International Sources of Environmental Policy Change in China: The Case of Genetically Modified Food

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Abstract:
China's agricultural biotechnology policy has undergone a profound transformation over the last decade, from a strongly promotional to a more precautionary approach. From the 1980s onwards, China invested heavily in biotechnology development and in the early 1990s emerged as the leading biotech country in the developing world. In the late 1990s, however, it halted the authorisation of new genetically modified crops and introduced stringent safety regulations more recently. This paper investigates the sources of this policy shift and argues that international factors have played a central role. Two trends, in particular, are identified as key sources of the move towards greater precaution: China's ongoing international socialisation, particularly in the context of the international scientific debate on biosafety and the negotiations on a biosafety treaty; and the growing globalization of agriculture and trade, which has exposed China to international competitive forces and trade restrictions in food trade. As the case of genetically food in China shows, political integration and economic globalisation can work together to promote a strengthening of the domestic environmental policy agenda.

Key Words:
Agricultural Biotechnology; China; Economic Globalization; Environmental Policy; Genetically Modified Food; International Socialization; Trade Policy.

INTRODUCTION[1]

China's agricultural biotechnology policy has undergone a profound transformation over the last decade. From the 1980s onwards, China was an enthusiastic promoter of modern biotechnology and became the world's first country to grow a genetically modified (GM) crop on a commercial scale. More recently, however, the country has tried to shore up its environmental risk regulations for genetically modified organisms (GMOs) and halted the authorisation of new GM crops in the late 1990s. The Chinese leadership has proclaimed that all benefits *and* risks of genetic engineering need to be considered before more GM products can be approved. This move towards greater precaution in agricultural biotechnology supports the view that environmental concerns have moved up the political agenda in China (Economy 2004; Ho 2001; Sims 1999; Zhang et al. 1999). At a minimum, it suggests at least a partial break with the unbridled technological optimism that characterised Communist rule in the past.

Unlike in Europe, where consumer hostility towards GM food has forced a strengthening of the European Union's biotechnology regulations, the shift in China's policy is not the direct result of societal pressure. Indeed, much of the recent focus on sustainability issues in Chinese politics, however shallow it may be, can only partly be explained with reference to the rise of an environmental movement. The nature of the autocratic political system and the weakness of civil society combine to constrain environmental activism and its political effects (Ho 2001; Schwartz 2004). Instead,

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we need to look for other explanatory factors. Ideological debates and bureaucratic politics within the core state play an important role here as has been noted in other policy areas (Fewsmith 2001b; Zweig 2002: 27). But as this paper argues, change in China's environmental policy is also influenced by international forces, and particularly so in the case of GMO regulation. This paper thus supports the recent shift in China studies towards greater emphasis on external factors in explaining political change (Moore 2000, 2002; Shirk 1996; Townsend 1991; Zweig 2002).

China's integration into the international system has produced two dynamics that impact on domestic environmental policy. The first dynamic is the result of China's ongoing international socialisation (Economy and Oksenberg 1999; Kent 2002). Participation in international environmental regimes provides mechanisms for transmitting global environmental concerns and norms into the domestic political arena. The second dynamic originates in the myriad of global links that tie China's domestic economy to international markets (Lloyd 2000; Moore 2002; Webber, Wang and Ying. 2002). Countries with higher regulatory standards can export these by imposing environmental restrictions on imports from China, thus producing an economically motivated 'trading up' effect. Where both dynamics work together and reinforce each other, China's global integration can become a powerful source for environmental policy change.

The growing internationalisation of domestic politics has spawned a large research literature in international relations and globalisation studies. Two principal arguments have dominated the debate. The first, based on rationalist assumptions and widely employed in international political economy, views internationalisation as a process

through which the incentives for governments, firms and socio-economic groups change within societies (Keohane and Milner 1996; Rogowski 1989; Simmons and Elkins 2004). This change in incentives generates new policy preferences and new coalitions of actors, potentially leading to domestic policy change. The second, based on constructivist assumptions, sees states as embedded in a wider framework of international norms and institutions, which affect the formation of preferences, and even identity, of domestic actors (Checkel 1997; Finnemore and Sikkinkh 1998; Risse et al. 1999). Through mechanisms of socialisation and social learning and the operations of transnational networks, international norms work their way into domestic politics and contribute to policy change. Much of the debate in international relations has centred on the question of which of these two perspectives better explains international-domestic linkages. More recent work, however, has begun to build bridges between rationalist and constructivist logics and has concentrated on identifying and elaborating the causal mechanisms that link international forces and domestic policy change (Zürn and Checkel 2005). This paper seeks to contribute to this effort, providing an empirical case study that illustrates the dual nature of the internationalisation of environmental policy change in China.

It is argued below that both dynamics – change in domestic preferences through economic globalisation and the adoption of environmental norms through transnational networks and concern transfer – have helped to promote an environmental safety agenda as part of China's agricultural biotechnology policy. The country's growing international integration has exposed environmental policy-making, in often subtle and indirect ways, to a range of international forces and influences. Despite a comparatively high degree of state control over the domestic

political agenda and a long history of resistance against globalisation (Chenggen 2003; Hughes 1997), China has been unable to isolate itself from the international GM food controversy.

The paper proceeds in four steps. The first section provides an overview of the evolution of China's biotechnology policy and the recent shift towards a more precautionary stance on biosafety. The second section analyses the effect that China's international integration, and particularly participation in the international biosafety regime, has had on domestic policy. The third section examines the impact of economic globalisation in agriculture and the 'trading up' effect produced by international trade restrictions on GM crops. The final section summarises the findings and looks at the challenges facing China's biotechnology and environmental policy.

SHIFTS IN CHINA'S BIOTECHNOLOGY AND BIOSAFETY POLICY

Genetic engineering of plants represents a revolutionary technological change in agriculture. Unlike traditional forms of plant and animal breeding, recombinant DNA techniques enable researchers to directly manipulate the genetic composition of target organisms. By inserting, removing or altering genes, genetic engineering produces much faster, and more targeted, forms of genetic change, which can also occur across species boundaries. The nature and relative novelty of this technology, which has been developed since the 1970s and commercialised since the 1990s, led to an intensive debate over the desirability and safety of genetically modified organisms

(GMOs). Advocates of the technology argue that GM plants can improve food quality and increase agricultural productivity; they see GM crops as key to ensuring food security in developing countries. Critics point to risks for human health and the environment, including threats to biological diversity; they question whether agri-biotechnology, which is capital-intensive and dominated by Northern multinationals, is a suitable and socially acceptable technology for the developing world (for an overview of this debate, see Falkner 2004: 249-252).

China's biotechnology strategy

Although agricultural biotechnology is dominated by a few multinational corporations, a number of developing countries have sought to develop their own research capacity and to adapt the new technology to domestic needs. China has taken a leading role among them. Genetic engineering has been an integral element of China's national agricultural strategy since the early 1980s. In a country preoccupied with food security and intent on catching up with Western technological advances, biotechnology's promise of increased yields, more reliable harvests and reduced chemical inputs was taken more seriously than almost anywhere else in the developing world. During the 1980s and 1990s, the Chinese state provided ever-increasing public funds for research and development, and even today the Chinese state plays a decisive role in funding and directing the country's biotechnological R&D and commercialisation.

The origins of China's biotech programme go back to the early phase of the economic modernization programme initiated in the late 1970s. Genetic engineering, alongside

computing and space technology, became one of the key areas of Deng Xiaoping's reform policy. It held the promise of not only improving farm yields but also helping China to take a leap in the global technological race (Suttmeier 1980). The country was able to build the largest scientific basis for advanced biotech research outside the industrialised world, with over 150 national and local research laboratories in operation today (Huang and Wang 2002). An estimated 2690 scientists were working in the field of plant biotechnology in 2003, up from 740 in 1986 (Huang, Hu, Pray and Rozelle 2004:7), and Chinese research institutes reported in 2002 that scientists had produced 141 types of GM crops, 65 of which were already in field trials (Huang and Wang 2003). Despite these impressive achievements, doubts persist as to whether China has really closed the technological gap with the West. On the whole, Chinese research laboratories are better at adapting international GMO developments to local conditions than engaging in the kind of basic research that has allowed Northern biotech firms to dominate the field. Partly in recognition of these limitations, China has now somewhat reluctantly accepted the need for co-operation with biotech multinationals, although foreign direct investment in agri-biotechnology remains a politically charged issue.

China's headlong rush into modern biotechnology proceeded largely unencumbered by any significant regulatory regime well into the 1990s. Whereas most leading biotechnology countries had created a comprehensive system of biotechnology governance by the late 1980s, China did not even begin to establish biosafety regulations until the early 1990s, long after other developing countries such as India had started to address the environmental and health concerns surrounding genetic engineering (Gupta 2000; Paarlberg 2001). The absence of any safety regulation for

genetic engineering played into the hands of Chinese researchers who in the late 1980s were the first worldwide to grow a GM crop in commercial quantities, a virus-resistant tobacco plant (Paarlberg 2001: 128). In 1997, 12 other GM crops were approved for field trials, of which three passed the safety tests for commercial planting (cotton, tomato, petunia). Of the GM crops approved for introduction to the market, only cotton has been grown on a large scale since 1997, with insect-resistant Bt cotton accounting for 58 percent of the total production in 2003. An estimated 5 million farmers are now using Bt cotton, including also varieties developed by Monsanto, the first and so far only multinational to sell GM seeds through a joint venture with a Chinese firm (Huang and Wang 2003).

Shift towards a more precautionary stance on biosafety

In the late 1990s, China was set to authorise a range of new biotechnology products when suddenly in 1999 a *de facto* moratorium on new GMO releases was introduced.[2] The timing of this unofficial ban on GM crop developments – after the European Union introduced its own GMO moratorium in late 1998 and shortly before the adoption of the Cartagena Protocol in Biosafety in January 2000 – is significant. It reflected the growing unease among scientists and policy-makers in China about the environmental risks and trade implications of domestic GM crop authorisations. Against the background of a shift in the domestic scientific debate and a growth in global anti-GM protests and GMO trade restrictions, China began to reassess its approach to agri-biotechnology.

[2] In September 2005, China approved the commercialisation of a new Bt cotton variety, but new GM crops that would enter the human food chain have so far failed to receive regulatory approval (China Daily 2005).

The 1999 moratorium was widely perceived as a significant policy shift, for in the preceding years China's efforts at ensuring biosafety had been comparatively lax. The first Chinese biosafety rules that were introduced in 1993 provided a mere framework for regulation. The Ministry of Science of Technology (MOST) was the lead agency dealing with biotechnology matters at that time and established the Safety Administration Regulation on Genetic Engineering, a set of general safety rules drafted by scientists for scientists. It took three years for the Ministry of Agriculture (MOA) to follow this up with its Implementation Guidelines of 1996, which became the basis for authorising the commercialisation of GM crops. Just like MOST's guidelines, the 1996 regulations were informed by a desire to promote biotechnology and concentrated on scientifically demonstrated risks (Paarlberg 2001: 129) – a position that tended to downgrade the importance of long-term and uncertain threats to human health and environment. It was only from 1996 onwards, nearly eight years after the first GM crops had been planted in China, that Chinese authorities required a case-by-case risk assessment of new developments in agri-biotechnology. MOA has since taken the lead in regulating and authorising GM crops for agricultural production, covering all aspects of biosafety assessment. Given its close links with the agricultural sector and biotech research institutes, MOA was widely seen to favour the rapid commercialisation of GM crops (Keeley 2003: 16).

A shift towards greater environmental awareness was already under way when in 2000 the allocation of regulatory authority within the state bureaucracy changed yet again. With the adoption of a new national seed law, the final managerial authority over all new GM crop varieties passed to the State Council, a central decision-making body at cabinet-level. This reorganisation produced a more centralised system of GM

regulation, thus acknowledging the greater political significance of biotech-related decisions. Some observers also interpret it as an attempt to take away regulatory authority from regional governments that had been able in the past to approve field trials by foreign biotechnology firms, as happened in Hebei in 1994 with the controversial decision to introduce Monsanto's GM cotton variety (Paarlberg 2001: 132).

Reflecting greater awareness of environmental concerns and the newly created Cartagena Protocol on Biosafety, the State Council produced new and more stringent biosafety rules. The State Council's 2001 Regulation on Safety Administration of Agricultural GMOs was followed in 2002 by three implementing regulations issued by MOA, covering the areas of biosafety evaluation, import safety administration and GM food labelling. These new acts provided a more comprehensive system of risk management, for the first time covering imported GMOs and providing consumers with some degree of choice. They also signified a shift away from the previous product-based risk assessment of GMOs, as favoured by the leading biotech country, the United States, towards a more process-based approach as practiced in the EU. During the drafting of these new regulations, the Chinese authorities paid close attention to policy developments in Europe, Japan and South Korea, as well as the outcome of the Cartagena Protocol negotiations (interview with MOA representative, 23.8.2004). The impression of a shift towards a more restrictive policy was further deepened when in February 2002 MOA issued a ban on foreign investment in the biotech seeds business. This move seemed to play into the hands of those critics who had argued that China's new-found emphasis on the safety of GMOs was motivated more by protectionism than environmental protection (Newell 2003: 30; interview

with Chinese Academy of Sciences representative, 22.8.2004; interview with industry representative, 24.8.2004).

Despite the evident strengthening of the biosafety provisions, however, the new system for biosafety management is still criticised by environmentalists for failing to reduce the central role played by pro-biotech scientists and regulators in the approval process, particularly in the powerful Biosafety Committee (Keeley 2003), and for maintaining the Agriculture Ministry's central role in the regulatory process without giving greater authority to the State Environment Protection Agency (SEPA), China's equivalent to an Environment Ministry. SEPA remains marginalized in the regulatory framework but has recently sought to acquire a greater role through its involvement in the current drafting of the first fully-fledged national biosafety law under direction of MOST (interview with SEPA representative, 17.8.2004).

As this brief historical overview suggests, China's biotech policy has undergone an important transformation since the mid-1990s. This brings us to the question 'how can we explain this policy shift?' What factors account for the strengthening of environmental concerns in GMO risk assessment? Conventional explanations of the 'greening of the state' as a result of pressure from social movements – as is evident in industrialised countries (Dryzek et al. 2003) – do not work in this case. Government insiders and representatives of civil society alike acknowledge that there has been no significant public debate, let alone political campaign, that might have sparked a governmental rethink on GMOs (interview with civil society representative, 22.8.2004; interview with SEPA representative, 17.8.2004). Much of the biosafety debate has been conducted in elite scientific and governmental circles, and the policy

change described above has been initiated from within the state. Yet, as this paper argues, debates within the Chinese state have themselves been subject to international influences and cannot be understood without considering the international context. In the following, the two most important external factors, international socialisation and economic globalisation, will be examined in greater detail.

INTERNATIONAL SOCIALISATION AND PARTICIPATION IN GLOBAL ENVIRONMENTAL GOVERNANCE

China's opening over the last three decades represents one of the most profound changes in the country's foreign policy and in international relations more generally. Since the People's Republic of China (PRC) was recognised in 1971 as the sole representative of China at the United Nations, and especially since Mao's death in 1976, China has joined a range of international organisations and committed itself to adopting international norms and rules (Kent 2002). The Chinese leadership after Mao saw membership in international organizations as both a requisite and a boost for achieving great power status. Yet integration into international society has brought with it new threats to national autonomy, as China has had to adopt certain international norms and rules that stand in contrast to its domestic political constitution. The country is also exposing itself to greater international scrutiny of its record in implementing international obligations. China has persistently tried to strike a balance between international integration and national autonomy (Hughes 1997). The difficulty in finding this balance is most prominently illustrated by China's accession to the World Trade Organization (WTO) in 2001, which became one of the most hotly debated foreign policy issues in China (Breslin 2003; Fewsmith 2001a).

The rise of domestic environmentalism

A notable consequence of China's international socialisation has been the growing recognition of environmental concerns on the domestic political agenda (Economy 2004; Sims 1999; Zhang et al. 1999). Having traditionally viewed environmental issues as a 'luxury' that should not threaten the country's economic aspirations (Sullivan 1995: 243-44), Chinese leaders have over the last decade embraced the concept of sustainable development. The current leadership under Hu Jintao has repeatedly stated that sustainability is a guiding principle of its economic policy and stressed its desire to put economic growth on an ecologically sustainable footing (Xinhua 2002).

While the rise of an environmental agenda was to some extent precipitated by domestic developments, domestic factors alone cannot explain it. To be sure, recent high-profile environmental disasters and disputes have played a role: local opposition to the building of the Three Gorges Dam highlighted the social and ecological damage caused by high-profile infrastructure projects; the massive flooding in the Yangtze River and Songhua River valleys in 1998 led to the government's public recognition of the problem of deforestation; and urban air pollution has become a major source of additional public health costs (Economy 2004: chapter 3; Sullivan 2005: 245-6). Yet, the growth of China's environmental movement (Cooper 2006), and civil society more generally (Howell 2004; Saich 2004: 190-2) remains a fragmented and, with the exception of the campaign against the Three Gorges Dam, localised phenomenon (Ho 2001: 897-900). Environmental organisations, although having seen rapid growth

since the mid-1990s, continue to operate under restrictions imposed by the central government (Yang 2005: 51; Schwartz 2004).

Given the constraints on domestic environmentalism, the international context has therefore been of particular importance to the rise of green issues on China's policy agenda. In the early 1990s, scholars speculated that the growth of international environmental concern would put pressure on China to address ecological threats (Frieman 1994: 191). This has been borne out in that the global system of environmental governance created since the 1970s provides an important normative and regulatory context for the adoption of national environmental laws and regulations in developing countries, and especially so in China. During the 1990s, China signed up to 25 multilateral environmental agreements and entered into a number of bilateral and multilateral projects for environmental cooperation (Chan 2004: 71-2). China is a party to the Kyoto Protocol on climate change and the Convention on Biological Diversity (CBD), and is actively supporting the Montreal Protocol's phase-out plan for ozone-depleting substances. China's successful record of compliance with the Montreal Protocol has led observers to conclude that, where financial aid and capacity-building are provided, the country now plays a constructive role in international environmental protection (Chan 2004; Zhao and Ortolano 2003).

The emergence of the biosafety agenda in China during the 1990s has followed this pattern of externally-induced environmentalism. It provides a clear example of what Economy and Schreurs (1997) have described as the internationalisation of environmental politics. International concerns about the risks associated with GMO

releases and efforts to deal with them preceded similar concerns and regulatory developments in China.

The international context: scientific exchange, biosafety negotiations and capacity building

The internationalisation of biosafety policy took on several dimensions: international scientific cooperation; participation in UN-sponsored biosafety talks; and biosafety capacity-building activities funded by international donor agencies. Links between the Chinese scientific community and the international GMO debate played a key role in strengthening the domestic biosafety agenda in the late 1990s (interview with SEPA representative, 17.8.2004). Scientists have been privileged actors in this process, not only because of their authoritative claims to policy-relevant knowledge but also because of the legitimacy they possess vis-à-vis a political elite that has staked its future on the promise of technological progress and economic growth. Moreover, unlike environmental campaigners, scientists can express legitimate ecological concerns without being suspected of politically subversive intentions.

Given that an international biosafety debate had long been underway since the 1980s (Zedan 2002) before China came to consider the need for domestic regulation, Chinese biotechnology experts were able to tap into a rapidly growing stream of international biosafety research and apply established methodologies of environmental risk assessment to the Chinese context. By the 1990s, Chinese biologists were well connected with international scientific communities, as a consequence of the gradual opening to international collaboration that was started as

part of Deng's modernisation strategy. These international links were critical in stimulating domestic interest in biosafety. In a sense, they provided a vehicle for transmitting information about GMO risks and biosafety concerns, first into domestic scientific debates, and then into the wider regulatory and political debate (interview with Chinese Academy of Sciences representative, 18.8.2004).

The role played by Chinese scientists in the process of information transfer and diffusion of environmental concern is reminiscent of the contribution that scientists make in other areas of international environmental protection. As Peter Haas (1995) argues, transnational expert groups, or 'epistemic communities', may seek to influence scientific and policy discourses within states with a view to promoting international environmental cooperation. Their role extends to raising awareness and creating concern, informing scientific and policy debates, and strengthening the hand of those forces within the state bureaucracy or political elite that are in favour of taking environmental action. They perform an important, yet all too often ignored, function in internationalising domestic environmental policy and transmitting international concern into domestic contexts. That Chinese scientists can play such a role has been noted before, in the context of the debate on ozone layer depletion in the 1980s (Zhao and Ortolano 2003) and on climate change in the 1990s (Economy 1997).

The emerging debate on scientific biosafety concerns was further promoted by China's participation in the international negotiations on a biosafety treaty conducted under the auspices of the Convention on Biological Diversity (CBD) between 1996 and 2000. This international process brought together international scientists,

regulatory experts, environmental NGOs and industry groups in an effort to establish the parameters and modalities for regulating transboundary movements of genetically modified organisms and culminated in the adoption of the Cartagena Protocol on Biosafety (Bail, Falkner and Marquard 2002). Having been one of the first parties to ratify the CBD in 1993, China participated in these talks from the outset. Its delegation of scientific and regulatory experts was led by the State Environmental Protection Agency (SEPA), which had hitherto played only a marginal role in domestic GMO governance. China joined what came to be known as the Like-Minded Group of developing countries, the key *demandeur* for a strong biosafety regime, but maintained a relatively low profile within that group, particularly when compared to the more active representatives of Ethiopia and India. At critical junctures throughout the negotiations, China showed willingness to reach a compromise in order to secure an agreement (Cai Lijie 2002), but mostly followed the group's position.

China's involvement with the biosafety talks had an important impact on its domestic agenda: it exposed China's scientific and political elite to the full range of biosafety concerns and risk regulation approaches being debated world-wide and helped to boost the standing of environmental experts domestically. The early phase of the negotiations, from 1996 to 1998, was concerned primarily with defining the key issues and concepts of international biosafety regulation and produced a long 'wish list' of items that delegates wanted to be included in a future biosafety treaty (Falkner 2002: 7-14). For the scientists involved, it provided a unique opportunity for international dialogue and the exchange of information on biosafety-related research that had been conducted around the world (Gaugitsch 2002). Chinese representatives taking part in the biosafety negotiations thus became a key element in the link

between the international and domestic debate on GMO safety. As Xueman Wang writes, the biosafety negotiations during the late 1990s "intensified the concerns and awareness of potential adverse effects of GMOs on environment and health." (Wang 2004: 902).

Participation in the Cartagena Protocol negotiations also gave rise to an institutional mechanism for transmitting biosafety concerns and norms into the domestic context. In order to support the regime-building effort and implementation of the protocol, the international community provided assistance for capacity-building to developing countries and economies in transition. China became one of the largest recipients of biosafety capacity-building aid from the late 1990s onwards. These projects, which were funded mainly by bilateral and multilateral donor agencies, aimed at establishing the scientific, administrative and regulatory capacity needed for carrying out risk assessment and management for GMOs. One of the key elements in China's capacity-building effort was the creation of a national framework for biosafety, which has been running from the late 1990s onwards and was sponsored by the Global Environment Facility (GEF) and UNEP. The country's environmental agency SEPA took this opportunity to challenge the dominance of other ministries, especially MOA, in domestic GMO regulation and was able to establish its lead role in the framework drafting process. The impact of the national framework, however, was of a more indirect nature. The initiative established a process that did not directly feed into the evolving domestic regulatory process, and SEPA's efforts eventually to replace MOA as the lead regulatory agency have not yet come to fruition. Still, the drafting exercise provided for yet another opportunity to connect the regulatory debate in China more

closely with developments abroad, and it galvanised scientific and political interest in biosafety matters (interview with SEPA representative, 17.8.2004).

Thus, the consequences of these forms of international concern and norm transmission were threefold: First, they helped to raise awareness in China of the environmental and health risks arising from genetic engineering in agriculture and legitimised a biosafety discourse that challenged the predominant focus on promoting technological advances in biotechnology. Second, the growing attention paid to biosafety issues and participation in the biosafety negotiations have allowed SEPA to raise its own profile domestically, albeit with mixed results. Third, despite SEPA's failure to change the institutional basis for risk assessment, greater awareness of GMO risks and biosafety concerns have led to a strengthening of the biosafety regulations. The State Council's new 2001 Regulation on the Safety Administration of Agricultural GMOs was followed in 2002 with three detailed implementation regulations issued by MOA, providing for the first time a comprehensive risk assessment of both domestic GMO applications and imports of GMOs. These new regulations updated and deepened the regulatory system put in place in the mid-1990s and strengthened the emerging shift towards a more precautionary approach in commercialising GM crops and foods.

ECONOMIC GLOBALISATION AND ENVIRONMENTAL 'TRADING UP'

Besides participation in international scientific debates and environmental regime-building, China's growing integration into the international economy has provided a further, potent, stimulus for the growth of a domestic environmental policy agenda. Intensified trade links and greater exposure to foreign investment have forced China

to consider the implications that environmental issues may have for its competitive position globally. The case of GMO politics is an important example of how greater economic integration can have a 'trading up' effect on environmental policy.

China's economic globalisation

The link between globalisation and domestic environmental policy has been a hotly contested issue in academic and policy circles. Many contend that global economic competition has a detrimental effect on environmental quality. In their view, increases in trade and investment are seen as spreading an environmentally unsustainable pattern of production and consumption and add to existing pressures on the Earth's finite resources (Goldsmith and Mander 2001). But economic globalisation can also act as a force for promoting environmental agendas and greener business practices. As David Vogel (1995) and others (Princen 2004) argue, an increase in economic interdependence is not necessarily linked with a weakening of national environmental standards. On the contrary, economies that are among the most internationally integrated also have some of the highest environmental standards. Countries with stricter environmental regulations can create export opportunities for environmental protection services and goods; and increased regulation in import markets may force export firms to improve the environmental quality of their goods. Thus, greater economic integration may provide a framework for 'trading up' instead of 'trading down' environmental standards (Vogel 1995), and countries that are subject to economic globalisation may end up increasing regulatory standards rather than engage in a 'race to the bottom'. The 'trading up' scenario has so far been documented primarily in industrialised countries, but recent studies suggest that developing

countries may also experience upward regulatory pressures resulting from globalisation (Garcia-Johnson 2000; Vogel 1997: 557).

In recent years, China has taken important steps towards greater integration into the international economy (Webber, Wang and Ying 2002). The gradual opening of China's state-controlled economy has been an integral element of the country's reform process. The most significant step on this path occurred in December 2001 when China became a member of the World Trade Organization (WTO). In doing so, China committed to adopting a whole range of international trade norms and obligations based on the WTO's enduring objective of liberalising international trade. The preparations for WTO entry further accelerated China's deepening engagement with the global economic order: in 2003, China overtook the United States as the world's leading destination for foreign direct investment (FDI), with annual FDI flows amounting to $53.5 billion (UNCTAD 2004); and having recorded a year-on-year growth in trade during the 1990s, China's total merchandise trade in 2003 nearly matched that of Japan (WTO 2004, p. 5).

Globalisation and global market integration are less pronounced in agriculture than in other sectors, such as manufacturing, but agricultural trade has steadily grown at an average rate of 6 percent during the 1980s and 1990s (Huang and Rozelle 2003: 116). Since the WTO accession agreements were signed, China has stepped up its efforts to open its vast agricultural market to foreign imports. WTO entry has further strengthened the structural shifts in agriculture away from a model of self-sufficient production (e.g. emphasising grain) to higher value and less land-intensive production (e.g. horticulture, livestock). While globalisation of the country's farm sector is still in

its infancy, the effects of greater international competition are being felt particularly in those agricultural sectors, such as soybeans, where trade barriers have been lowered and imports have risen dramatically (ibid., 119).

'Trading up' in agri-biotechnology

The 'trading up' effect on agricultural biotechnology was driven by the fear that should China go ahead with commercialising GM crops it would end up losing market access to countries with GMO import restrictions. The first time that this dilemma occurred was in the case of GM tobacco, China's first commercially grown GM crop that was introduced in the late 1980s, long before other countries began the commercial planting of GM crops. The virus-resistant GM tobacco variety promised higher yields to producers but fell out of favour with international buyers, particularly – and ironically – the United States, which was concerned about negative consumer reactions to the use of GM tobacco. China responded by officially ending the planting of GM tobacco in an attempt to placate and retain its tobacco export markets, although the precise extent to which farmers have phased out GM varieties remains unknown (Paarlberg 2001:128-9). The experience with GM tobacco did not in itself put an end to China's biotechnology programme, but provided a first glimpse of the repercussions that the domestic introduction of GM crops might have on export markets (interview with Chinese Academy of Sciences representative, 18.8.2004).

GM cotton became the second major transgenic crop variety after tobacco to receive regulatory approval in China. In 1997, the first insect-resistant GM cotton varieties passed the regulatory hurdles and were introduced in four provinces (Hebei, Henan,

Shanxi, Shandong) around the Yellow River, in an area severely affected by bollworm in the early 1990s (Keeley 2003:10). For the first time, China also allowed a foreign company, Monsanto, to sell GM seeds. The initial success of the Bt cotton varieties was evident from the rapid adoption rates: by 2001, GM cotton was being grown on more than 2 million hectares and accounted for 45 percent of China's cotton area, with nearly 5 million Chinese farmers planting the GM variety (Huang and Wang 2003: 11). But because cotton has been grown primarily for domestic consumption and does not enter the food chain, biosafety concerns surrounding genetically modified varieties (for an overview, see Keeley 2003: 18-27) were not affected by international trade concerns. Thus, in contrast to the tobacco experience, agricultural globalisation did not have a noticeable 'trading up' effect on GM cotton.

The threat of exclusion from export markets resurfaced, however, in other GM crop developments that affected food production and China's international trade. In the late 1990s, some of the world's biggest agricultural import markets began imposing labelling requirements and restrictions on GM food shipments. The EU led the way with its *de facto* moratorium on GM imports of late 1998 (partially lifted in 2004). The temporary ban on new GM crops was essentially an effort to restore confidence in the EU's system for food regulation that had been damaged by a string of food scares culminating in the outbreak of 'mad cow disease' (BSE). The first GM foods to be sold in Europe had been met with growing consumer concerns and were described in the media as 'Frankenstein foods'. Although the EU's regulatory system was designed to ensure that health and environmental concerns were taken into account in the GMO approval process, some EU member states felt it necessary to impose a ban on further approvals to avert an even greater crisis in public confidence. In 2003, the

EU further strengthened its regulations by introducing a comprehensive system of labelling and traceability for all GM food content, whether present in the end product or during the production process, thus giving the consumer the right to choose between GM and non-GM food (Brack, Falkner and Goll 2003). This meant, however, that continued public hostility to GM crops and food in Europe could close off the European export markets for GM products grown outside the European continent – a development that was closely watched in China.

The EU was not alone in taking precautionary action against GM food. Japan and Korea, two of China's most important agricultural importers in Asia, also introduced restrictions on GM imports and established their own labelling systems for GM content in food. Both countries are important import markets for Chinese soy-based products, such as tofu and soybean sauce. These developments amounted to a serious challenge to China's desire to promote agricultural biotechnology and mobilised domestic export interests to lobby against the proposed introduction of GM soybeans in domestic production (interview with Chinese Academy of Sciences representative, 22.8.2005).

The threat of market exclusion caused by rising anti-GM sentiment in Europe and elsewhere became all too real when in 2000 the EU temporarily halted imports of Chinese soy sauce after British inspection authorities detected GM content. Although China did not allow the commercial growing of GM soybeans domestically, it had started to import GM soybeans from the United States in order to meet growing soybean demand in the production of animal feed and food products that were also destined for export. GM soybean varieties were being developed and tested by

Chinese research laboratories at that time, but a decision on authorising domestic growing of GM soybean has since been put on hold. Chen Zhangliang, a leading biotechnology expert and the then vice-president of Peking University, summed up the growing concerns over the loss of export markets:

> We fear bans on the export of our products. This is a big controversy in Europe… Some have proposed special areas set aside for export goods, where GM crops would not be used. But this is hard to enforce since everyone wants to export. The government is very cautious. (O'Neill 2001)

Externally induced market pressures thus helped to shift Chinese policy towards a more precautionary stance. To protect its soybean export markets, China postponed a decision on whether to allow domestic cultivation of GM soybeans. It also established a segregation system to exclude GM soybean imports from any domestic use other than in crushed form as animal feed, the effectiveness of which, however, remains contested (interview with industry representative, 24.8.2004; interview with civil society representative, 22.8.2004).

The introduction of more stringent biosafety rules has also led to disruption in China's farm imports and has frustrated efforts by foreign firms to develop a GM crop base in China. Among the new trade-related regulations introduced in March 2002 was a requirement for foreign GM crop shipments to receive safety certification before they could be imported. The rules caught China's biggest trading partners by surprise and led to a fierce diplomatic spat with the United States over the disruption they caused in US soybean shipments (Rugaber 2002). Introduced only four months after China's

WTO entry, the new certifications system was interpreted in Washington as 'back-door' protectionism aimed at manipulating the burgeoning trade in soybeans flowing into China, the single largest export market for US soybean producers (interview with US trade official, 25.8.2004). US trade representatives complained about the uncertain nature of the new biosafety rules, which failed to give clear guidance to traders on the documentation requirements and allowed Chinese authorities to delay a decision for up to 270 days, a timeframe China adopted from the Cartagena Protocol's procedures for risk assessment. A fall in soybean imports from the US was only reversed after the country bowed to US pressure, including from President George W. Bush, and produced interim safety certificates for US imports before issuing formal three-year certificates in February 2004 (China Daily 2004; interview with Ministry of Commerce official, 24.8.2004).

In sum, greater exposure to international economic competition has helped to strengthen those within China's scientific and political elite who have argued for a more precautionary approach to commercialising GM crops. Commercial, and to some extent protectionist, interests have served to reinforce environmental arguments in favour of a 'go-slow' approach to commercialising GMOs. This may change, of course, should international trade restrictions on GM food be lifted in the future. The persistence of the trading up effect also depends on the continued existence of sufficiently strong farm export interests in China that perceive the introduction of GM crops as a commercial risk, as has been the case with soybeans and corn. As Anderson and Yao argue on the basis of an economic analysis of China's trade sensitivity in agriculture, these export interests are likely to persist in the foreseeable future. In their

view, China has "…a vested interest in ensuring that the GM debate abroad does not lead to excessive denials of market access for GM products" (2003: 169).

GLOBALISATION, INTERNATIONALISATION AND ENVIRONMENTAL POLICY IN CHINA

This paper has examined the recent shift in China's biotechnology policy towards comprehensive risk assessment and a more precautionary approach to commercialising GMOs. It has argued that in order fully to understand the sources of this policy change we need to consider the impact of international political and economic factors on domestic environmental policy-making. This is in line with recent arguments in the debate on China's internationalisation and domestic reform. Chinese leaders increasingly recognise the need to adjust to international norms (Moore 2000), a trend that is being reinforced by China's integration into the global economy (Breslin 2003; Zweig 2002).

Two dynamics have been identified as the international factors driving this process: international socialisation, as seen in the growing integration of China into international environmental governance and transnational scientific networks; and economic globalisation, particularly the environmental 'trading up' effect brought about by greater exposure to international agricultural trade. Both these dynamics have worked together in this case to push environmental concerns higher up the political agenda in China, against the background of comparatively weak domestic pressure from either consumers or environmental campaign groups.

The case of GM food regulation provides an intriguing example of the ways in which the growth of international linkages and transnational actor networks can bring about domestic environmental policy change. This case is all the more significant as China has traditionally placed a high value on preserving its national sovereignty. Even in the current era of economic liberalization and international integration that Deng's reform policy initiated, China has been adamant in its defence of policy autonomy vis-à-vis external influences. It has sought to curtail the growth of a domestic environmental movement and to monitor transnational links with international environmental groups. This is not to say, however, that China has experienced a loss of autonomy in the field of biosafety policy. Far from it, the Chinese state continues to exercise a high degree of control over both the development of biotechnology and regulatory policies in biosafety. The internationalisation of biosafety policy has led to a reconfiguration of the power balance between pro-biotech and pro-environmental advocates within the core state. Although civil society groups are slowly making their mark in this struggle, the decision-making process over the future of biotechnology remains firmly in the hands of the state. Moreover, the rise of the biosafety agenda has given the state a different means of controlling the direction of the biotechnological revolution, particularly with regard to the growing influence of foreign biotech firms. It has also added a new regulatory barrier to international farm trade that, as some of China's main trade partners allege, has gained in popularity as other trade barriers have been eliminated as a consequence of WTO accession. The shift towards greater precaution in GMO regulation, therefore, reflects both greater environmental sensitivity *and* the strategic use of safety concerns for protectionist purposes. In a sense, the biosafety agenda satisfies both the environmental

constituency and those state elites that seek to control foreign investment and competition, while integrating the country every further into the global economy.

The Chinese experience will be familiar to many other developing countries that are receptive to international biosafety concerns and are keen to preserve agricultural export markets in regions with GMO import restrictions. Many African and Southeast Asian countries have found themselves in such a position. Other countries, however, will face different sets of external influences. Mexico and Brazil, for example, have recently relaxed their restrictive GMO policies while liberalising trade with the United States, the world's leading biotech country. Thus, the nature of integration into the international political economy will shape the direction in which external factors drive domestic policy change in the developing world.

It is nevertheless important to recognise the limitations of the internationalisation effect on China's environmental policy. As in the case of climate change policy, where a 'greening' of policy has been thwarted by pro-developmental interests within the core state (Economy 2004: 183), the move towards precaution in agri-biotechnology is resisted by powerful interests within the scientific community and government. Environmental risk assessment of GMOs remains contested and is far from being fully established. Indeed, the Chinese government remains committed to utilising the potential of genetic engineering and continues to support research and development of new GM products. Over the last few years, a group of scientists have intensified their efforts to convince the government of the need to authorise new GM crops, especially GM rice, in which China has developed a competitive edge. Concerns over biosafety and the impact of future rice exports have so far caused the

government to delay a decision on GM rice, but the balance of concerns is tipped by some observers to shift in favour of commercialisation in the near future (interview with Chinese Academy of Sciences representative, 22.8.2004).

As in other instances of political internationalisation and economic globalisation, domestic institutions and interest group politics play an important role in shaping the way in which international factors impact on the domestic level. Very few, if any, countries simply adopt international norms and obligations, and most countries are able to ameliorate, at least to some extent, the effects of global economic integration. Through processes of transformation into national law, domestic implementation, legal interpretation and even international re-negotiation, they respond to international commitments in an often creative manner, thus preserving a significant degree of national autonomy in the transmission of international commitments. The case of GMO policy in China supports this view. The different international forces operating in the field of biotechnology have been utilised by competing interests within the Chinese state and the biotech sector to support their own agenda. While economic and political globalisation have created a more open process of deciding the future of biotechnology in China, domestic actors within, or associated with, the core state, will largely determine the direction of this process.

What has changed under conditions of globalisation is that these debates over the use of biotechnology in agriculture no longer take place solely within the confines of a scientific-industrial biotech complex that has been the driving force behind the country's advances in agri-biotechnology. They are now conducted with the legitimate participation of ecological researchers and biosafety regulators who are

keen to ensure that environmental risks receive due attention. Moreover, civil society is slowly making its way into this debate, with Greenpeace leading a careful and targeted campaign to disseminate scientific research and inform mainly urban consumers of the risks involved in GM food. China's global economic and political integration has thus set the scene for environmental policy change in an important area.

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