

The GM Cold War: How Developing Countries Can Go from Being Dominos to Being Players

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INTRODUCTION

This article examines the impact of the international order on developing-country choices with regard to the role that genetically modified organisms (GMOs) might play in meeting their food security and agricultural development needs, and in tackling the related problems of hunger, malnutrition, disease, excessive population growth and poverty. The impact of the international order is significant and in many respects counterproductive.

Developing countries will need to increase agricultural production by 50% in the next 25 years in order to meet these needs.¹ GMOs could potentially help meet these needs by enhancing yields and providing a variety of economic and environmental benefits. However, GMOs also pose several important economic as well as environmental risks, which are increased by the lack of developing-country capacity to assess and manage such risks. Both the potential benefits and risks of GMOs are different and greater for developing than for developed countries. Further, because of broadly varying local conditions, GMO policies are likely to differ widely among developing countries, with appropriate decisions often taken on a crop-by-crop, trait-by-trait basis.

Because of these circumstances, developing countries would be ill-advised simply to copy the GMO policies of developed countries and either adopt a wholesale policy of aggressive use of GMOs, as they are urged to do by the USA and the agricultural biotechnology industry, or reject or severely restrict their use, as urged by many European countries and non-government organizations (NGOs). The trade and regulatory GMO conflict between the EU and the USA has only exacerbated the existing differences, with developing countries caught in the cross-fire of this GM Cold War and leaving them with serious legal uncertainty as to

the role of GMOs in their national agricultural policies. The various international organizations involved in development assistance, each of which pursues a different agenda, have not provided a clear signal to developing-country governments with regard to which policies are most beneficial for each of them. These three obstacles, international conflict, legal uncertainty, and fragmented and uncoordinated development assistance, lead to difficulty, or even paralysis, in developing-country decision making regarding GMOs. Changes are needed in current international arrangements to bring the situation of developing countries closer to the ideal of informed and capable decisional independence, and help them become serious players in the global dialogue over agricultural development and GMOs, rather than Cold War pawns or victims.

THE SITUATION AND NEEDS OF DEVELOPING COUNTRIES

FOOD SECURITY, AGRICULTURAL AND ECONOMIC DEVELOPMENT

Developing countries must expand agricultural production by over 50% to meet rising food demand due to population growth, greater affluence and rural economic development. By 2020, the population in developing countries will have grown to 6.15 billion versus 1.36 billion in developed countries.² Although opinions on global food availability differ, there is agreement that a significant number of people are undernourished: the Food and Agriculture Organization (FAO) estimates for 1997–1999 show 815 million undernourished people worldwide.³ This number is likely to increase with

¹ Food and Agriculture Organization, *World Agriculture: Towards 2015/2030* (FAO, 2002), available at <<http://www.fao.org/DOCREP/004/Y3557E/y3557e03.htm#c>>.

² Food and Agriculture Organization, *How Appropriate are Currently Available Biotechnologies in the Crop Sector for Food Production and Agriculture in Developing Countries?* (FAO, 2000), para. 3, available at <<http://www.fao.org/biotech/C1doc.htm>>.

³ Food and Agriculture Organization, *State of Food and Agriculture 2002* (FAO, 2002).

the growth of the world population. While redistribution of the food surpluses currently created by developed countries can help alleviate hunger and malnutrition, this is not a viable long-term solution to developing-country needs.

Despite rising food demand, many developing countries experience low yields due to biotic stress, such as weeds, pests and diseases; and abiotic stress, including heavy metals in soil, extreme drought and extreme humidity.⁴ Also, there is a lack of additional arable land, and some of the marginal land likely to be converted for agricultural use is ecologically valuable. Other significant constraints include the cost of inputs, such as fertilizers and of transportation.⁵ Further, political instability, war and AIDS also have serious adverse impacts on developing-country agriculture.⁶

Other constraints are external. Developed-country agricultural subsidies have led to very low worldwide prices for agricultural products. US agricultural subsidies were worth an estimated US\$18.3 billion in 2003. EU countries spent about US\$50 billion on subsidies in the same year.⁷ This has caused developing countries, most of which are predominantly agricultural, to become net importers of agricultural products and become increasingly dependent on developed-country agriculture.⁸ Eliminating domestic support, market protection and export subsidies by industrialized countries would triple developing countries' net agricultural trade (export earnings minus import earnings) and increase their agricultural sector income by over US\$23 billion.⁹ It would, however, also increase food prices and agricultural intensity in developing countries, adversely affecting consumers and the local environment.

GMOs could potentially make a contribution, along with many other measures, to expanding developing-country agriculture in a sustainable way. These other measures include development of improved non-GM

crop varieties, enhanced soil fertility, integrated pest management (which can be achieved in conjunction with GM crops), improved water resource management, integration of crops and livestock, better roads, credit extension, access to fertilizer, appropriate land reforms, and policies and institutions that support small-holder farmers. The benefits of GMOs are potentially much greater for developing countries than for developed countries, where food insecurity and rural poverty generally are not an issue. But GMOs are far from a silver bullet. At present, GMOs suitable for the needs of developing countries have barely begun development. Further, the economic and environmental risks of GMOs, and the limited ability of developing countries to manage those risks, must be factored into the balance: 'Developing countries may gain especially high rewards from new technologies, but they also face especially severe challenges in managing the risks'.¹⁰

CURRENT STATE OF GM AGRICULTURE: FACTS AND FIGURES

The use of GMOs in agriculture has increased rapidly over the past decade: the global area planted with GM crops has increased from 1.7 million hectares in 1996 to 67.7 million hectares in 2003. However, applications are heavily concentrated in a few countries and crops. In 2003, six countries (the USA, Argentina, Canada, Brazil, China and South Africa) were growing 99% of all GM crops. Well over half of the world's GM acreage is in the USA. China and South Africa both had an increase of 33% in the number of hectares of GM crops in 2003. Other countries with smaller but growing acreages of GM crops are Australia, India, Romania, Uruguay, Mexico, Spain, Germany, the Philippines, Colombia, Honduras and Bulgaria. Spain is the only EU country to grow GM crops in a significant volume. Four GM crops (soybean, maize, cotton and canola) with GM herbicide-tolerant and/or insect-protection traits dominate, with soybean representing 61% of all acreage worldwide. Bt cotton is the fastest expanding GM crop.¹¹ There are only a few examples of GM crops developed specifically to fit the needs of developing countries.¹² However, some of the GM

⁴ Food and Agriculture Organization, *What Should be the Role and Focus of Biotechnology in the Agricultural Research Agendas of Developing Countries?* (FAO, 2002), para. 3, available at <<http://www.fao.org/biotech/C8doc.htm>>; P.G. Pardey and N.M. Beintema, *Slow Magic, Agricultural R&D: A Century After Mendel* (International Plant Genetic Resources Institute, 2001), at 1.

⁵ Food and Agriculture Organization, *Agricultural Biotechnology for Developing Countries – Results of an Electronic Forum* (FAO, 2001), chapter 7.

⁶ M. Sagoff, 'Biotechnology and Agriculture: The Common Wisdom and its Critics', 9:1 *Ind. J. Global Leg. Stud.* (2001), 13.

⁷ J. Sparshott, 'WTO Rejects Farmer Subsidies', *Washington Times* (27 April 2004), available at <<http://www.washingtontimes.com/functions/print.php?StoryID=20040426-111351-2383r>>.

⁸ FAO Committee on Commodity Problems, *Major Developments and Issues in Agricultural Commodity Markets* (FAO, 2003).

⁹ X. Diao *et al.*, *How Much Does it Hurt? The Impact of Agricultural Trade Policies on Developing Countries* (International Plant Genetic Resources Institute, 2003), at 2.

¹⁰ United Nations Development Programme, *Human Development Report 2001: Making New Technologies Work for Human Development* (UNDP, 2001), at 4.

¹¹ C. James, *PREVIEW Global Status of Commercialized Transgenic Crops: 2003* (International Service for the Acquisition of Agri-biotech Applications, 2003); International Service for the Acquisition of Agri-biotech Applications, *Double Digit Growth Continues for Biotech Crops Worldwide*, press release (13 January 2004).

¹² D. Pimentel, 'Overview of the Use of Genetically Modified Organisms and Pesticides in Agriculture', 9:1 *Ind. J. Global Leg. Stud.* (2001), 51, at 63.

crops currently under development, such as iron-fortified rice, are designed for developing-country needs.¹³

Lack of public funding has led agricultural research (non-GMO as well as GMO) to shift from the public to the private sector, which is currently dominated by five large multinationals (Monsanto, Dupont, Syngenta, Bayer and Dow; in 2001 Monsanto products were used on 91% of the total world area devoted to commercial GM crops).¹⁴ The US\$20 billion that developed countries spend annually on agricultural research is evenly split between the public and the private sectors. In contrast, public agricultural research accounts for the overwhelming majority of the US\$12 billion that developing countries spend annually.¹⁵ Private companies in developed countries spend in the order of US\$1–1.5 billion on agricultural research specific to biotechnology research and development. This greatly exceeds the amount devoted to GMO research in developing countries. The Consultative Group on International Agricultural Research (CGIAR) Centres invest only US\$25 million annually in biotechnology in developing countries, yet this constitutes a considerable proportion of the total public investment in agricultural biotechnology in these countries.¹⁶

The national agricultural research capacities of many developing countries, and even more their environmental and health regulatory capacities, are not very well developed. One can distinguish three categories of developing countries. Type I countries have national agricultural research centres (NARCs) with a strong capacity in molecular biology to develop new GM crops for their specific needs, and the ability to export these new varieties. China, Brazil and India are examples of such Type I countries. Type II countries can conduct applied plant-breeding research and apply molecular tools (markers and transformation protocols), but depend on GM tools developed elsewhere. Type III countries have very fragile capacities in plant breeding and virtually no capacity in molecular biology. They largely depend on the introduction and testing of varieties from abroad, especially from the CGIAR system.

Developing countries that are developing and field testing GM crops suitable for local conditions and the crops involved are as shown in table 1.

TABLE 1¹⁷

COUNTRIES WHERE FIELD TRIALS ARE CONDUCTED

Argentina	Costa Rica	Kenya	South Africa
Brazil	Egypt	Mexico	Thailand
China	India	Philippines	

TRANSGENIC CROPS BEING TESTED

Beans	Maize	Potato	Sugar Cane
Cabbage	Melon	Rape	Sweet Potato
Cauliflower	Mustard	Rice	Tobacco
Chilli	Papaya	Soybean	Tomato
Cotton	Peanut	Squash	Wheat
Eucalyptus	Pepper	Strawberry	

With regard to biosafety regulation, Type I countries have a framework in place, but only modest and untried capacity to implement it. In Type II countries, there is, or soon will be, a framework, but implementation capacity is weak. Most Type III countries do not have a regulatory framework for biosafety.¹⁸ Lack of capacity in regulating health risks is similar.

POTENTIAL BENEFITS AND RISKS OF GMOS FOR DEVELOPING COUNTRIES

From the perspective of developing countries, GMOs pose a variety of complex cross-cutting risks and benefits that vary widely depending on the crop and trait in question, local agro-ecological conditions, the structure of the agricultural sector, technical and management capacities, and other circumstances. The character and magnitude of risks and benefits for developing countries are likely to be very different than for developed countries. Also, the assessment of the balance between risks and benefits, and policies for the use of GMOs, will vary among different developing countries, depending on their circumstances and the crops and traits in question. For example, a Type I developing country, with strong GMO capacities and export opportunities, may make quite different decisions than a country with weaker capacities that is also the centre of origin of important wild genetic resources closely related to GM counterparts.

¹³ F. Goto *et al.*, 'Iron Fortification of Rice Seeds by the Soybean Ferritin Gene', 17:3 *Nature Biotechnology* (1999), 282.

¹⁴ Action Group on Erosion, Technology and Concentration, *Ag Biotech Countdown: Vital Statistics and GM Crops* (ETC Group, June 2002), available at <<http://www.etcgroup.org/article.asp?newsid=342>>.

¹⁵ See Pardey and Beintema, n. 4 above, at 10. Figures are for 1995.

¹⁶ D. Byerlee and K. Fischer, 'Accessing Modern Science: Policy and Institutional Options for Agricultural Biotechnology in Developing Countries', 1 *IP Strategy Today* (2001), at 5–6, available at <<http://www.biodevelopments.org/ip/ipst1n.pdf>>.

¹⁷ G.H. Toenniessen *et al.*, 'Advances in Plant Biotechnology and its Adoption in Developing Countries', 6:2 *Current Opinion in Plant Biology* (2003), 191, at 192.

¹⁸ See Byerlee and Fischer, n. 16 above, at 4–5.

Economic Benefits and Risks The use in developed countries of GM commodity crops has in many instances enhanced yields and reduced net input costs (including costs of pesticides and labour), increasing profits, which have been shared between the farmers using the technology and the manufacturers.¹⁹ GM crops engineered to be resistant to insects, disease, parasites, drought and soil depletion promise similar benefits for developing countries. Studies on the use of Bt cotton in a number of developing countries (China, India, Mexico, Argentina and South Africa) show similar economic benefits.²⁰ Small-scale farmers have been successful in using Bt cotton and maize in a number of cases. Since the studies are limited, no conclusions can be drawn from them as to GMOs in general.²¹ Some Type I developing countries, especially China, are investing heavily in GM crop development and see potential economic benefits in exporting GM seeds and know-how to other developing countries. In addition, benefits could accrue to countries believing that GMO optimism will eventually prevail, if such optimism were indeed to prevail. They could then reap potentially significant 'early mover' advantages, while countries that adopt a 'wait and see' attitude would lose out.

On the other hand, GMO technologies pose significant economic risks, including the failure of the technology to deliver the promised benefits, and the loss of export markets due to continued consumer resistance to GM foods and regulatory restrictions. Stringent labelling and traceability requirements, like those recently adopted by the EU, may foreclose export markets for non-GM products because of the difficulties that developing countries may face in avoiding the risk of

GMO contamination of their non-GM crops. If there were to be a broader worldwide move towards GMO pessimism, the 'early mover' countries would lose out.

A further set of risks is posed by dependency on GMO technologies developed by multinational firms and controlled by them through intellectual property rights. In India, for example, farmers using Monsanto's GM seeds pay an extra US\$50–65 per acre as a 'technical fee' over and above the price of seed. Farmers doing business with Monsanto's herbicide-resistant crop seeds must sign a contract stating that they will not buy herbicides or other chemicals from other companies.²² Also, most developing-country farmers grow a variety of crops using traditional knowledge and methods. By switching to GM or other non-traditional crops, these farmers have to change their agricultural practices. They may find it difficult to return to traditional ways and the corresponding traditional knowledge may disappear.

Environmental Benefits and Risks To the extent that GMO technologies increase yields, they may reduce agricultural clearing and thereby lessen habitat loss, and thus the damage to biodiversity.²³ Use of pest-resistant GM crops can decrease pesticide use, with attendant health benefits for agricultural workers²⁴ and environmental benefits for non-target species. GMO technologies may facilitate the use of low-till agricultural methods that may reduce pollution run-off, erosion and release of greenhouse gases stored in the soil, although the potential for such methods in developing countries is largely untested.²⁵

There are also potentially significant environmental risks from the use of GM crops. A GM crop could transfer modified genes to wild relatives and potentially create a 'superweed', or could itself become a weed, potentially threatening biodiversity. The spread of GM traits can also threaten valuable wild precursors of crop plants and invade neighbouring organic and other non-GM crops. In addition, use of pest-resistant GMOs may hasten the development of pest resistance. The need for careful case-by-case assessment and management of such risks is exemplified by field trials in the UK, which found that two of the three GM crops examined had adverse effects on the general ecology in the vicinity, while the effects of the third were

¹⁹ US Department of Agriculture, *Genetically Engineered Crops for Pest Management in US Agriculture*, USDA Agricultural Economics Report 786 (USDA, 2000); J. Bhatia *et al.*, *Background: Genetically-Engineered Bt-Containing Field Corn* (Food Safety Network, 21 July 1999), available at <<http://www.foodsafetynetwork.ca/gmo/bt-survey/bt-background.htm>>.

²⁰ For China, see C.E. Pray *et al.*, 'Five Years of Bt Cotton in China – The Benefits Continue', 31:4 *The Plant Journal* (2002), at 423–430; for India, see M. Qaim and D. Zilberman, 'Yield Effects of Genetically Modified Crops in Developing Countries', 299:5608 *Science* (2003), at 900; for Argentina, see M. Qaim and A. de Janvry, 'Genetically Modified Crops, Corporate Pricing Strategies, and Farmers' Adoption: The Case of Bt Cotton in Argentina', 85:4 *Am. J. Agr. Econ.* (2003), at 814–828; for South Africa, see R. Bennett *et al.*, *The benefits of Bt Cotton to Small-Scale Producers in Developing Countries: The Case of South Africa*, paper presented at the Seventh International Consortium on Agricultural Biotechnology Research International Conference on Public Policy for Agricultural Biotechnology (2003); for Mexico, see G. Traxler *et al.*, 'Transgenic Cotton in Mexico: Economic and Environmental Impacts', in N. Kalaitzandonakes (ed.), *The Economic and Environmental Impacts of Agbiotech: A Global Perspective* (Kluwer-Plenum, 2003).

²¹ Food and Agriculture Organization, *The State of Food and Agriculture 2003–2004; Agricultural Biotechnology – Meeting the Needs of the Poor?* (FAO, 2004), at 49.

²² T. Campbell, *Will Biotechnology Feed the World's Poor?* (Development Studies Centre, Kimmage Manor Dublin, 1998).

²³ J.H. Adler, 'Cartagena Protocol: Biosafe or Bio-sorry?', 12:3 *Georgetown Int'l. Env'tl. Law Review* (2000), 761, at 772.

²⁴ Intergovernmental Forum on Chemical Safety, press release (7 November 2003), available at <http://www.who.int/ifcs/Documents/Forum/ForumIV/Press_release/FIV_closing_pressr_en.pdf>.

²⁵ R. Paarlberg, 'Agrobiotechnology Choices in Developing Countries', 2:1–3, *Int. J. Biotechnology* (2000), at 167–168.

considered beneficial. Non-GM crop refuges, buffer zones and other safeguards can reduce if not eliminate adverse environmental impacts, but governments must ensure that farmers carry out these management practices.²⁶

Consumer Health and Welfare GM crops may enable farmers to grow more food that can be used to feed the growing number of undernourished people. Further, 'second generation' genetic modifications may enhance the nutritional value of foods or otherwise address health or dietary problems, including vitamin deficiencies and allergies.²⁷ On the other hand, the development of new foods, through transgenic transformations, may also create new allergenic risks, particularly where genes from species that have not been used as foods before are inserted into food crops. Such risks may be difficult to detect through current testing methods and manifest themselves only over time. Enhanced toxicity is also a potential risk.²⁸

Labelling Labelling of GM foods can allow consumers to make informed choices as to the food they are eating and may also help to trace the source of any adverse health effects. On the other hand, labelling may be costly and difficult for many developing countries because of the need for testing to ensure that products labelled as non-GMO are indeed non-GMO. Also, labelling may not be feasible where food products are sold in bulk and unpackaged. Furthermore, labelling may not be effective as price is often the overwhelming consideration for many consumers.

DEVELOPING-COUNTRY CAPACITY ISSUES REGARDING DEVELOPMENT AND USE OF GMO CROPS

The extent of the GMO research and regulatory capacity needed in a developing country depends on what the country's choices and needs are with regard to GMOs. A country that has no intention of growing GMOs or of importing GMOs is in a very different situation than a country that seeks to grow, import and use GM products on a wide scale. The latter is likely to have a more urgent need for capacity to fulfil responsibilities with regard to research and regulation of

GMOs. Another choice to be made involves the substantive and procedural stringency and complexity of regulations and their effect on technology development in the country:

[P]olicy makers have to consider the play off between the need to minimize risk and to promote technology development. Strict regulatory frameworks will act to minimize the potential risks associated with GMOs but they may also act as a barrier to investments in GMO research and to the development of potentially useful GM products. If the costs . . . of complying with the regulations are substantial they will obviously act as a disincentive for parties with limited resources . . . On the other hand, relaxed regulations, allowing rapid and easy approval of GMOs, may not effectively protect citizens and the environment from potential risks. Policy makers have therefore to carefully balance these costs and benefits.²⁹

High regulatory costs and burdens will help entrench the large international biotech firms and discourage local, smaller-scale ventures, as well as create barriers to the development of crops suitable for 'niche' developing-country uses. The potential use of GMO regulation for protectionist purposes also cannot be ignored.

As we have seen, developing countries' research and development and regulatory capacities – with respect to non-GM as well as GM crops – vary widely. If a country already has a strong non-GM crop research and development and regulatory capacity, the additional resources needed to develop and regulate GM crops are far less than if a country has to start virtually from scratch. In many countries, such capacities are limited at best. The current focus by the international community on GMOs has simply served to underscore the systemic weaknesses of many countries with respect to crop development, biosafety and food safety regulation.

Ideally, a developing country should have the public sector research and development capacity to develop and apply both non-GM and (if it chooses) GM crops that are suitable for its circumstances and needs. Many developing countries, however, lack the scale and the professional, technical and other resources to achieve such capacity. Developing countries also need the ability to evaluate and adopt or adapt existing private-sector innovations. Partial solutions to these problems include the creation of regional research and development centres that pool resources; reliance on the CGIAR system and other international agricultural research centres (IARCs); multilateral and bilateral assistance programmes to help build developing-country

²⁶ Royal Society of Canada, *Elements of Precaution: Recommendations for the Regulation of Food Biotechnology in Canada* (Royal Society of Canada, 2001).

²⁷ C. Pohl Nielsen and K. Anderson, *Golden Rice and the Looming GMO Trade Debate: Implication for the Poor*, Centre for Economic Policy Research Discussion Paper No 4195 (2003), at 2 and 18.

²⁸ See Royal Society of Canada, n. 26 above, at 46–47.

²⁹ *Regulating GMOs in Developing and Transition Countries?*, FAO Electronic Forum on Biotechnology and Agriculture, Conference 9, Background (April–June 2003), para. 4(f), available at <<http://www.fao.org/biotech/C9doc.htm>>.

capacities; and private–public partnerships. Such partnerships can be mutually advantageous where, for example, the developing-country government provides local knowledge and evaluation infrastructure, and the private sector provides biotechnology tools and know-how.³⁰ The private sector is, for a variety of reasons, beginning to pay greater attention to the interests of developing countries through, for example, arrangements to unblock intellectual property barriers and public–private GMO research and development partnerships.

Environmental, health and consumer protection regulation should include risk assessment, risk management, monitoring and enforcement. Effective regulation will also require government outreach to farmers to assist them in implementing environmentally sound agricultural technologies, including appropriate GMOs as well as more established technologies, such as chemical pesticides. Many developing countries lack the laws, institutions, personnel, and administrative and technical capacities to carry out these functions effectively.³¹ The lack of adequate regulatory capacities increases the environmental health and safety risks posed by GM crops, a factor which must be weighed in the balance in decisions by developing countries whether to use such crops.

Resource limitations may exacerbate conflicts among different developing-country government agencies. Agricultural ministries and government-funded research institutions tend to hold strong pro-GMO views, while ministries with health and biosafety regulatory responsibilities generally hold more cautious views with regard to GMOs. However, in most developing countries, the agriculture ministry and the research institutes have substantially more scientific and technical personnel. Due to the lack of their ‘own’ personnel, the regulatory agencies may become unduly dependent on agricultural agency experts, who generally are GMO optimists and who may end up advising on regulatory decisions that conflict with their own (optimist) view and the interests of the agency for which they work. On the other hand, if regulatory agencies fail to work closely with agricultural ministries and research institutes, they will be seriously handicapped in carrying out their responsibilities in an informed and effective manner. The dual role of governments as both GMO ‘players’ and regulatory ‘referees’ also may create a situation where State or parastatal entities, which develop or use GMOs, enjoy unduly lax or otherwise preferential regulatory treatment relative to the private sector.³²

³⁰ See Byerlee and Fischer, n. 16 above, at 4–5 and 14–15.

³¹ *Ibid.*

³² P. Newell, *Biotechnology and the Politics of Regulation*, Institute of Development Studies Working Paper 146 (IDS, 2002), at 3.

INTERNATIONAL INFLUENCES ON DEVELOPING COUNTRIES' CHOICES REGARDING GMOS

In the highly polarized debate between GMO optimists, exemplified by the USA, and GMO pessimists, exemplified by the EU, many developed countries have not only chosen sides but have tried to induce developing countries to become their allies in the conflict. This GMO Cold War has placed strong pressures on developing countries to choose sides, undermining their abilities to make independent judgements and choices with regard to whether or how GM biotechnologies fit their particular circumstances. International civil society organizations, on the one hand, and the biotechnology industry, on the other, have only made the differences more acute. These conflicts, as exemplified by the pending USA–EU case before the World Trade Organization (WTO) regarding GMOs (see below), have also increased uncertainties under international trade law regarding the extent to which the import of GM products can be regulated. The various international trade regulatory and development assistance organizations, which form a ‘regime complex’ for GMOs,³³ have also become embroiled in the conflict, exacerbating the already existing institutional fragmentation at the international level and further undermining developing countries’ efforts to build and exercise effective independent decisional capacity.

THE EU–USA GMO CONFLICT AND ITS CONSEQUENCES FOR DEVELOPING COUNTRIES

The EU and USA have taken quite different positions on almost every aspect of how to regulate GMOs, which has culminated in the USA (together with Canada and Argentina) filing a complaint against the EU with the Dispute Settlement Body (DSB) of the WTO.³⁴

The EU and USA have different ways of characterizing and regulating GMOs. The USA has not enacted separate environmental and food safety regulatory programmes for GMOs, and often regulates a GM product on the same basis as a non-GM product unless scientific evidence shows that it poses different

³³ See K. Raustiala and D.G. Victor, ‘The Regime Complex for Plant Genetic Resources’, 58:2 *International Organization* (2004), 277.

³⁴ The request to establish a Panel was filed on 7 August 2003 (see documents of 8 August 2003, WT/DS291/23, WT/DS292/17, WT/DS293/17). The Panel was established on 4 March 2004 (see note by the Secretariat of 5 March 2004, WT/DS291/24, WT/DS292/18, WT/DS293/18).

and greater risks. The EU has adopted separate, more stringent regulatory programmes for GM crops and foods, which are presumed not to be as safe as their non-GMO counterparts because they are made through the use of transgenic and other modern biotechnologies. For a period of over 6 years, during which it was adopting more stringent GMO regulations in response to strong public concern over GMOs, the EU has slowed down or halted the approval of many pending applications for the placing on the EU market of certain GMOs. The USA, Canada and Argentina have attacked this *de facto* moratorium before the DSB as being not scientifically justified and unfairly excluding foreign GMO products from European markets. In the USA, there are no mandatory requirements for labelling GM foods or products (or non-GM foods or products). Since 2001, some voluntary labelling of foods as not containing GMOs has been allowed, subject to rules on which words are used on the label in order to prevent what, in the view of the US Food and Drug Administration, would be a misleading implication that GMO foods are inherently unsafe. The EU has recently adopted a Regulation on GM labelling and traceability. Products with GM traces of 0.9% or more must be labelled as containing GMOs.³⁵ The traceability regulations institute a 'farm to fork' documentation system for products consisting of, or containing, GMOs, using the same threshold level that is used for labelling GM products.³⁶ Regulatory requirements for products produced from, but not containing, GMOs are similar.³⁷

Countries like Japan, Switzerland and South Korea have adopted regulatory positions broadly similar to the EU, whereas countries such as Brazil, Canada and South Africa have taken a more pro-GMO position.

The USA and EU and some of its Member States have exerted a variety of inducements, constraints and pressures on developing countries to adopt their respective positions. The EU has imposed stringent regulatory requirements on foods containing or produced from GMOs. A country or firm can export food

products to the EU only if the country or firm is listed by the European Commission as compliant with EU food safety rules.³⁸ The EU GMO regulations, and traceability and labelling requirements, may have the effect of foreclosing the use of all GM crops (even those not exported to the EU), because of the difficulty that developing countries face in ensuring segregation of GM and non-GM products. The USA has also used trade negotiations as a leverage instrument by making acceptance of pro-GMO policies a factor in negotiations over bilateral free trade agreements.³⁹ Further, the USA consistently provides food aid in the form of GM food and last year it enacted the 'United States Leadership Against HIV/AIDS, Tuberculosis and Malaria Act', which ties funding to fight AIDS in developing countries to the acceptance of GM food. The Act embodies a 'sense of the Congress' that this condition is appropriate to overcome 'fears of benign genetic modifications to food' and help feed those infected with HIV/AIDS.⁴⁰

Both the EU and its Member States, and the USA have also used capacity-building assistance in biosafety regulation and agricultural development to push their agendas. Not surprisingly, the USA and EU approaches to capacity building are very different, exemplified by the contrast between USAID, and German and EU assistance projects. One German project, for example, helps African countries develop laws and regulatory structures that ensure that GM organisms do not pose a threat to human beings or the environment,⁴¹ and helps them meet their obligations under the Cartagena Protocol, including identification requirements for exporting living modified organisms (LMOs). The EU's capacity-building efforts help developing countries exporting to the EU to comply with the EU's labelling and traceability regulations. In contrast, USAID's Agricultural Biotechnology Support Project (ABSP) II focuses on the promotion of the infrastructure developing countries need to use biotechnology safely, supporting training and indigenous technology development.

³⁵ Directive 2001/18/EC of 12 March 2001 on the deliberate release into the environment of genetically modified organisms, as modified by Regulation 1830/2003 of the European Parliament and of the Council of 22 September 2003 concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms and amending Directive 2001/18/EC, [2001] OJ L106/1, Article 21(3).

³⁶ Regulation 1830/2003 of 22 September 2003 concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms and amending Directive 2001/18/EC, [2003] OJ L268/24, Article 4(7).

³⁷ *Ibid.*, Article 5.

³⁸ *Facilitating Food and Agriculture Trade: EU Biggest Global Food Importer*, EU Press Release IP/04/627 (11 May 2004).

³⁹ More liberal rules on GMOs are part of the US free trade negotiations with Thailand. See the website available at <<http://www.ftawatch.org/cgi-bin/content/updatee/show.pl?0005>>.

⁴⁰ United States Leadership Against HIV/AIDS, Tuberculosis, and Malaria Act, Public Law 108-25, 108th Congress, 1st Session (27 May 2003).

⁴¹ German Assistance Programme, *Development of Frame Conditions for the Utilization of Biotechnology and Genetic Engineering*, available at <http://www.gtz.de/biotech/index_e.htm>; E. Masood, 'Germany Backs Rival Analysis of GM Safety in Africa', *SciDevNet* (7 October 2003), available at <<http://www.scidev.net/news/index.cfm?fuseaction=readnews&itemid=1046&language=1>>.

INTERNATIONAL TRADE, ENVIRONMENTAL AND HEALTH RULES FOR GMOS – UNCERTAINTY, RISKS AND OPPORTUNITIES FOR DECENTRALIZED EXPERIMENTATION?

In dealing with GMOs, developing countries face a legal question fraught with political significance: to what extent can they bar or restrict imports of GMOs from other countries in order to prevent or minimize economic, social, environmental and health risks related to GMOs, while being in compliance with international trade law? Thus far, the three most important international institutions that might resolve this question, the WTO, the Codex Alimentarius and the Biosafety Protocol to the Convention on Biological Diversity,⁴² have failed to provide any answers. Their abilities to do so have been greatly impaired by the fallout of the GMO Cold War, as well as by the differences in their roles and orientations.

Whatever international rules regarding GMO trade and regulation eventually emerge will have a double edge for developing countries. Rules that allow wide latitude for countries to restrict GM product imports will allow developing countries greater control, but will simultaneously restrict possible GM export markets, since their trading partners may well do the same. Rules that restrict countries' abilities to limit imports have the opposite consequences. The calculus would be further complicated if, for example, different levels of restriction were allowed for GM crops and GM foods.

The regulatory conditions under which GM imports can be restricted also have important implications for developing countries. For example, if a country must justify restrictions on GM imports on the basis of an elaborate risk assessment, many developing countries might have to allow the import of GM products because they lack the ability to conduct such an assessment. On the other hand, their own potential GM exports to developed countries might be barred by developed countries that are able to conduct such assessments. Then again, if a detailed international set of rules emerged, this could relieve developing countries of much of the obligation to come up with their own regulatory frameworks. Yet, given the great variety of circumstances among developing countries and the rapidly evolving state of agricultural biotechnology,

detailed international rules may be inappropriate. Thus, the character and stringency of the international conditions imposed on developing countries' regulation of GMOs, and on international trade in GMOs, have important implications for the trade/regulatory position of developing countries and their capacity-building needs.

WTO The primary orientation of the WTO is, of course, free trade, although it must accord due respect to the environmental, health and other regulatory policies of its members. The relevant WTO rules, embodied in the General Agreement on Tariffs and Trade (GATT), the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) and the Agreement on Technical Barriers to Trade (TBT), are far from clear on the conditions under which countries may restrict trade in GMOs and GM products; indeed, there is disagreement as to which of these agreements applies to GMOs.⁴³ The legislative capacity of the WTO for achieving positive harmonization is severely constrained by the need for member consensus on new agreements and the organization's lack of authority to adopt administrative rules to clarify the provisions of WTO agreements. The DSB is the WTO's only institution that can resolve legal gaps and ambiguities through the negative harmonization technique of case-by-case reviews of domestic regulations by looking at their consistency with existing WTO agreements.⁴⁴ In recognition of these institutional limitations, the SPS and TBT Agreements encourage the development of international regulatory standards by other bodies, such as the Codex Alimentarius and the International Plant Protection Convention,⁴⁵ by according these standards presumptive trade validity. However, the GMO Cold War has severely impeded these other bodies in adopting such international standards.

The GMO trade dispute brought by the USA, Canada and Argentina, against the EU before the DSB, although narrowly focused on the EU's *de facto* moratorium on the processing of applications for the placing of GMOs on the EU market, draws attention to a number of broader issues. Does the application of GMO regulation have to be judged against the SPS Agreement if one of its objectives falls within its scope,

⁴² Cartagena Protocol on Biosafety to the Convention on Biological Diversity (Montreal, 29 January 2000), available at <<http://www.biodiv.org/doc/legal/cartagena-protocol-en.pdf>>.

⁴³ General Agreement on Tariffs and Trade (Marrakesh, 15 March 1994), available at <http://www.wto.org/english/docs_e/legal_e/06-gatt.pdf>; Agreement on the Application of Sanitary and Phytosanitary Measures (Marrakesh, 15 March 1994), available at <http://www.wto.org/english/docs_e/legal_e/15-sps.pdf>; Agreement on Technical Barriers to Trade (Marrakesh, 15 March 1994), available at <http://www.wto.org/english/docs_e/legal_e/17-tbt.pdf>.

⁴⁴ For discussion of positive and negative harmonization techniques in the context of multi-jurisdictional free trade systems, see R.B. Stewart, 'International Trade and Environment: Lessons from the Federal Experience', 49:4 *Wash & Lee L. Rev.* (1992), 1329.

⁴⁵ See SPS Agreement, n. 43 above, Article 3(4); and TBT Agreement, n. 43 above, Article 2(6).

even if some of the other objectives may fall outside its scope, and under the TBT Agreement or GATT? How does risk have to be shown to validate a regulatory restriction? What is the role of the precautionary principle in the GMO regulatory context? Does the Biosafety Protocol, which embraces a precautionary approach, and general international regulatory practice, which treats GMOs as posing novel and distinct risks, contain relevant principles of international law that inform the WTO agreements?

Of the WTO agreements possibly applicable to GMO regulations, the SPS Agreement is the most detailed. It is likely that, in as far as countries take measures limiting trade in GMOs to protect human, animal or plant life or health, the SPS Agreement will apply. For these reasons, the following focuses on this Agreement. The SPS Agreement allows a country to justify SPS measures based on the precautionary principle, but only as long as these measures are provisional.⁴⁶ However, in the *Beef Hormones Case*⁴⁷ the WTO Appellate Body stated, without further specification, that use of the principle is not exhausted with the possibility of this provisional application.

A further issue of great importance for developing countries is whether they should enjoy greater latitude to restrict GMOs than developed countries by reason of their more limited regulatory capacities, greater ecological or socio-economic vulnerabilities and weaker capacities for resilience. The SPS Agreement allows for three specific economic considerations to be taken into account when deciding on a level of protection: loss of production or sales resulting from a risk materializing; the cost of control or eradication; and the relative cost effectiveness of other approaches.⁴⁸ Conceivably, these provisions might be interpreted to accord greater regulatory latitude to developing countries. In the *Beef Hormones Case*, the Appellate Body found that a risk assessment can include 'risks arising from failure to comply with good veterinary practice' and 'risks arising from difficulties of control, inspection and enforcement of the requirements of good veterinary practice'.⁴⁹ This may allow considerable room in a risk assessment for risks arising from weaknesses in regulatory, compliance and enforcement capacities that are especially relevant to developing countries.

⁴⁶ SPS Agreement, n. 43 above, Article 5(7).

⁴⁷ WTO 18 August 1997, *EC Measures concerning Meat and Meat Products (Hormones)*, WT/DS26/R/USA, and WTO AB 16 January 1998, *EC Measures concerning Meat and Meat Products (Hormones)*, WT/DS26/AB/R and WT/DS48/AB/R (AB-1997-4).

⁴⁸ SPS Agreement, n. 43 above Article 5(3).

⁴⁹ The Appellate Body found, however, that there was not enough evidence (in the form of scientific reports) to substantiate the EU claim that potential abuse and difficulties of control lead to such risks, and concluded that therefore the EU had not carried out the required risk assessment on this aspect. See Appellate Body Report, n. 47 above, para. 207.

Given the sharp conflicts among important WTO constituencies, the complexity of the scientific and legal issues presented, and the evolving character of GMOs and their regulation, it seems quite unlikely that the DSB will use the USA–EU case to lay down any specific rules of general applicability, and it is plausible that it will either find a way to avoid deciding the case on the merits or to decide it on very narrow grounds, perpetuating existing legal uncertainties for developed and developing countries alike.

Both the SPS Agreement and the TBT Agreement have special provisions that address the capacity limitations of developing countries, including more lenient time-frames for compliance and trade regulatory capacity-building assistance by developed-country members.⁵⁰

Codex Alimentarius By providing 'safe harbour' treatment of international regulatory standards, the SPS and TBT Agreements elevated the Codex from a relatively obscure club, where developed-country government officials and experts meet to discuss food regulations, to a highly visible forum with wide developing-country membership. But instead of solving the controversies that existed in a WTO context, the result of the 'safe harbour' treatment has been simply to move them to Codex, without getting much closer to solutions. Codex has been able to agree on only a few aspects of GMO regulation: principles on risk analysis of GM food and two sets of guidelines on risk assessment of GM plants and GM micro-organisms. Labelling guidelines and recommendations are still a subject of discussion and there is no agreement whatsoever on the issue of GMO risk management.

Codex capacity-building activities are limited. It encourages parties to assist developing countries in building relevant technical and regulatory capacity. The FAO and WHO have established a US\$40 million Codex trust fund to help developing countries participate in Codex formulation of food standards and the implementation of those standards.

Biosafety Protocol The Biosafety Protocol to the Convention on Biological Diversity provides special rules and procedures for international trade in GMOs. The Protocol has its base in concerns of developing countries, supported by the EU, that because of capacity limitations, they will not be able to control effectively which GM products cross their borders or regulate adequately their use.⁵¹ The Protocol is generally considered a counterweight to the WTO and its more developed-country-oriented position.

⁵⁰ SPS Agreement, n. 43 above, Articles 9 and 10; and TBT Agreement, n. 43 above, Articles 11 and 12.

⁵¹ S. Zarilli, *International Trade in Genetically Modified Organisms and Multilateral Negotiations: A New Dilemma for Developing Countries* (United Nations Conference on Trade and Development, 2000).

The Protocol distinguishes two categories of GMOs (calling them living modified organisms): those that are intentionally introduced into the environment (like seeds and crop plants) and those that are used for food, feed or processing (LMO-FFPs), which are not meant to be introduced into the environment.⁵² For the first category of LMOs, the Protocol introduces the Advance Informed Agreement (AIA) procedure.⁵³ Summarized, AIA means that an exporter must provide an importing country with a risk assessment of the LMOs the exporter wishes to ship and that the exporter has to have the explicit consent of the importing country. The procedure for LMO-FFPs places the burden of regulatory initiative on importing countries.⁵⁴ In both procedures, an importing country's decision whether to consent may be based on a precautionary approach without any requirement that its use should be provisional or subject to regular review. Socio-economic concerns, such as effects on local culture, may be taken into account in an importing country's decision when these concerns arise from the impact of LMOs on the conservation and sustainable use of biodiversity.

Both the interpretation and application of the precautionary principle under the Protocol are broader than what is allowed under the SPS Agreement. The same goes for socio-economic considerations. The extent of overlap between the Protocol and the SPS Agreement,⁵⁵ and the question of which of the two should prevail in the event of conflict, are sharply disputed.⁵⁶ These issues may play some role in the pending WTO GMO case, although the USA, Canada and Argentina are not parties to the Protocol. Claims that the Protocol 'trumps' the WTO agreements have intensified the disincentive for these and other GMO exporting countries to ratify the Protocol, undermining its utility as a forum where both GMO optimists and GMO pessimists address and possibly make some progress on GMO trade-regulatory issues.

As regards capacity building, a biosafety information clearinghouse has been established pursuant to the Protocol.⁵⁷ The clearinghouse is largely internet based and provides developing countries with access to a vast array of scientific, legal, environmental and technical information. In addition, the Protocol actively

promotes international cooperation to assist developing countries in building human resources and institutions needed for biosafety.⁵⁸ Its provision that exporters can be asked to prepare and pay for risk assessments of 'their' LMOs also addresses developing importing-country capacity limitations.⁵⁹

INTERNATIONAL PROGRAMMES TO BUILD DEVELOPING-COUNTRY CAPACITY IN GMO RESEARCH, DEVELOPMENT AND REGULATION

A great variety of international organizations are involved in GMO issues through programmes to assist developing countries in agricultural development, including development and use of GMOs, and in building biosafety regulatory systems. These assistance efforts are fragmented and tend to reflect distinct positions in the global GMO debate. The resulting patchwork of assistance efforts, driven by the global conflicts over GMOs, undermines the goal of enabling developing countries to make and carry out informed, independent choices about the role of GMOs in their agricultural development programmes and to implement effectively those choices. Conflict and fragmentation are accentuated by the pressures on developing countries exerted by multinational biotech companies and GMO-pessimist NGOs.

We have already noted the capacity-building activities of the EU and USA, and those encouraged by the WTO, Codex and the Biosafety Protocol. The other major international organizations involved in such efforts include the following.

CGIAR The Consultative Group on International Agricultural Research, which includes most IARCs, aims at preserving and improving genetic resources for developing-country agriculture. CGIAR research centres located in developing countries develop new crop varieties suited for developing-country conditions and help build agricultural research and development capacity by training local scientists through collaborative projects and other activities. Although CGIAR activities have been targeted primarily on non-GMO agriculture, there has recently been more substantial investment in GM crop varieties and related capacity-building efforts. Collectively, the CGIAR centres invest around US\$25 million annually in biotechnology, which represents 7.7% of the total CGIAR budget.⁶⁰ CGIAR takes a 'GMO optimist' position. It acknowledges the ecological risk posed by GM crops for developing countries

⁵² Pharmaceuticals and products derived from LMOs fall outside the scope of the Protocol.

⁵³ See Biosafety Protocol, n. 42 above, Articles 8–10.

⁵⁴ *Ibid.*, Article 11.

⁵⁵ There is disagreement between the EU and USA whether the Biosafety Protocol also involves food safety issues. See T.P. Stewart and D.S. Johanson, 'A Nexus of Trade and the Environment: The Relationship between the Cartagena Protocol on Biosafety and the SPS Agreement of the World Trade Organization', 14:1 *Colo. J. Int'l Envtl. L. & Pol'y* (2003), 1, at 9.

⁵⁶ The Preamble of the Protocol seems to allow for both interpretations.

⁵⁷ See Biosafety Protocol, n. 42 above, Article 20.

⁵⁸ *Ibid.*, Article 22.

⁵⁹ *Ibid.*, Article 15.

⁶⁰ See Byerlee and Fischer, n. 16 above, at 5.

who lack the technical and regulatory capacities effectively to manage those risks. But it believes that the appropriate answer is not to abandon GMOs, but instead to provide focused capacity building so that developing countries can make and execute their own decisions on the use of GMOs.⁶¹ Its efforts are focused on GMO research and development rather than biosafety and health regulation.

GEF and UNEP The Global Environment Facility (GEF) and the United Nations Environment Programme (UNEP) are key supporters of the Biosafety Protocol and its approach to GMO regulation. In November 2000, the GEF Council approved the GEF Initial Strategy for Biosafety to assist developing countries in establishing national biosafety frameworks to implement their Protocol obligations and promote information sharing and collaboration among countries in biosafety regulation. As part of this strategy, UNEP is currently carrying out a programme to assist 120 countries to adopt legal frameworks for environmental and health regulation aimed specifically at GMOs, spending on average US\$1 million per country.⁶² UNEP and GEF do not provide support for GMO research and development capacity building.

FAO The Food and Agriculture Organization supports agricultural development in developing countries through three types of activities: promoting international standard-setting bodies (such as Codex); providing technical assistance and training with a focus on strengthening regulatory and management capacities for agriculture, environmental and food safety; and disseminating information (through, for example, BioDeC).⁶³ FAO's position tends towards GMO optimism. FAO's most recent 'Statement on Food and Agriculture' concludes that agricultural biotechnology can benefit the poor, if it is appropriate, accessible and affordable for poor country farmers.⁶⁴ Funding for public-sector GMO research that focuses on poor farmers should receive increased funding, but not at the expense of other agricultural research. Governments should also provide incentives for

appropriate private-sector research and public-private partnerships. Regulatory procedures should be strengthened and rationalized to ensure that the environment and public health are protected, and that the process is transparent, predictable and science based. The international community should make capacity building for both agricultural research and regulation a priority.

WHO The capacity-building activities of the World Health Organization are geared towards food safety in general. They include encouraging donor support for food safety as a priority in public health policies in developing countries, developing regional food safety strategies, maintaining a network of WHO collaborating centres engaged in capacity building, and providing technical assistance and educational tools for food safety initiatives. WHO has recently taken a more active role on GMOs, stating that public health could benefit enormously from biotechnology but that the potential risks need to be examined and addressed in an holistic way, considering not only safety but also food security, social and ethical aspects, access, and capacity building, in order to make a true improvement to public health.⁶⁵

The World Bank In the 1970s, with the help of the FAO and UNEP, the World Bank created CGIAR. It was only in 1999 that the bank itself formed an Ag-Biotechnology Task Force and, in 2002, its Rural Development Strategy expressed a commitment to 'helping countries assess, explore, and safely use new technologies'.⁶⁶ This was the bank's first explicit statement on biotechnology. A 2004 presentation shows that of a total of US\$2.3 billion in World Bank loans for agricultural research, US\$50 million is spent on biotechnology.⁶⁷ The bank finances capacity-building projects in developing countries that range from building biotechnology research capacity and promoting public-private partnerships, to consumer and farmer information, and development of regulatory frameworks. The bank is also an implementing agency for GEF-funded biosafety projects in India and Colombia within the context of the Biosafety Protocol.⁶⁸ The bank's position could be categorized as mildly GMO optimistic, although none of its statements is very outspoken.

⁶¹ See International Plant Genetic Resources Institute, *Public Awareness: Genetic Modification* (IPGRI, 2001), available at <http://www.ipgri.cgiar.org/Institute/fact_genmod.htm>.

⁶² United Nations Environment Programme, *Project Executive Summary*, GEF Council Work Programme Submission (December 2003), available at <http://www.gefweb.org/Documents/Council_Documents/GEF_C22/Biosafety_-_Global_-_Project_Document.pdf>. UNEP is also carrying out demonstration programmes in six countries to establish more fully developed biosafety regulatory programmes.

⁶³ FAO-BioDeC is a database meant to gather, store, organize and disseminate updated baseline information on the state-of-the-art of crop biotechnology products and techniques that are in use, or in the pipeline, in developing countries. See the FAO's website at <http://www.fao.org/biotech/inventory_admin/dep/default.asp>.

⁶⁴ See FAO, n. 21 above, at 104.

⁶⁵ See World Health Organization, *Food Safety: Capacity Building* (WHO, 2003), available at <<http://www.who.int/foodsafety/capacity/en/>>; World Health Organization, *Food Safety: Twenty Questions on Genetically Modified Foods* (WHO, 2004), available at <<http://www.who.int/foodsafety/publications/biotech/20questions/en/>>.

⁶⁶ World Bank, *Reaching the Rural Poor: A Renewed Strategy for Rural Development* (World Bank, 2002), at 15.

⁶⁷ *World Bank Presentation to the Second Conference on Biotechnology for Asian Development* (7–8 April 2004), available at <http://www.ris.org.in/SecCon/pehu_paul.pdf>; World Bank, *Reaching the Rural Poor* (World Bank, 2003).

⁶⁸ *Reaching the Rural Poor*, *ibid.*

Other international organizations Other international organizations involved in GMO issues and capacity building include the United Nations Development Programme (UNDP), which took a firm GMO-optimist position in its 2001 *Human Development Report*,⁶⁹ was widely criticized for this position by many NGOs, then retreated and never announced a new policy position. UNDP has some involvement in capacity-development activities within the context of the Biosafety Protocol.

The United Nations Conference on Trade and Development (UNCTAD) has made biotechnology a 'discussion topic'. Its focus with respect to GMOs is on needs assessment and subsequent capacity building in fields such as science and technology education and research.

The Organization for Economic Cooperation and Development (OECD) has been involved in issues of biotechnology from the very beginning. Since most of its members are on different sides in the GMO conflict, it focuses on finding points of agreement on smaller issues at play within the debate as building blocks for further agreement.

The Commission on Science and Technology for Development (CTSD) is a subsidiary body of the UN Economic and Social Council. Recently it convened panels on legal and regulatory issues, capacity building, and public awareness and participation in science policy making in biotechnology. The panel reports provide a good overview of the issues at stake in the GMO debate.⁷⁰

NGOs and Industry NGOs that are opposed or take a precautionary approach to GMOs, including Greenpeace, Friends of the Earth, Consumer International and Food First, have devoted extensive efforts to influencing decision making in international fora such as the WTO, Codex Alimentarius and the Biosafety Protocol. Many grassroots organizations in developing countries are active on GMO issues at the local level. Many of them are linked through the Third World Network, addressing GMO issues from a developing country and North-South perspective. NGOs

also increasingly provide developing countries with targeted assistance in preparing their positions for international conferences and meetings. The successes achieved by developing countries in the WTO Cancun trade negotiations are widely perceived as being, in part, the result of such efforts, which are being extended to GMO issues.

The Biotechnology Industry Organization (BIO) is the most prominent representative of the biotech industry internationally and is active in various trade regulatory fora, including Codex and the Biosafety Protocol. It is consulted on the implementation of the UNEP/GEF biosafety project and has an international programme to help individual biotechnology companies find partners and investors in other countries.

Individual biotech firms are also active in the international GMO debate and in promoting GMO products in individual developing countries through joint venture, lobbying and other activities. Monsanto, for example, carries out demonstration plots and farmer trials in developing countries to show the value of 'technology packages' (including GM seeds, crop-protection products and fertilizer); provides micro-loans to developing-country farmers to use Monsanto products; and has joint GMO research and development ventures with developing-country scientists.⁷¹

THE FAILURE OF THE INTERNATIONAL ORDER TO MEET THE DEVELOPING-COUNTRY NEED FOR SOUND AND EFFECTIVE DECISION MAKING WITH REGARD TO GMOS

It cannot be assumed, *a priori*, that developing countries are the most appropriate entities to choose the GMO policies that will best serve their citizens. Many governments of the poorer developing countries are weak, sometimes undemocratic, and vulnerable to external pressures and inducements by the rich and powerful, who, admittedly, are not always examples of 'good government' either. The GMO Cold War exacerbates these vulnerabilities. But there are no better candidates available. In their dealings with developing countries, developed countries seek to promote their own interests in the GMO debate, rather than the distinct and widely varying interests of developing countries. The international trade regulatory and

⁶⁹ UNDP, n. 10 above, at 3-4.

⁷⁰ Commission on Science and Technology for Development, Report of Panel on Legal and Regulatory Issues in Biotechnology (E/CN.16/2001/Misc. 2, 26 April 2001), available at <http://www.unctad.org/en/docs/ecn16_01m2.en.pdf>; Commission on Science and Technology for Development, Report of Panel on Capacity Building in Biotechnology (E/CN.16/2001/Misc. 1 and Corr. 1, 1 April 2001), available at <http://www.unctad.org/en/docs/ecn16_01m1&c1.en.pdf>; Commission on Science and Technology for Development, Report of Panel on Public Awareness and Participation in Science Policymaking in Biotechnology (E/CN.16/2001/Misc. 3, 2 April 2001), available at <http://www.unctad.org/en/docs/ecn16_01m3.en.pdf>.

⁷¹ Monsanto, *Growing Partnerships for Food and Health, Developing Country Initiatives in Agricultural Product and Technology Cooperation* (Monsanto, 2002), available at <http://www.monsanto.com/monsanto/content/our_pledge/techcoop.pdf>.

development assistance organizations have their own institutional missions and are caught up, in various ways, in the developed-country GMO conflicts. Each has only a limited, partial perspective on the complex and widely varying economic, environmental and social factors that determine what GMO policies will best serve the citizens of different developing countries. Accordingly, developing-country governments should be the primary decision makers regarding GMO policies for their countries, based on their local needs and circumstances, and the international order should respect and facilitate this role. The international order, however, has largely failed to take this responsibility.

When assessing the influence of the international order on developing countries and GMO policies, three main trends emerge: conflict, legal uncertainty and fragmentation. The result of these trends is that the ability of developing countries to make and implement effectively informed choices about the role of GMOs in their agricultural sectors is undermined rather than promoted.

Developing countries have been caught in the cross-fire of the GMO Cold War. Both GMO proponents and opponents among the developed countries have sought to use trade and aid sticks and carrots to win developing countries to their side. Notwithstanding these pressures, a few of the strongest developing countries, including China, Brazil and South Africa, have been able to chart their own, more or less independent course. But many other developing countries, including most of those in Sub-Saharan Africa with the most serious food security needs, are in a far weaker position. Caught between warring economic superpowers, many developing countries have sought to avoid taking any firm decisions one way or another on the role of GMOs. While it is conceivable that some developing countries, emulating the strategy of the non-aligned States during the post-World War II Cold War, might benefit substantially by playing off the EU, USA and other donors, so far this appears not to have been the case.

International GMO conflicts have also generated legal uncertainty by preventing the WTO, Codex and the Biosafety Protocol regimes from establishing clear GMO trade regulatory rules. This uncertainty, which is likely to persist for some time, does not have to be an altogether bad thing for developing countries. It may allow them scope to experiment with different GMO development and regulatory policies, to learn from their own and others' experiences, and may enable them, subsequently, to make well-founded decisions as to the use of GMOs. It also avoids premature closure, in the context of a rapidly evolving technology, on trade rules that prove unsuitable but difficult to change. On the other hand, legal uncertainty also leaves them vulnerable to claims, and accompanying

pressures, from developed-country GMO champions and opponents as to what international law requires or permits them to do. It also makes it difficult for developing-country governments to assess the future export markets for GM or non-GM products and the resulting economic implications of a decision on whether to use GMOs. Uncertainties regarding the role of the precautionary principle and the SPS risk-assessment requirements in relation to the circumstances and capacities of developing countries create additional complexities. The Biosafety Protocol was intended to resolve many of these problems, but appears instead to have compounded them. The resulting legal indeterminacy is a probable contributor to the paralysis of decision making in many developing countries with regard to GMO issues.

International development assistance activities are fragmented and fail to meet developing-country needs for an integrated and balanced approach to building capacity in agricultural research and development, as well as to building health and biosafety regulatory frameworks. The assistance efforts of the developed countries, especially the EU and USA, reflect their GMO Cold War positions. The efforts of international organizations reflect their institutional missions, and are also affected by the conflict. Organizations such as CGIAR support GMO research and development by funding developing-country research institutes and agriculture ministries. Organizations such as UNEP and GEF push an agenda focusing on the risks of GMOs, working with environment ministries to develop biosafety regulations. As a result of this fragmentation, different ministries and other government bodies tend to become clients of different donor countries or organizations, increasing the 'disconnect' between them at the domestic level, and making it more difficult for developing-country governments to make sound and effective decisions on GMO issues. This 'disconnect' between different national government agencies has even led to situations where a country's delegation to meetings in the context of agricultural development has taken a position quite different from the position another delegation of the same country took in another, environment-oriented context.⁷²

Also, little attention has been given to the need for technical and management capacity to support effective biosafety regulation. Regulators need access to experts who can make a balanced and informed assessment of all the risks and benefits of various GM products, as they may arise, in the specific context of a given country. They must also have the ability to monitor how GM crops are being used in the field, and

⁷² Oral communication of 29 June 2004 by Programme Officer, Secretariat Convention on Biological Diversity.

adequate management and enforcement capacities to ensure that the use is proper and safe. What is needed to remedy this disconnect is an integrated, coordinated and tailored approach that pools resources or coordinates donor programmes for intensive training and capacity development. This should involve all relevant governmental actors and focus on the barriers to effective GMO decision making that are unique to each individual country.

ADDRESSING THE DEVELOPING-COUNTRY GMO DILEMMA: POTENTIAL SOLUTIONS

The GMO Cold War, and the resulting uncertainty and insecurity, hit developing countries hardest, drawing them into a conflict between polar positions, neither of which is suitable, or was ever meant to be suitable, for developing countries. As Paarlberg observes:

the highly precautionary European approach would cost them too much in terms of loss of options to boost farm productivity, and the industry-driven US approach could – in their circumstances – put equity or biosafety at risk.⁷³

It is therefore important that developing countries are able to take their own positions with regard to GMOs, which reflect the weighing of various economic, environmental, health and social risks and benefits of GMOs in general, and of different GM crops and traits in particular, in a country-specific context.

The legal uncertainty regarding GMO trade rules will likely persist so long as there are sharp conflicts among developed countries over GMOs. The development of a 'second generation' of GM foods, which bring benefits to consumers, gradual regulatory approval by the EU of additional GM products, the accumulation of information about the benefits and risks of current and new GM products, or a dramatic GMO environmental or public health event may promote or prevent a degree of convergence in transatlantic attitudes. In all events, it will most likely not be the WTO DSB that solves the controversy. Further, GMO conflicts will likely continue to prevent any significant degree of harmonization of trade rules through new WTO agreements, adoption of Codex standards for GMO risk management, or ratification of the Biosafety Protocol by the USA. As discussed above, the lack of agreement provides scope for flexibility and experimentation, but it also provides legal uncertainty, which may weigh especially heavily on developing countries.

Since the GMO conflict is not likely to be solved soon, the question for the immediate future is whether a détente can be achieved in the GMO Cold War that would also provide for a neutrality zone for developing countries. Elements for such a détente could include the following:

- scaling down on the use, by the USA, EU and other developed countries, of trade restrictions and inducements designed to administer leverage on developing country decisions on GMOs;
- shifting development assistance for new crops and biosafety and food regulation from being bilateral and fragmented to multilateral, integrated and coordinated approaches;
- making an existing international forum, such as the FAO, the focal point for the promotion of a balanced, holistic approach to developing-country interests and needs in agricultural development and the role of the different means of meeting those needs;
- expanding opportunities for developing-country agriculture, whether GMO or non-GMO, by removing unjustified developed-country market barriers and export subsidies to domestic producers.

A détente could create an opportunity for the development of principles to guide developing-country decisions on GMOs and their regulation, which would take appropriate account of their circumstances and needs, including limited risk-assessment and risk-management capacities. Such principles would not aspire to be legally binding but could provide a set of widely shared expectations in the near to medium term, while experience with GMOs and, thus, knowledge as to the magnitude of risks and benefits in specific situations accumulates. One possibility for a forum to develop and adopt these principles could be an organization such as the FAO. Another could be to create a new, ad hoc, informal institutional arrangement for this purpose. These and other options invite serious exploration. It is unlikely that the actors on different sides of the GMO debate, such as the EU and USA, will readily agree on their own to the creation of a neutral space for developing countries to make their own judgments and choices about GMOs, although they might, overall, prefer a partial truce to unremitting conflict. The push for such a space will have to come from developing countries themselves.

As to the international assistance efforts, a push is needed as well. The current situation, in which each donor gives isolated assistance to one domestic institution and/or only one aspect of the wide range of relevant issues, often reflecting a predetermined position with respect to GMO policy choices, aggravates conflict and promotes deadlock in GMO decision making at the level of developing-country governments. It will not be easy to overcome these problems

⁷³ See Paarlberg, n. 25 above, at 164–165.

by making the current, highly pluralistic system of assistance programmes more consistent and more integrated. This approach could be advanced if one international organization, for example the FAO, were to take a coordinating role to ensure greater integration and coordination of such capacity-building efforts. An integrated approach could be tested in a few pilot countries.

The impetus for such changes will have to come from one or more powerful blocks of developing countries with an active interest in agricultural development, trade and the subject of GMOs. The stronger developing countries, such as Brazil, China, India and South Africa, might form the nucleus of such a group. A successful example of the leverage that forming a bloc can have are the WTO negotiations in Cancun in 2003: the Group of 22, comprised of developing countries led by Brazil, China, India and others, refused to compromise and walked away from the negotiating table when developed countries (mainly the EU and USA) would not agree on the 'Singapore Issues' (investment, competition policy, government procurement and trade facilitation) and agricultural subsidies. This initiative, proven successful, could be expanded to include GMO issues. There are, of course, potentially significant differences in the interests and policy positions of the leading developing countries currently engaged with GMOs, and the situations and interests of the other developing countries also vary widely. Thus, it remains to be seen whether effective developing-country solidarity can be built with regard to GMO issues, including further steps to remove barriers to developing-country research and development created by the intellectual property rights asserted by northern firms and research universities. Linking GMO issues to demands for much greater support by donors for developing-country agricultural research and development, and environmental and health regulation generally, could enhance the chances for success.

While the ideal situation may be GMO self-determination by each developing country, in reality many developing countries will have difficulty being self-sufficient with regard to decision making on GMO and other agricultural technologies. Many developing countries are too small and/or too poor to support the required scale of agricultural research and development and regulatory infrastructure, including scientific and technical personnel and facilities, to support the development, management and regulation of GM crops that fit their needs. It is unrealistic to envision an effective, coordinated system of GMO research, development and regulation in a country with little agricultural research and regulation to speak of. A potentially promising response to these problems is the use of regional approaches. The countries in a region might, for example, pool scientific, technical and regulatory resources to support both agricultural research and

development, and biosafety regulation in regional institutions. Laws, regulatory programmes and techniques for outreach, monitoring and effective management might be developed collaboratively, with regional institutions acting as a catalyst. Such an approach could potentially provide for economies of scale, while also fostering research and development, and the development of regulatory and management programmes, that are responsive to local conditions. Regional approaches could also better deal with the fact that seeds can readily move from one country to another, as exemplified by the spread of GM soybean seeds from Argentina to Brazil. Developing countries in the region with greater resources and experience could take a leadership role in such regional efforts. Fledgling regional efforts to address GMO issues are already underway. This approach, however, requires a commitment by international donors and private firms, as well as the countries in the region.

CONCLUSION

The debate over GMOs must be seen in the wider context of developing-country needs for the sustainable development of their agricultural sectors. Developing-country agriculture faces sharply rising needs for increased production juxtaposed with a multitude of internal and external constraints. GMOs can potentially be part of an array of options to address these constraints; these options have to be evaluated in the context of relevant environmental, economic and social objectives and local circumstances. GMOs may bring great benefits to developing countries but also great risks. These risks and benefits can differ significantly depending on factors such as the country's situation, the GM crop involved and whether there is careful consideration as to the use of the crop. Assessing these risks and benefits, and making the most advantageous choices, poses significant challenges for developing-country governments.

Instead of helping developing countries in taking careful, well-balanced decisions as to whether or not to use GMOs in agriculture and, if so, which GM crops to use and how to use them, the international order has embroiled them in developed-country conflicts over GMOs. The conflict has pushed developing countries in inconsistent directions, spawned legal uncertainty and accentuated the fragmentation in international development-assistance activities.

The welfare of developing countries is likely to be best served if they are given the independence and the means to make their own choices regarding agricultural development, based on their own circumstances and assessments, and to decide whether these choices involve the use of GMOs or not. The legal uncertainties regarding GMO trade regulatory rules will not be

resolved soon, but steps can be taken to begin developing principles that recognize and respect the distinct situations and interests of developing countries. Where international financial and other assistance is offered with regard to GMOs, this assistance should aim for balance and integration. This will likely require a leadership role for an international organization taking an holistic and even-handed approach to GMO issues. Regional approaches can help to address the capacity limitations that many developing countries will inevitably face. Leadership on global and regional GMO issues, by more advanced developing countries that have begun to exert political muscle in the broader context of global agricultural trade, will be essential to move this agenda forward. The combination of these measures can help developing countries to make those choices that are beneficial for their agricultural sectors and their populations. Developing countries

need not remain largely passive bystanders or victims in the GMO Cold War. They can become players pursuing their own interests and achieving their own goals.

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