防治行动计划》（简称“水十条”）的授权而制订的。该名录包括了 22 种持久性有机污染物和内分泌干扰物质等“隐形污染物”，并要求将其纳入废水的排污许可证进行管理，限制这些化学物质在产品中的使用并鼓励将其替代。

今年 6 月，中共中央明确了土壤污染防治的方向，指出应“评估有毒有害化学品在生态环境中的风险状况，严格限制高风险化学品生产、使用、进出口，并逐步淘汰、替代。”这一新的授权无疑将增加化学品环境管理的监管动力。

但业内人士认为，将化学品环境管理分散在大气、水、土壤等领域中只是短期权宜之计。“这会增加监管的难度，也让公众的监督更加困难，”马军认为。

从刚刚结束的一次化学品环境风险防控专委会年会上传出的消息显示，今年三月新成立的生态环境部仍在积极研究制订化学品环境风险管理专项法规，酝酿中的该法规将“以风险防范和源头控制为根本原则”，形成以“危害筛查、风险评估、分级管理（禁止、限制、优先控制等）的制度体系。”



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马军
公众环境研究中心主任

China's next environmental challenge is hard to see

The slow, harmful effects of unregulated chemicals are a growing risk to public health

Ma Tianjie, Feng Hao



China has quickly become the world's largest manufacturer of chemicals – but neither regulators nor the public know much about the tens of thousands of different substances being transported and used around the country. (Image: Yan Cong/Greenpeace)

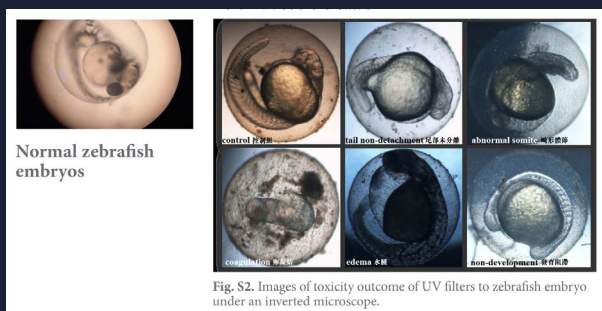
Public health campaigns have been telling people for years to apply a generous layer of sunscreen when they go to the beach, and to make sure they're fully protected before getting into the water. But recent research from Hong Kong Baptist University finds that sunscreens are having a shocking effect under the surface by causing deformities in fish embryos.

Few people have heard of chemicals commonly used in sunscreens, such as benzophenone-3 (BP-3), ethylhexyl methoxycinnamate (EHMC) and octocrylene (OC). When they are applied to the skin they block ultraviolet radiation, but in the water they also cause abnormalities in the young of zebrafish, and accumulate in the food chain where they can ultimately reach the human body.

The authors of the paper, which was published in the journal *Environmental Science & Technology*, have called for regulations to cover the use of such chemicals in personal care products.

Pollutants concealed in everyday products aren't as noticeable as smog or foul-smelling waterways, and the damage they cause isn't immediately visible. But China is already the world's largest manufacturer of chemicals and neither regulators nor the public know much about the tens of thousands of different substances being transported and used around the country.

Meanwhile, the use of the chemicals is causing a rise in environmental health issues. Experts say that systems designed to deal with visible pollution and accidental releases aren't well-suited for managing hidden pollution, and urgent changes are needed to address this.



Abnormal zebrafish embryos, from Li, Adela Jing, et al. "Joint Effects of Multiple UV Filters on Zebrafish Embryo Development" *Environmental Science & Technology* 52.16 (2018)

Seeing the danger

In recent years, China has strengthened its system of environmental management and seen some impressive results. PM2.5 levels in Beijing in 2017 were 35% lower than in 2013 following a three-year action plan that was initially regarded as next to impossible. The 2015 Environmental Protection Law and the Party leadership's focus on "ecological civilisation" have also empowered regulators to impose heavy fines on polluting firms and even shut down factories and jail offenders.

Visible pollution is being brought under control, but hidden pollution is still mostly unregulated.

There are about 45,000 chemicals known to be in circulation on the Chinese market (the actual number may be much larger), but fewer than 3,000 are regulated. These include substances that present clear risks because they are explosive, flammable or highly toxic. However, Greenpeace has calculated that about half of the 45,000 chemicals could cause long-term harm to the environment or human health.

"China's management of chemicals focuses on those which are dangerous and present definite and immediate risks," explained Wang Yan, toxics campaigner at Greenpeace. "Management of chemicals

which have slower harmful effects on health and the environment is weaker, particularly when it comes to transportation, processing and use, and release into the environment."

Wang added that China's emphasis is on workplace safety and the prevention of accidents, with less thought given to people's health and protection of the environment. For example, the BP-3 found in sunscreen was identified as a potential endocrine disruptor as early as 2012. Its use in cosmetic products is restricted by EU regulation. But BP-3, like many other similar chemicals, is not regulated in China.

Liu Jianguo, associate professor at Peking University's College of Environmental Sciences and Engineering, has written that dangerous and polluting production methods and use of chemicals have shifted from developed to developing nations, such as China, where technology and regulations are less developed.



Experts say that systems designed to deal with visible pollution and accidental releases aren't well-suited for managing hidden pollution, and urgent changes are needed to address this."



The aftermath of the 2015 chemical warehouse explosion in Tianjin. Management of chemicals in China has long focused on preventing incidents like this, with less attention paid to protection of public health and the environment. (Image: Wu Hao/Greenpeace)

Regulatory blind spots

Experts interviewed by *chinadialogue* said that China faces a growing challenge to manage chemical risks in an environmentally safe way and that current measures are inadequate. One problem is that environmental regulators are focused on more visible issues, such as smog and water pollution, and give little priority to hidden risks.

Ma Jun, director of the Institute for Public and Environmental Affairs, added that "environmental law enforcement agencies are facing multiple challenges with limited resources".

China has no national law on the management of chemicals. The highest-level relevant rules are the *Regulations on the Safety Administration of Dangerous Chemicals*, revised in 2011 by the State Administration of Work Safety (now the Ministry of Emergency Management). These regulate about 3,000 substances, which are included on a register of dangerous chemicals. The regulations were devel-

oped from a 1987 set which had been in place for 20 years and covered mainly explosive, flammable and highly toxic substances.

The 2011 revision added "harmful to the environment" to the definition of dangerous chemicals, which allowed the regulation of chemicals for environmental reasons. The Ministry of Environmental Protection then published a trial method for registering chemicals hazardous to the environment in 2012, including those representing persistent and bioaccumulative risks. It included extra regulations for 84 environmentally-harmful substances and required firms manufacturing and using the chemicals to register and submit annual reports of releases and transfers.

Unfortunately, these departmental regulations were not enforced properly, and in 2016 they were annulled – a rare surrender for China's environmental regulators. Industry media outlet REACH24h said at

the time that "the Ministry of Environmental Protection held a number of seminars and training sessions to encourage implementation, but with industry resistance and a lack of supporting documents, the regulations could not be maintained".

Wang Yan said that "environmental management of chemicals is marginalised, both within the environmental regulatory system and that for chemicals".

A worsening health crisis

With effective regulation still not in place, environmental health issues are becoming more apparent. A report from the China National Cancer Centre, China's Cancer Burden, published this year, shows that the most common cancer among women is breast cancer; incidences between 2000 and 2013 grew by 3.5% annually – the highest rate of growth globally. Rates in cities such as Beijing, Shanghai and Guangzhou are approaching those in the developed world.

In the most recent evaluation of endocrine-disrupting chemicals from the World Health Organisation and UN Environment Programme, a worldwide increase in incidence of some diseases is attributed partially to "unidentified environmental factors". These include cancers of the endocrine system, such as breast and testicular cancer, reproductive diseases and infertility. The report also noted that "chemicals to which all humans in industrialized areas are exposed have been shown to interfere with hormone synthesis, action or metabolism".

A different regulatory approach

China's environmental regulators have wanted to bring chemicals under their jurisdiction for a long time. The first attempt to establish an actively maintained list of chemicals, including those representing persistent and bioaccumulative risks, and require those manufacturing and using the chemicals to register and submit annual reports of releases and transfers, resulted in failure. However, it was regarded as an embryonic form of a pollutant release and transfer registry, a key part of any system for managing environmentally-harmful chemicals and encouraging firms to use less or opt for alternatives. The US Toxic Release Inventory and the EU's Pollutant Release and Transfer Register (PRTR) both improved the management of toxic and harmful chemicals in those jurisdictions.

According to Ma Jun, "International experience shows that a PRTR system allows the media, environmental groups and the public to use openly available information to pressure firms into cutting emissions, and can give the government a more comprehensive and accurate grasp of how firms are releasing and transferring harmful chemicals".

After the above mentioned regulation was abandoned, policy-makers lowered their ambition and no longer aimed to create a complete regulatory system all at once. A source close to policy-makers said that "merging regulation of chemicals with governance of water, soil and air is a more realistic direction at the moment".

In 2017 the then Ministry of Environmental Protection published an initial list of chemicals to be prioritised for regulation that included 22 persistent organic pollutants and endocrine-disrupting chemicals. The change resulted from powers granted by a State Council action plan on water pollution, and required licenses to release the substances in waste water, limits on their use in products, and encouragement to switch to alternatives.

In June the Communist Party Central Committee clarified the direction on soil pollution, saying that the risks associated with harmful chemicals in the environment should be assessed, with strict restrictions on the manufacture, use and import of high-risk chemicals, which should be gradually eliminated and replaced. This new authority will be a further boost to management of environmentally-harmful chemicals.

But industry insiders say that dividing management across air, water and soil is only a short term measure. "This will make both regulation and public oversight more difficult," said Ma Jun.

The creation in March of a Ministry of Ecology and Environment from the old Ministry of Environmental Protection is cause for optimism though. According to leaked reports, the ministry is actively working on a new set of regulations based on the principles of "risk prevention and control at the source". They will classify harms, assess risks and manage chemicals by banning, restricting or controlling their use.

中国在全球化学品管理新形势下所面临的挑战与方向

随着中国成为全世界化学工业的中心之一，如何管理广泛的
可能具有潜在环境健康危害的化学品成为政策制定者的重要课题。

刘建国



形形色色的化学品广泛存在于人们的日常物品和周围环境中，中国的化学品管理体制尚未充分跟上世界化学品管理的发展潮流，化学品管理制度体系发展长期滞后。摄影：Qiu Bo/Greenpeace

上世纪 60 年代，蕾切尔·卡逊所撰写的《寂静的春天》轰动一时。书中关于杀虫剂滴滴涕（DDT）的环境健康危害的警告让美国乃至整个西方社会意识到，各种具有杀虫奇效的化学品可能给环境带来“看不见”的伤害。该书也被誉为是欧美环境保护运动的重要发端。

《寂静的春天》发表近 40 年后的 2001 年，国际社会签订了旨在消除和控制“持久性有机污染物（POPs）”的《斯德哥尔摩公约》。滴滴涕等多种有机氯杀虫剂成为该公约第一批受控的主要化学品，成为国际社会针对人体健康和生态环境具有潜在有害的化学品采取全球统一风险管理行动的开始。

《斯德哥尔摩公约》的签署也是中国政府重视化学品潜在的环境和健康风险并采取行动的重要开端。在过去的 10 年里，以 POPs 履约为目标的科研及监管行动在中国广泛开展，将化学品管理问题逐步深入地纳入环境保护的视野。然而，与其急速增长的化工产业、市场和化学品消费相比，中国化学品管理发展十分滞后；在不断加快和升级的国际化学品管理发展形势面前，中国的化学品管理相比仍处于初级阶段。化学品管理体系的完善和加强应是中国下一阶段环境保护和可持续发展的重点议程之一。

“看不见”的潜在风险

对于化学品管理，中国长期以来的监管重点都是“危险化学品”，其显著的特性是易燃、易爆、急性毒性等。但需要强调的是，很多人类社会广泛使用的化学品一般都不具有显性的“毒性”或“危险性”，但是可以在很低的浓度水平对生态环境和人体健康产生长期潜在的危害性影响，如内分泌干扰、生殖发育毒性和神经行为异常等。例如，为了提高电子产品和建材的防火性能而大量加入溴化阻燃剂、为了使各种塑料制品变得更柔软而使用的短链氯化石蜡和邻苯二甲酸酯类增塑剂、为了提高纺织品的防水性能而使用的全氟烷基化合物（PFASs），以及为个人护理品中添加的各种表面活性剂、防腐剂、增白剂等等。与中国长期使用的“危险化学品”概念范畴及传统理解相比，这些化学品可称为“潜在有害化学品”。

形形色色的化学品广泛存在于人们的日常物品和周围环境中，按照既往的评估，它们通常是“安全”的。但不断发展的科学研究显示，这些物质的多种潜在的危害性，可能对环境和人体带来潜移默化的长久损害。目前，人类社会开发利用的化学品已多达 10 万种以上，但其中大多数化学品的潜在环境和健康危害性并不为人所知。

欧盟将“持久性、生物累积性和有毒性”（PBT）化学品、“致癌、致畸和生殖毒性”（CMR）化学品以及“内分泌干扰物质”（EDCs）等具有潜在环境和健康危害性的化学品定义为“高关注化学物质”（Substances of Very High Concern, SVHCs）。这一概念及范畴充分代表了当今国际化学品管理及科学界所共同关注的化学品，获得了国际社会的普遍认同。

中国成管理重地

在全球产业转移的背景下，世界化学工业的重心正在从发达国家向中国等发展中国家迅速转移。在 2000~2010 年的 10 年间，全球化学品产值翻一番，增长主要来自以中国为主的新兴经济体国家，其中中国的贡献占了大约 50%。OECD 预计，中国到 2020 年的化学品产值增长率将远高于其他国家，成为不折不扣的全球化学品生产和消费第一大国。

在过去的 10 多年里，发达国家不断加快 SVHCs 等潜在有害化学品的淘汰，推出高技术附加值、安全、环保的替

代品。与之相伴的，是高污染、高风险的落后化学品及其生产工艺，逐步转移到技术和管理水平相对落后的发展中国家，中国则是有害化学品“产业、污染和风险同步转移”的主要目的地，并逐渐成为 SVHCs 等潜在有害化学品的主要生产、使用、排放及受害国。以 PFOS 和 PFOA 等国际高关注的全氟化合物为例，其由发达国家开发并在近年因环境和健康风险问题逐渐开始淘汰或严格限制，在中国的生产和使用却得以持续增加。近年环境监测研究表明，中国的环境和人体中的 PFOS 和 PFOA 等 SVHCs 的污染普遍存在，且显示出浓度逐年明显增高的趋势。全球化工产业转移和发展形势、中国经济发展的现实以及现有监测研究均表明，中国将可能成为未来全球 SVHCs 等潜在有害化学品风险管理的地。

法规和制度缺位

在世界范围内，化学品安全管理重心早已逐步从“显性危害”转移到公共健康和环境“潜在风险”领域。但中国长期奉行的是一套以“安全生产”或“职业安全”为主导的化学品管理立法和制度体系。《危险化学品安全管理条例》是中国化学品管理的最高层次法规，因此，化学品管理在中国通常被称为并认为是“危险化学品管理”。该条例的主体制度体系侧重于化学品的突发性事故的防范和应急，管理对象则是侧重在具有易燃、易爆或急性毒性等威胁安全生产或职业安全的所谓“危险化学品”（目前约 2800 多种），而对市场上现有的数以万计或十万计的化学品（包括多种国际已识别管控的 SVHCs 等各类可能具有潜在环境和健康风险化学品）缺乏基本的信息收集、评估机制和有效的风险管理规划。

由于缺乏完善的制度基础，中国对 POPs 及其他每一种 SVHCs 都仅能逐一按个案研究应对，而非基于风险类别加以全面的风险管理，因而消耗大量基础调研和行政管理资源。这种管理方式在面对数量快速增加的 SVHCs 时是极为低效且不可持续的。总之，中国的化学品管理体制尚未充分跟上世界化学品管理的发展潮流，化学品管理制度体系发展长期滞后。

技术和管理能力不足

现有已识别的 SVHCs 通常都是在工业经济和社会生活中具有广泛应用价值的化学品。发达国家对其采取限制、禁用或淘汰等风险管理措施是建立在其先进的社会经济发展水平，以及多年持续的替代技术开发基础上的。

发展中国家普遍缺乏必要的替代技术研发储备及能力。由于现有的主要化学品替代技术多基本掌握在发达国家手中，在国内化工技术能力不足的情况下，中国等发展中国家通常不得不引进国外技术来履行国际公约要求，从而不仅要付出高昂的经济成本，且往往不得不出让多年积累的行业市场优势，走入技术和市场受制于人的恶性循环。

除技术能力不足外，中国实施 SVHCs 等潜在有害化学品的风险管理还面临管理能力的严重不足。发达国家自上世纪 90 年代初就启动了针对市场现有化学品的风险评估与风险管理进程，不仅积累了大量的化学品风险评估知识、信息和数据库，还积累了大量的管理经验。中国化学品管理的整体发展滞后，导致对广泛存在于市场的化学品的风险管理缺乏必要的基础信息和专业化的管理组织机构及人员。

化学品的风险管理是建立在科学的风险评估基础上的。与发达国家不同，中国的化学品风险评估相关基础性研究工作基本上是从本世纪初加入 POPs 公约之后才逐步展开，并在过去不到十年的时间里取得了迅速发展和进步。但由于长期局限于以职业安全管理为主导的化学品管理体制，中国除基本掌握现行化学品管理体制控制范围内的 2000 多种“危险化学品”的风险信息外，对境内的至少 46000 多种现有工商业化学品中的绝大多数化学品缺乏基本的风险信息与认识。

除科学的风险评估之外，化学品的风险管理还需要建立在充分的风险决策分析和公共参与基础上。社会经济影响分析 (Socio-Economic Analysis, SEA)，即权衡化学品风险管理行动的环境、健康效益和社会、经济成本，以做出科学、合理的化学品风险管理决策。它有利于制订符合本国国情及能力的化学品风险管理政策，有效避免做出过激而不利于经济发展或过于保守而不利于环境和健康保护的决策。对于中国这样仍属发展中国家的化学品生产使用大国而言，SEA 的使用尤为重要。然而，中国一直缺乏基于影响与效益相平衡的化学品风险管理 SEA 研究，难以达成科学合理的化学品风险管理决策；同时，在化学品风

险管理的公共参与方面则更缺乏充分的制度保障和有效的机制安排。

完善中国未来的化学品管理体系

“到 2020 年实现化学品生产、使用以及危险废物符合可持续发展原则的良好管理，最大限度地减少化学品对人体健康和环境的不利影响”，是 2002 年的世界可持续发展首脑峰会 (WSSD) 提出的一项全球可持续发展战略目标 (简称“WSSD-2020 化学品目标”)。为此，国际社会建立并启动实施了包括一系列全球行动计划在内的国际化学品管理战略 (SAICM)。2015 年 9 月，联合国可持续发展峰会达成的《2030 年可持续发展议程》再次重申了“WSSD-2020 化学品目标”，并强调要“显著减少有害化学品向大气、水和土壤的排放以将其对人体健康和环境的影响降至最低”，这接近于由欧洲提出的“无毒环境”目标。显然，化学品管理将是世界各国实现 2030 可持续发展目标的一项基本任务。

中国政府近年来将生态文明提升为国家战略，《“十三五”生态环境保护规划》则明确提出了以环境质量为核心的指导思想以及生态环境质量总体改善的总体目标，并将“加强重金属、危险废物以及有毒有害化学品风险管控”确定为四项关键任务之一，为中国化学品环境管理体系的完善提供了新的动力。

中国环境保护部于 2017 年底发布了首批“优先控制化学品名录”，最新改组的生态环境部则设立了固体废物和化学品司，是中国政府适应国际化学品管理趋势、加强化学品环境无害化管理的重要标志。

“无毒的环境”是良好环境质量的基本要素，化学品环境无害化管理 (Environmentally Sound Management of Chemicals, ESMC) 是生态文明与可持续发展的重要组成部分。作为国际影响力不断提高并日益承担全球环境保护责任的大国，中国亟需制订国家化学品管理战略，建立以保护环境和公共健康为主旨、并针对所有化学品的国家化学品管理法，将 SVHCs 等潜在有害化学品的风险管理置为国家化学品管理优先领域；构建完善的化学品环境无害化管理制度体系，并制订国家现有化学品风险评估与风险管

理行动计划；调整化学工业及相关产业结构，全面推进绿色和可持续化学，并加强化学品管理的公共参与和公共治理。同时，中国作为世界化学品生产和使用大国，一直是《斯德哥尔摩公约》等化学品国际公约及 SAICM 的积极参与者，更应在 2020 后的全球化学品治理体系的构建和运行中扮演重要角色。

刘建国

北京大学环境科学与工程学院，副教授，博士生导师。《中国化学品管理国家概况》(*National Profile of Chemicals Management in China*) 的主编，中国实施 SAICM 能力建设快速启动项目 (QSP) 的负责专家，环境保护部化学物质环境管理专家评审委员会委员，中国环境科学学会持久性有机污染物专业委员会委员、化学品环境风险防控专业委员会委员。

China's chemical challenges

A national regulatory system for all substances on the market is needed to protect human health and the environment

Liu Jianguo



*The manufacture, trade and use of chemicals in China has expanded rapidly, but regulation lags behind.
(Image: Qiu Bo/Greenpeace)*

When Rachel Carson published *Silent Spring* in 1962 its warnings of the damage that pesticide DDT was causing to people's health and the environment shocked the United States and Western society. The book led to the realisation that any pesticide could cause unseen harm, and was a major force behind the creation of the environmental movement in Europe and the US.

But it was another forty years before the start of international efforts to control potentially harmful chemicals. Countries agreed to control and eliminate persistent organic pollutants (POPs) when they signed the Stockholm Convention in 2001. DDT and other pesticides were among the first chemicals subject to those controls.

This is also when China started to take chemical risks seriously by undertaking research and putting in place regulation aimed at complying with the convention.

The manufacture, trade and use of chemicals in China has expanded rapidly, but regulation lags behind. Chemicals management is becoming part of the country's environmental protection efforts, but China is just getting started whereas international mechanisms are well-developed. China should prioritise regulatory improvements as it improves environmental protections and works toward sustainable development.

Unseen risks

China has focused on regulating hazardous chemicals – those that might explode or ignite, or which are highly toxic. But many commonly used chemicals are not obviously toxic or hazardous – yet can, at very low concentrations, present a chronic risk to health and the environment, affecting the endocrine system, reproductive health, or the nervous system.

These other chemicals can be referred to as hidden hazards. For example, brominated flame retardants are widely used to reduce the flammability of electrical goods and building materials. Short chain chlorinated paraffins (SCCPs) and phthalates make plastic products softer. Per- and polyfluoroalkyl substances (PFASs) make fabrics water-repellent. And various surfactants, preservatives and whiteners are added to cosmetic products.

A huge range of chemicals that were regarded as safe and used in everyday products have been found to cause lasting harm to the environment and human health. Over 100,000 chemicals are currently manufactured and used globally but it is unclear how many of these may be dangerous.

The European Union defines chemicals which are "persistent, bioaccumulative and toxic" (PBTs), "carcinogenic, mutagenic, or toxic for reproduction" (CMR), and "endocrine-disrupting" (EDCs) as "Substances of Very High Concern", or SVHCs. Regulators and researchers are concerned about these chemicals, and there is general agreement on this internationally.

China's growing share of the chemicals market

The manufacture of chemicals is rapidly shifting to China and developing countries from developed ones. Between 2000 and 2010 global chemical output doubled. Most growth was in emerging economies, and half was in China. According to the Ministry of Industry and Information Technology, China is already the world's largest manufacturer of chemicals.

In the past ten years developed nations have been eliminating harmful substances such as SVHCs and replacing them with alternatives that are high-tech, safe and environmentally-friendly. Meanwhile, the manufacture of dangerous chemicals has been shifting to developing nations where technology and regulation lags behind.

For example, perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are fluorocarbons that were developed in the West but which were recently phased out or restricted. In China their manufacture and use is growing.

This is a risk to human health and the environment. Recent environmental monitoring shows steadily increasing levels of SVHCs such as PFOS and PFOA in people's bodies and the environment.

China will be key to global regulation of harmful chemicals such as SVHCs as the chemical industry grows and shifts there. As the largest producer, user and releaser of these substances, China will also suffer the most harm.



A huge range of chemicals that were regarded as safe and used in everyday products have been found to cause lasting harm to the environment and human health. "

Legislative and regulatory failings

The global regulation of chemicals has long since shifted from obvious hazards to hidden risks to public health and the environment. But legislation and regulation in China have been more concerned with industrial and worker safety. The highest-level rules on chemical safety focus on preventing and responding to major incidents involving about 3,000 explosive, flammable or toxic substances. But there are tens – or perhaps hundreds – of thousands of substances on the market in China, including hazardous chemicals such as SVHCs. There is a lack of basic data on usage and production, and assessment of safety, environmental and health risks.

Without a comprehensive system to regulate substances based on shared hazardous properties, or risk categories, China can only research and tackle POPs and other categories of SVHCs individually. This requires huge amounts of basic research and administration, and is inefficient because the number of SVHCs is increasing rapidly. Overall, China's regulation of chemicals has not kept up with international trends.

Inadequate technical and regulatory capability

The restriction and elimination of some SVHCs in developed nations follows years of social and economic development combined with research and production of alternatives. Developing nations usually lack the capabilities to research alternatives, leaving them no choice but to import technology at great cost to meet international obligations. This also affects their economic competitiveness.

China also lacks the regulatory capacity to effectively manage the risks of SVHCs. Developed nations started assessing and managing the risks of chemicals in the 1990s and have accumulated substantial knowledge, data and regulatory expertise along the way. China's system lacks basic data, specialist bodies and the personnel necessary to implement effective risk management of the substances in use.

Chemical risk management is based on scientific assessment of risks but in China understanding of these is limited. Unlike in developed nations, China's basic research in this area only started in the early 2000s when it signed up to the Stockholm Convention. It has progressed rapidly in recent years but the long-standing focus on industrial safety means that while China has a solid grasp on the risks associated

with fewer than 3,000 hazardous chemicals, there is no understanding of the risks of the vast majority of the 46,000 chemicals in the government's inventory of chemicals in circulation.

Effective risk management also requires full policy analysis and public participation. Socio-economic analysis (SEA) can help avoid decisions that cause excessive harm to the economy, the environment and public health by weighing the costs and benefits of particular substances. The analysis tool can guide rational and scientific policy choices that match the country's circumstances and capabilities.

This process is particularly important for China, a developing nation and major chemicals manufacturer. But China lacks research into SEA cost/benefit frameworks for chemical risk management, which makes good policy-making harder. There are also no safeguards to ensure public participation.

Improving China's chemical regulation

In 2002 the World Summit of Sustainable Development (WSSD) set the goal of "aiming to achieve, by 2020, that chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment." To this end a policy framework was established, the Strategic Approach to International Chemicals Management (SAICM), which included a number of global action plans. In September 2015 the WSSD restated that 2020 goal in its 2030 Agenda for Sustainable Development, with a goal to "significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment." This approaches the EU's non-toxic environment strategy. Clearly, regulation of chemicals is key for each nation to achieve its 2030 sustainable development targets.

Chemicals regulation in China has been given new impetus by the government's commitment to an ecological civilisation. The 13th Five Year Plan for Ecological and Environmental Protection explicitly calls for environmental quality to guide political thought. In practice, this means better controls of heavy metals, hazardous waste and toxic and harmful chemicals.

In 2017 China's environmental ministry published its first list prioritising chemicals to be controlled, and a recent ministerial shake-up created a new depart-

ment to manage solid waste and chemicals. This is a sign that China's government is aligning itself with international trends and reducing the environmental harm caused by chemicals.

China's international influence is on the rise and the country is improving its stewardship of the environment. But there is an urgent need for a national regulatory system for all chemicals in commercial use that focuses on environmental and human health protection; that prioritises SVHCs; that includes risk assessment and management action plans; and that demands changes to industry so that it is more sustainable and environmentally-friendly, with stronger public governance.

As a major producer and user of chemicals, China has actively engaged with the Stockholm Convention and the SAICM, and should play an important role in building and operating the post-2020 international chemicals regulation regime.

Liu Jianguo is an associate professor at Peking University's College of Environmental Sciences and Engineering; editor of the National Profile of Chemicals Management in China; leading expert with China's SAICM Quick Start Program (QSP); a member of the Ministry of Ecology and Environment's Chemical Environmental Management Expert Committee; a member of the China Society for Environmental Sciences' Persistent Organic Pollutants Expert Committee and Control of Chemical Environmental Risk Expert Committee.

“去毒”之路：纺织行业在中国的绿色挑战

纺织行业消除有毒化学品的行动在中国已进行 7 年，成果如何？武毅秀撰文分析。

武毅秀



企业废水排放是纺织行业环境足迹的很重要的一部分。来源：卢广 / 绿色和平

21 世纪的纺织业可谓赶上了一个好时代。从 2000 年到 2017 年间，全球服装年产量翻了一番，并在 2014 年产量首次超过了 1000 亿件——相当于地球上的每个人都分摊到了 14 件单品。Zara、H&M、Nike 和 Adidas 等品牌在全球迅速扩张，并带动其身后的产业链快速发展。

作为全球纺织服装最大的生产国和出口国，中国在全球纺

织业产业链上一直占据着举足轻重的地位。但随着带有“中国制造”标牌的纺织服装产品被销往世界各地，与生产这些产品相伴的污染却被留在了中国。

过去数年，中国纺织业的上下游正静悄悄地开展一场“去毒”运动。这场运动的成果与困惑，显示了中国作为“世界工厂”在绿色产业升级中面临的机遇和挑战。

民间组织推动的“去毒”

纺织行业在生产过程中使用和排放的大量具有潜在危害的化学品，是其供应链环境足迹的很重要一部分。

全球生产的化学品约有 25% 用于纺织业。联合国环境署《全球化学品展望》报告曾指出，中国纺织行业消耗了全世界 42% 的纺织化学品。纺织品生产工艺中需要使用大量的化学产品作为染色剂，助剂、稳定剂等对布料进行处理。这些化学品很多会随纺织印染废水进入环境中。

2011 年，国际环保组织绿色和平发布了“时尚之毒”报告，开始了全球范围内动员消费者要求纺织行业为时尚去毒的运动。报告显示在中国广东、浙江的纺织工业园区的污水中均含有具有生殖毒性和致癌性的多种有毒有害物质。而供应链证据将这些工厂的货品指向了包括 Adidas、Nike 以及 H&M、Zara 等在内的全球知名服装品牌。

仅仅几个月后，包括公众环境研究中心（IPE）、自然之友在内的多家中国民间环保组织共同发布“为时尚清污”报告，再次将矛头对准纺织行业巨头，指责其“在华供应链存在严重环境违规，对中国的水环境造成严重影响。”

压力下，多家纺织服装业的领导品牌，包括 Inditex（ZARA 母公司），H&M 等快时尚品牌和 Puma，Nike，Adidas 等运动品牌，均加入了承诺到 2020 年实现供应链内有毒有害物质零排放的厂商行列。为此，这些品牌甚至还成立了一个 ZDHC（Zero Discharge of Hazardous Chemicals）基金会，作为行业合作促进机构，对“去毒”的要求作出回应。

纺织行业“去毒”承诺的核心元素包括：对供应链进行化学品管理、信息公开透明（通过网络平台公布纺织废水和污泥的检测结果，并公布供应商清单）、有毒化学品的替代和淘汰。

如今，七年过去，距离 2020 年“无毒时尚”目标也只有不到 2 年时间了。供应链去毒的进展如何？



一家位于浙江绍兴的印染企业内景，摄于 2012 年。图片来源：卢广 / 绿色和平

“去毒”之路

民间组织的“去毒”呼吁，给行业带来了震动。

中国纺织工业联合会（CNTAC）可持续发展项目主任胡柯华这样评价：“在绿色和平的报告之前，纺织业界关注的都是终端产品里的化学品，关注的是产品质量的合规，对于生产过程中的化学品到底是怎样的情况，是不太在意的。所以报告出来时，业界一方面是震惊，一方面也不太理解这个问题，有些业界人士甚至感觉很无辜。”



写有“去毒”字样的橱窗模特，被环保志愿者安装在中国浙江的一个纺织印染废水排放口附近，呼吁纺织行业清除有毒有害化学品，图片摄于 2012 年，来源：吴迪 / 绿色和平

据绿色和平统计，截止目前全球已有 80 家纺织品牌和供应商作出了“去毒”承诺，这些品牌的销量占全球纺织业市场份额的 15%。“这些品牌都在实现无毒供应链的道路上取得了长足的进步”。如今，绿色和平在最新一期的《为时尚去毒》(Destination Zero) 进展报告里这样评价品牌们的表现：“品牌为时尚去毒的行动，已经帮助将纺织行业的化学品管理工作推向一个不可逆转的新的趋势。”

加入“去毒”承诺的公司要做的第一件事，就是建立一个生产禁用物质清单（MRSL, Manufacturing Restricted Substances List），俗称为“有害物质黑名单”。名单中的化学品将在生产全过程的各个环节被禁用。品牌也会公布淘汰这些化学物质的时间表。

H&M 全球可持续项目化学品管理经理 Veera Sinnemaki 是这样介绍 H&M 的供应链“去毒”之路的：“在 2012 年，

公司要做的第一件事，就是对现有供应商使用的化学品进行全面的筛查和信息登记，然后对化学物质毒性进行筛检（screening）。”

2012 年，H&M 发布了 MRSL，同时也发布了面向其供应商的正面产品清单，并针对 H&M 的供应商做了培训。

“通过 MRSL 的发布，我们的供应商就会知道有哪些产品他们是需要替代的。之后，H&M 通过正面清单告诉厂家哪些产品可以用在我们的生产线上。这个过程，需要每个供应商提供他们的化学品使用清单，然后与我们的清单进行比对，”Sinnemaki 解释说，“今天，制定化学品清单和采购政策已是我们所有供应商的最低要求。”

在 2018 年 9 月更新发布的“H&M 正面清单”里，列出了数千种允许使用的纺织化学品，详细列出了每一种产品的名称、种类、用途、供应商等信息。

Sinnemaki 说：“最大的挑战是供应商对化学品问题的意识。应该说，当时来自民间组织的宣传和报告有助于这一问题的传播。在当时，我们没有别的选择，只能就决定这样开始了。”

针对供应商的能力建设是品牌需要啃下的第二块“硬骨头。”供应链的化学品管理涉及到供应链环节的多个层级的供应商，不仅仅是“第一级”的成衣供应商那么简单。而在污染最多、化学物质使用最多的湿法处理（wet processing）环节，也是化学品管理知识、能力和意识极为匮乏的环节。大多数品牌需要提供培训、技术支持，从零开始为供应链中的厂家提供能力建设。

与之相辅相成的是供应链的信息透明。加入“去毒”承诺的品牌，需要公开他们的执行进展，保证越来越多的供应商公布他们的废水检测结果。如今，很多品牌已经将这一信息公开扩大到了二、三级的供应商，甚至有一些品牌开始上溯到纤维制造阶段。

“全面的公布我们的一级供应商和二级供应商的名单，会使他们接受到各个方面的更加密切的关注和监督，并不仅仅局限在化学品上。当他们看到自己的名字公开的时候，对他们是更好的监督，”Sinnemaki 表示。

挑战重重

对供应链化学品的管理，最终需要落实到有害化学品的替代。出于成本和成熟替代品的可获得性等原因，有害化学品的替代一向被认为是“去毒”过程中最困难的一步。在实践中，达成“替代”这个共识，甚至要比寻找替代品本身难度更大。

“这是一个先有鸡还是先有蛋的问题。供应链的厂商往往希望品牌能够先采取行动，而品牌寄希望于上游行业能够先提供替代品。” ZDHC 基金会东亚区总监林立介绍化学品替代项目时这样说。

林立以富马酸二甲酯 (DMF) 的淘汰为例，说明行业共识对替代的推动作用。DMF - 二甲基甲酰胺，是皮革和纺织品生产中用途很广的一种溶剂，因其健康风险而被欧盟列为“高关注物质”(SVHC)。在品牌们调研 DMF 的替代品时，发现上游的合成革行业已有解决方案。由此，几个大的品牌率先提出要在 2020 年或 2025 年淘汰 DMF。”通过越来越多的品牌加入，在行业的合作和对话之下，从 2015 年到今年五月，中国的无 DMF 替代品 -- 水性合成革产量增长了 120%，无溶剂合成革增长了 40%。我们预计到今年年底，DMF 替代品的产量还会持续增加，”林立表示。

对此，绿色和平“为时尚去毒”的项目官员 Yannick Vicaire 很有感触的认为，替代的成本和难度，并没有想象的那么高。”在过去几年，我们看到全氟化合物 (PFC，一种具有潜在危害的化学品) 的市场已经产生了巨大的变化。从 PFC 的替代历史我们可以看出，其中花费最多的时间，是品牌‘抗拒’的时间。一旦品牌公司同意，某种化学品需要被替代，市场就会紧跟上。”

上游厂商和政策支持成瓶颈

尽管到目前为止，大部分的大型纺织品牌已经悉数展开了供应链去毒的行动，但绿色和平的 Vicaire 仍然认为距离全行业的真正“去毒”还很远。

“我认为我们还没有实现‘无毒’供应链。尽管现在已经有 80 家纺织品牌加入了去毒的承诺，我们需要这个理念尽快被政府所采纳和推行。因为尽管大品牌可以加大对供

应链的管理，但是这个行业其余的品牌还没有加入进来。”纺织服装行业高度分散的属性增加了问题解决的难度。80 家国际大型的服装零售公司和纺织供应商，其体量也仅占全球行业的 15%。世界范围内，电商和网购的兴起使得纺织品牌更加多元。在中国，更多的工厂服务于二、三线、甚至没有品牌标签的低廉服装品牌。这意味纺织业供应链的大部分还没有被置于严格的化学品监管之下。中外对话访问的业内人士均认为，来自上游化学品厂商的深度参与和政策的引导，对于下一步的行动至关重要。

H&M 的 Sinnemaki 认为，政策的进步会降低品牌推进工作的难度。”我们希望政策能够最终让源头的化学品公司负起责任。如果生产这些化学品的公司能够淘汰这些有毒化学品的话，那么对于纺织品的供应商和品牌来说，管控化学品将会变得非常容易。”

此外，如何发挥和调动起中国供应商的主动性，在上游行业内实现更有效的联动，也是中国纺织产业面临的问题。今年 4 月，中国的一些大型纺织染料、助剂、化学品公司，发出了“行业自愿行动”的倡议，承诺制订上游行业的 MRSL 和正面清单，以便更好地整合目前的多个标准和行业要求。胡柯华认为，“中国的化学品供应商占据了全球 60% 以上的体量，所以说在全球的纺织品化学品管理里，他们才是真正的主角。”

“没有其他利益相关方在去除有害化学品上的推动，我们对于供应商的推动是有限的，”林立这样总结，“政策推动和市场推动两条腿的方向一致的话，供应链去毒的步伐会更快。”

Fashion detox: China's textile industry under pressure to clean up

Leading brands are trying to remove toxic chemicals from their supply chains but they can't do it alone

Wu Yixiu



A textiles factory discharge pipe in China (Image: Lu Guang/Greenpeace)

The 21st century has been good to the textile industry. Global clothing production doubled between 2000 and 2017 to surpass 100 billion items annually for the first time in 2014 – that's equivalent to 14 new items for every person on the planet. Leading brands such as Zara, H&M, Nike and Adidas have expanded their supply chains to keep up with demand.

China is the world's largest producer and exporter of textiles and clothing, but while "Made in China" products are sold around the world, the pollution from their manufacture doesn't leave the country.

The call to clean up

Textile manufacturing uses enormous quantities of potentially harmful chemicals. Large amounts of dyes, additives and stabilisers are used to treat textiles, which then enter the environment through wastewater. According to the Chinese Textile Industry Association, 25% of global chemical output is used in the textile industry. The United Nations Environment Programme's Global Chemicals Outlook report points out that 42% of that usage is in China.

In 2011 Greenpeace published *Dirty Laundry*, a report that called on consumers worldwide to demand change in the fashion industry. It showed wastewa-

ter in textile industry zones in Guangdong and Zhejiang contained chemicals that cause cancer or are harmful to reproduction. Supply chain investigations linked the products from those factories with global brands, including Adidas, Nike, H&M and Zara.

Just several months later a number of Chinese non-governmental organisations, including the Institute for Environmental and Public Affairs and Friends of Nature, published a report on fashion's polluting practices, again taking aim at global mega-brands and warning of "severe breaches of regulation in their Chinese supply chains, with a grave impact on China's water environment".

Leading brands, including fast fashion companies Inditex (Zara's owner) and H&M, along with Puma, Nike and Adidas, committed to ending the release of harmful substances from their supply chains by 2020. A Zero Discharge of Hazardous Chemicals Foundation (ZDHC) was set up to encourage and guide change in the sector.

The key elements of that commitment include management of chemicals used in the supply chain, information transparency (wastewater data monitoring and supplier lists) and the replacement of harmful chemicals with alternatives.

Seven years have passed and the 2020 target is nearing, so what progress has been made?

Reforming the industry

Before the Greenpeace report, the textile industry was focused on product quality and chemicals in end products, said Hu Kehua, head of sustainable development at the China National Textile and Apparel Council. "The use of chemicals in the manufacturing process wasn't of much concern so the report shook the industry, but also we didn't really understand the issue and some people felt they were being wrongfully accused," he said.

According to Greenpeace, 80 fashion brands and suppliers, accounting for 15% of the global clothing market, have agreed to "detox".

"Committed brands and companies are delivering on the rigorous management of hazardous chemicals collectively," wrote Greenpeace in *Destination Zero*, a recent progress report, "and they have reached a critical point where there's no going back".

The first step companies are asked to take is to set up a Manufacturing Restricted Substances List (MRSL), which is often described as a harmful substances blacklist that can guide the elimination of harmful chemicals from the manufacturing process.

Veera Sinnemaki, chemicals programme manager with H&M, explained: "The first thing we did in 2012 was to look into chemicals in the supply chain. Together with the facilities, we conducted a chemical inventory, then we analysed the hazards of each incoming chemical."

In 2012, H&M published its MRSL along with a list of endorsed alternative chemicals. It then started training its suppliers.

"Once the MRSL was released our suppliers would immediately know which chemical products they needed to replace," said Sinnemaki. "We then provided the positive list, which is the chemical products that we endorse so that they know which chemicals are allowed to be used in our supply chain."

One challenge was helping suppliers understand why the changes were necessary, added Sinnemaki. Another was working to build capacity with them. Management of chemicals involves the entire supply chain so it's not just a matter of working with the top tier suppliers of finished clothing items; the use of chemicals is greatest at the wet processing stage,



In 2012, Greenpeace activists installed a group of mannequins around a large wastewater discharge pipe belonging to the Linjiang Waste Water Treatment Plant, in Xiaoshan District, Hangzhou. (Image: Wu Di/Greenpeace)

where knowledge and abilities are most lacking so companies have had to provide training and technical support to build these capacities from scratch.

Supply chain transparency can help this process if companies publicise their progress and ensure that more suppliers make wastewater monitoring data public. Many companies have extended this to second and third tier suppliers, with some having also reached textile manufacturers.

"By releasing the list of the first and second tier suppliers they will be scrutinised more," said Sinnemaki.

Finding alternatives

Ultimately, the chemicals that cause harm need replacing, but cost and availability of alternatives means this is seen as the toughest part of the process.

"The manufacturers in the supply chain always want to see the fashion firms take action first, while the fashion firms want their suppliers to provide alternatives," said Lin Li, East Asia director of the ZDHC Foundation.

The replacement of dimethyl fumarate (DMF) is a good example of the role industry consensus can play, said Lin. DMF is a widely used solvent in the textile and leather industry, but it has proven hazardous to health so was listed by the EU as a Substance of Very High Concern (SVHC). When fashion brands searched for an alternative they found a solution with their suppliers of synthetic leather, and so several major firms required the removal of DMF from their supply chains, with deadlines ranging from 2020 to 2025.

"With more companies getting involved, and with cooperation and dialogue within the sector, production of DMF-free alternatives, such as water-based synthetic leather and solvent-free synthetic leather, grew by 120% and 40% respectively from 2015 by May this year. We expect that to continue to increase by year's end," said Lin.

Yannick Vicaire, campaign strategist for Greenpeace's DetoxMyFashion project, said the costs and difficulties should not be overstated. "Once companies agree that chemicals should be substituted, the market follows."

Engaging all suppliers

Although the majority of major fashion brands have started to take action, Vicaire thinks there is still a long way to go. "Even though 80 brands have adopted the zero discharge of hazardous chemicals goal we are not there yet. We need these dynamics to be adopted by all governments because though big brands lead the trend, the rest of the industry have not followed," he said.

Spurred by the emergence of online shopping and e-commerce, the textile and clothing industry is dominated by small firms, which makes change more difficult. In China many factories supply lesser-known brands, or produce cheap unbranded clothing. This means the bulk of the clothing supply chain is not subject to strict chemicals management. Industry figures interviewed by *chinadialogue* said that chemical suppliers and policy-makers will be crucial to supporting the sector's next steps.

H&M's Veera Sinnemaki agreed that government policy is needed to get the industry to change. "If there are policies holding chemical companies accountable, chemical management work will be much easier for both brands and suppliers," she said, referring to the upstream chemical companies that provide chemical agents to the textile industry.

There is some movement among chemical suppliers on this issue. In April, a number of large Chinese suppliers of dyes, additives and chemicals to the clothing sector launched a voluntary initiative to produce a Manufacturing Restricted Substances List and a positive list of preferred substances that apply to their own sector. This would integrate several existing industry standards.

Hu Kehua thinks that China will be key to making this work. "China's chemical manufacturers account for 60% of global output, so have a real role to play in chemical management in the clothing sector," he said.

"Without help from other stakeholders to eliminate harmful chemicals, there are limits to what we can do in the supply chain," concluded Lin Li. "Detoxification of supply chains would happen quickly if both policy and the market moved in the same direction."

关于中外对话

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