

COMMENTARY

TECHNOLOGY DEVELOPMENT

The tragedy of the commoners: biotechnology and its publics

Ambuj Sagar, Arthur Daemmrich and Mona Ashiya

In pluralistic societies, innovations offering new ways to promote independence or individuality are generally rapidly embraced, whereas those that appear to centralize power and authority are either outright attacked, or accepted only after contentious debates. Biotechnology, however, has repeatedly broken this mold, offering the potential for remarkably individualized products while also appearing to concentrate capabilities and power in the hands of a small number of global players. For example, biotechnology's promise to provide health care specific to individual needs goes hand in hand with giving corporations access to detailed genetic information. Likewise, its potential to fine-tune food production to local needs coincides with concentrating the capabilities to do so in a small number of institutions. Understandably, such scenarios have met with both support and opposition. The most recent, and perhaps the most contentious of the resulting controversies, has been the highly visible and ongoing debate on genetically modified (GM) agricultural products. Many observers seem to be surprised by the sudden rise of this issue, and its origin is often ascribed to a lack of public trust in regulatory institutions.

In one sense, the emergence of the GM issue should not be seen as surprising: it is only one of numerous debates over the applications of biotechnology. Scientists, politicians, and the public have also expressed concern about aspects of cloning, xenotransplantation, genetic testing, and gene prospecting,

to name a few other prominent examples. We suggest that a major factor in the emergence of these controversies has been neglect of the needs, interests, and concerns of the primary stakeholders—the “commoners”—in the

biotechnology arena. The sustainable development of biotechnology will require a renewed focus on stakeholders and their needs. This, in turn, demands a clearer understanding of public concerns as well as attention to issues of institutional structure and representation in decision-making processes. The framework presented in this paper suggests some steps in this direction. While many of the points raised in the following analysis are based on examples from agricultural biotechnology, our approach also applies to other areas where ongoing development hinges on proper process in the construction of new forms of governance.

The complexities of controversy

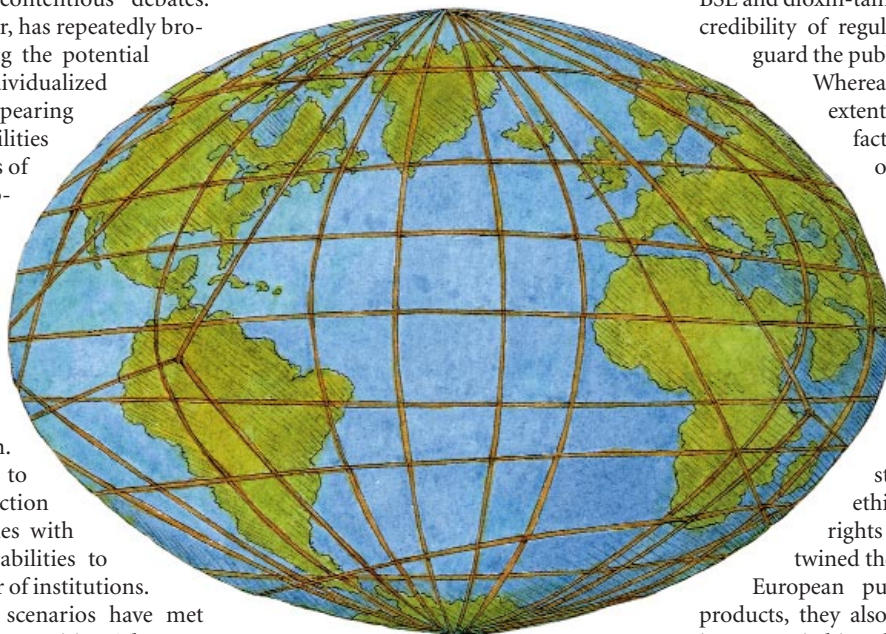
Observers of recent developments in the agricultural biotechnology arena often claim that different degrees of trust in regulatory institutions have shaped the lay public's response to the products of this new technology. Whereas protests have targeted GM foods in Europe, Americans have been comparatively quiet and accepting of such new foods. Some analysts have claimed that this difference emerges from greater regulatory transparency and an

ability to modulate agency decisions (often through the courts) in the United States in contrast to the closed-door elite decision-making procedures employed in Europe. They further suggest that experiences with BSE and dioxin-tainted foods have eroded the credibility of regulators in Europe to safeguard the public interest.

Whereas the above is true to some extent, a broader analysis of the factors governing debates over GM products shows limitations of reducing the controversy solely to degrees of trust in environmental and health safety agencies. A more textured account indicates that the public is also concerned with issues such as globalization and stratification of power, ethics, equity, and individual rights and choice. Such intertwined themes underlie not just the European public disquiet over GM products, they also cut across a number of issue areas in biotechnology (see Figure 1 for a representative list). Put another way, concerns of “commoners” focus not just on the narrow aspects of applications of individual technologies, but also on the broader institutional and political context in which they are introduced. As the sociologist Dorothy Nelkin has noted, “controversies over science and technology are struggles over meaning and morality, over the distribution of resources, and over the locus of power and control¹.” Lay individuals, unhindered by disciplinary boundaries, often display a remarkable sensitivity to issues that policy experts fail to address. As a result, risks that are reduced to narrow variables and deemed amenable to traditional “scientific/technical” analyses by experts are not resolved easily once they become public controversies. In the current policy discourse, attention is paid mostly to specific issues such as GM products, genetic testing, or gene prospecting as they become contentious. There is little systematic analysis of underlying currents that lead to controversies.

Concerns of the commoners

Public concerns must be understood as factors that shape the very discourse—the style



Ambuj Sagar (ambuj_sagar@harvard.edu) and Arthur Daemmrich (arthur_daemmrich@harvard.edu) are in the Science, Technology, and Public Policy Program, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University in Cambridge, MA. Mona Ashiya (mona_ashiya@dfci.harvard.edu) is at the Dana-Farber Cancer Institute in Boston, MA.

and content of interactions—surrounding biotechnology around the globe. They determine the structure and boundaries of disputes and are key considerations for conflict resolution. Here we discuss two particularly important cross-cutting concerns to illustrate how they are germane to debates in biotechnology.

Risk and uncertainty. Recent public protests against GM foods are indicative of a divide between expert and lay perceptions of risk and uncertainty. Scholars of risk analysis have long noted that risk estimates vary significantly between experts and the public². Public risk perception is influenced as much by social relations and feelings of power and powerlessness as by objective knowledge about the likelihood of large-scale accidents or individual harm. Furthermore, there is an increasing sense that the shift from an industrial era to the information age has produced a “risk society,” characterized by self-inflicted dangers, increasing interdependence of human decisions, worldwide implications even of seemingly local events, and controversies that undermine the basis for calculating risk and insurance³. In such a society, regulatory institutions, corporations, and even scientists who base decisions regarding field trials or widespread marketing of GM foods on risk/benefit calculations fail to grasp the deeper ethical and social bases that shape public opinion.

Consequently, even when government officials in Europe, Asia, and Latin America respond to public concerns by instituting additional testing and regulatory requirements on biotechnology, they fail to account for the broader unquantifiable concerns of the “commoners.” Attention has, instead, focused on environmental and human health risks alone. For example, this past June, the European Union’s environment ministers adopted a decision imposing a *de facto* moratorium on new marketing approvals for GM organisms. Furthermore, ministers from Denmark, France, Greece, Italy, and Luxembourg independently insisted that they would block new applications to market GM seeds, plants, or foodstuffs until a new regulatory regime is put in place⁴. These announcements came two days after the Japanese Ministry of Agriculture, Forestry and Fisheries (MAFF) stated it would tighten safety regulations on GM crops in the wake of a Cornell University study showing that pollen from insect-resistant *Bt* (*Bacillus thuringiensis*) maize is potentially toxic to monarch butterfly larvae. MAFF will suspend approval of *Bt* crops in Japan until revised safety protocols are developed for GM crops. In a third example, the Brazilian state of Rio Grande do Sul has declared itself a “genetically modified free zone.” This followed a Brazilian federal court decision in

June barring the planting or distribution of GM soybeans in the country.

These events all illustrate the degree to which broad uncertainty is being examined in a traditional risk framework, making it amenable to testing and regulation under existing structures. But, in this process, moral and cultural unease as well as concerns about the unknown (or perhaps unknowable) consequences of some aspects of biotechnology are swept aside. Given this divide, the lay public is likely to increasingly demand “socially precautionary” principles

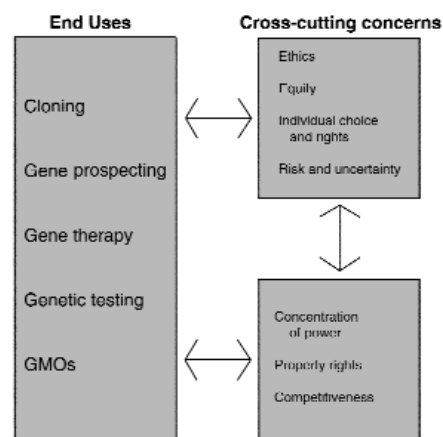


Figure 1. Concerns of “commoners” focus not just on the narrow aspects of applications of individual technologies, but also on the broader institutional and political context in which they are introduced.

in regulatory oversight. Decision makers should consider how they have represented the public and its concerns when making complex and often incommensurable calculations of economic benefits against ecological and health risks. All too often, key concerns are lost in the processes through which institutions model and represent stakeholders.

Globalization and its discontents. Current modes of exchanging knowledge, services, and consumer goods are rapidly reshaping the social, political, and economic structures of the world. This process of globalization is widening troubling gaps in access to knowledge and financial resources. In turn, these disparities are fueling criticism of new technologies—even within highly developed countries—based on several key features.

First among the issues to be considered are increasing income/resource disparities. The developing world, home to 80% of the world’s population, generates less than 20% of the global gross domestic product, and there are few signs this divide will shrink in the foreseeable future. In 1997, the richest fifth of the world had an income 74 times that of the poorest fifth, more than double the inequality in 1960⁵.

Second, patterns of industrial ownership are changing. Recent mergers have led to the formation of transnational corporations of unprecedented size and wealth. Worldwide mergers in 1998 were worth \$2.4 trillion and reflected a 50% increase over 1997, which itself was a record year⁵. In the biotechnology sector alone, mergers and acquisitions increased from \$9.3 billion to \$172.4 billion in the decade between 1988 and 1998⁴.

Third, there have been major shifts in the nature of financial flows to developing countries. Whereas public development aid dropped from \$56.9 billion in 1990 to \$47.9 billion in 1998, private flows to developing countries increased from \$43.9 billion to \$227.1 billion in the same period⁶. As a percentage of their combined gross national product, contributions from members of the OECD’s Development Assistance Committee have fallen to their lowest level ever, from 0.33% in 1992 to 0.22% in 1997⁷.

Fourth, disparities are increasing in knowledge generation and utilization. North America, Europe, Japan, and newly industrialized countries accounted for 84.5% of the \$470 billion spent on research and development worldwide in 1994 (the latest year for which data are available)⁸. A similar trend is also evident when considering patent filings. Industrialized countries hold 97% of patents worldwide, and more than 80% of patents granted in developing countries belong to individuals or corporations based in industrialized countries⁴.

These disparities pose critical challenges to governments, particularly those of developing countries. In today’s world where knowledge is considered the single “most important factor in determining the standard of living⁹,” the biotechnology pillar of the knowledge economy is often seen as increasing global divisions. For example, future applications of biotechnology may increasingly depend on genetic diversity. A substantial portion of the global genetic resources reside in the South, while the capabilities to commercially utilize them lie in the North. This raises serious concerns about appropriate benefit sharing. Furthermore, as developing countries become more dependent on private sources for capital, choices available to promote and expand research in biotechnology are constrained. Notably, even pragmatic analysts from the North are concerned that future innovations will be limited under an emerging industry structure where the top five biotechnology firms control more than 95% of gene transfer patents⁴.

More broadly, critical reactions to emerging applications of biotechnology are based on control of research agendas, access to useful technologies, influence in decision-making forums, and debates over who will benefit from new technologies. Biotechnology is

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expected to give further impetus to the current process of globalization. Given the aforementioned concerns, it often serves as lightning rod for expressing disquiet about the apparent future of the world. While such public concerns may not be easy to face or assuage, downplaying their relevance will only exacerbate the current polarization.

Who speaks for the stakeholders?

Given the substantial social and economic consequences of biotechnology, a broad swath of society has become a stakeholder in discussions on its applications. At the same time, a variety of institutions are involved in these debates. Figure 2 presents some major categories of relevant institutions and stakeholders.

Importantly, while some stakeholders may be able to participate directly in discussions about the adoption of new technologies, most are unable to do so. For this reason, channels to incorporate stakeholder views into debates take on critical importance. To some extent, such perspectives are inserted into discussions and decision making about biotechnology through participating institutions. However, these have to balance a number of interests and agendas, including those of the institutions themselves, of their internal constituents, and of stakeholders they explicitly represent. For example, the views of a biotechnology firm may be shaped by the personal ambitions of the company officers and scientists, the obligation to ensure returns to shareholders, and the need to satisfy customers. Similarly, nongovernmental organization (NGO) positions reflect the passions of activists, the concerns of their donors, and their public support base¹⁰. Such balancing acts may often give short shrift to the already marginalized voices of external stakeholders and raise serious issues about the authenticity of representation, even though many institutions derive their legitimacy from “representing” stakeholders.

Even the most well-meaning organizations can view the interests of beneficiaries in a simplistic manner, or distort them unwittingly. Moreover, institutions may indulge strategically in a “virtual representation” of their stakeholders that offers both moral authority in defense of their own views and reduced costs of actual representation. The recent GM foods debate illustrates a situation where supporters and opponents of this technology have invoked their concern for the disenfranchised to defend their positions. Biotechnology firms, some government agencies, and other organizations cite the potential contribution of biotechnology to resolve world hunger, while NGOs highlight the potential adverse impacts of biotechnology on farmers and

ecosystems in developing countries (see, for example, refs 11–13).

Thus, some hard questions should be asked of any institution that participates in a given debate: Whose interests does it purport to represent and whose interests does it actually represent through its actions? How does it model and understand stakeholders’ interests? Is the institution’s present mode of representation consistent with past actions and stances in other policy arenas? More broadly, are the interests of all stakeholders represented equally? Finally, how is the institution accountable to its stakeholders? Such questions apply equally to industry, advocacy groups and academia. Requiring institu-

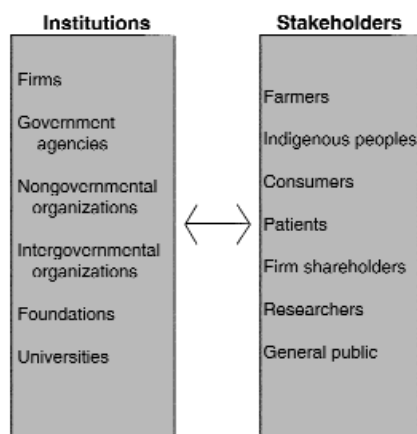


Figure 2. Major categories of institutions and stakeholders in biotechnology.

tions to provide answers should compel them to be more honest in their representation of stakeholders’ views.

The issue of accountable representation is central to the biotechnology debate. Ultimately, stakeholders’ interests should be given priority, not only for reasons of justice and fairness, but also because sustainable development of biotechnology will require widespread acceptance by the public of its goods and services. Accountable representation necessitates the integration of stakeholder interests into activities including basic and applied science, policy research, advocacy, and policy formulation and implementation.

Conclusion

The issue of trust certainly will continue to be of major significance for biotechnology in the coming years. But this issue is far more complex than generally portrayed, and not easily reduced to “trust in regulatory institutions.” In our view, public trust—the ultimate arbiter of any technology in the marketplace—is based on perceptions of how a technology will influence the lives of various individuals, of how specific firms as well as the industry as a whole have repre-

sented public interests, and of the social, political, and economic landscape that serves as a backdrop for technological change. Thus, it becomes fundamentally important to pay attention to the “commoners” in the biotechnology debate, as well as to their needs and concerns.

Biotechnology’s future ultimately relies on governing institutions listening and responding to the public, rather than discounting key stakeholders as irrational, scientifically illiterate, or technophobic. Institutions such as the biotechnology industry and government agencies stand to gain greater acceptance only by soliciting public input, implementing policies in a transparent and democratically representative fashion, and demonstrating their responsiveness to concerns raised by scientific experts, other organizations, and citizens and consumers around the world. New interactive approaches must be developed in order to bring stakeholders together and allow them to articulate cross-cutting concerns. Industry, given its stake in the debate, will need to go furthest by not merely recognizing “the public” as stakeholders, but by granting them some of the rights normally afforded citizens of modern states: open access to information, the opportunity to comment on proposed actions, the right to receive reasoned explanations, and above all, recognition that dissent can be bridged only through compromise.

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