FORUM ON ROLE OF GENETICALLY MODIFIED ORGANISMS IN THE FUTURE OF FOOD AND AGRICULTURE

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Introduction To The Forum On The Role Of GMOs In The Future Of Food And Agriculture

Food is a subject about which there will always be a great deal of controversy. For one thing, many people care about what they eat and are increasingly concerned about additional ingredients or tampering. Interest in the specific source of food and how it was grown has increased in recent years, especially in the more developed part of the world. For another, the elimination of hunger is probably the greatest social goal, and food modification (and fortification) has been a critical part of easing hunger for the whole of human history. Today there is a much smaller proportion of hungry people on the planet than ever before thanks to technologies that have resulted in the development of hybrid crop through crop breeding, more efficient farming techniques, and the use of fertilizers, herbicides, and pesticides to reduce pest loads and increase yields.

The development of genetically engineered (GE) crops, which are a form of Genetically Modified Organisms (GMOs), certainly fits within this paradox. These technologies hold a promise of making crops more resistant to pests and more productive, increasing effective yields several times over. They could also reduce the need for pesticides and herbicides, potentially eliminating the need for many chemicals in the food system. They might also improve the nutritional value of staple foods. At the same time, there is a concern that GMOs represent a disturbing trend as "Frankenfoods" that may unleash a host of unintended consequences. A discussion of GMOs is a fundamentally geographical issue as it considers the interaction of humans with the physical environment, and one in which geographers and nongeographers have engaged.

It is for this reason that this makes a fantastic forum topic, the second one the *Geographical Review* has offered. The purpose of the forum is to delve into complex, timely, and controversial topics, and offer an opportunity to represent diverse views on such topics. Forum essays are intended to stimulate and

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provoke discussions and debates on some of the most important issues for geographers. In this case, we have an issue that has spurred many different opinions and to that end, we have invited five different experts to write brief essays elaborating their points of view.

Our essays cover differing grounds and separate perspectives. Pam Ronald explains that genetic modification of crops has been taking place over the span of human history. She describes how today's innovations in genetic engineering have enabled crops to become evermore resistant to insects, tolerant to herbicides, and more nutritious. This ultimately increases both the quantity and quality of food, and creates greater food security. Antoinette WinklerPrins acknowledges the legitimate concerns over GMOs, but argues that there is a role for these innovations, as they are needed. GE crops should not be categorically dismissed, but belong in a "tool chest" of agricultural innovations, and may in fact allow for more sustainable agriculture. Bill Moseley distinguishes between food availability and food access. He maintains that one of the key problems with GMOs is that, like the Green Revolution before, some GMOs require expensive inputs and that this may decrease food access for poor farming households, even if the new technologies increase crop yields for the wealthiest farmers. Lindsay Naylor delves into the power dimensions of GMOs, pointing to a need to consider who controls this system, as there is considerable corporate control in the development of GE crops. She argues that the key problem with GMO production is that it only adds to an agro-industrial food system and exacerbate imbalances in the allocations of agricultural resources, which is a concern for food justice. Glenn Stone questions whether the different sides of the GMO debate can truly be thought of as honest brokers. There is considerable confusion and misinformation when it comes to GMOs and that scientists, who might be relied on to provide a more dispassionate analysis, are overly influenced by who controls the technology, the reward structure of research universities, and growing polarization in the GMO debate.

This complexity and the nuances that follow from the development of GMOs have often been simplified into sound bites to fit within a political position. To be sure, the growth of GMOs has spurred vigorous discussion in the scholarly and lay press, and tremendous public passion on all sides of the issue. Since GMOs are also a quintessentially geographical topic, involving the people-environment interface as well as a differential expression of their acceptance across the globe—for example, many European countries, and some of their former colonies rejecting them, while the United States and some other countries being very open to them—we feel that this forum is an excellent opportunity to provide some key insights into why people can disagree about the ultimate value and role of GMOs in modern agriculture.