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**Panel on Public Awareness and Participation in  
Science Policy-making in Biotechnology**

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Summary report prepared by the UNCTAD secretariat<sup>\*</sup>

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<sup>\*</sup> This paper summarizes the panel's discussions; it does not necessarily reflect the views of the UNCTAD secretariat.

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### **Executive Summary**

1. The primary objective of this third CSTD panel on biotechnology was to create a process for building public awareness about the opportunities and challenges presented by biotechnology development and for promoting dialogue amongst scientists, the biotechnology industry, policy makers and the public. It has become clear that, at a time when science is opening up so many new possibilities for addressing human welfare problems, there is, perhaps paradoxically, a growing distrust of science on the part of the public. The public backlash against genetically modified products in some western European countries has strongly reinforced the need for a more transparent process for informing and involving non-experts in biotechnological development.

2. Despite this backlash, the “Eurobarometer” survey found in 2000 that public perceptions of biotechnology in Europe are, on the whole, positive. However, the survey also found that the increased understanding of biotechnology has not necessarily resulted in greater public acceptance. This was attributed in part to the polarization of the public debate on genetically-modified crops. Moreover, the panel agreed that there is a pressing need for more balanced information to reach the public. As many national Governments are mistrusted to provide such balanced information. In this regard, therefore, scientists and journalists were identified as the two key groups best suited to disseminate this information. The panel agreed that scientists must become more active in reporting details of their work to the public, both directly and through the mass media. It was recognized that journalists and editors are primarily concerned with providing ‘good stories’ to the public, rather than supplying accurate and balanced information on science and technology issues. Nevertheless, the quality of science reporting could be enhanced through training in science communication and through closer links between journalists and the scientific community.

3. Many of the problems of public perception and public awareness in Europe are also relevant also in developing countries and countries with economies in transition. In many developing countries, there are further significant difficulties in building public awareness. These include diverse levels of education and literacy across the country as a whole and the inability for large parts of the population to access the mass media. From reports presented to the panel, it was evident that public awareness about and interest in, biotechnology is low in many developing countries. Perhaps partly because of this, raising awareness and involving the public in policy debate has not been a priority of national Governments. It was recognized that whilst public understanding of biotechnology is very low, the public will not have an effective voice in science policy decision-making, even where mechanisms to ensure public participation are introduced. Furthermore, as long as a low level of public interest persists, it is difficult to justify expenditure of resources on participatory decision-making mechanisms such as public consensus conferences. However, it was agreed that in as much as building public awareness is a prerequisite for successful public involvement in policy debate, mechanisms such as public opinion surveys could be introduced in order for governments to gauge the tide of public perceptions of biotechnology. In addition, action should be taken to ensure that the ‘public interest’ is adequately represented in policy debate and formulation.

4. National Governments, international organizations and NGOs can play key roles in raising public awareness and promoting public participation in science policy decision-making, both by providing balanced information and by establishing and supporting public forums for open and transparent dialogue on the potential opportunities and challenges related to biotechnology.

## INTRODUCTION

5. At the first two CSTD panels on biotechnology this year, the need for greater public awareness and participation in decision-making with regard to technology emerged as a significant issue for developing countries. The public backlash against genetically modified products in some western European countries has strongly reinforced the need for a more transparent process for informing and involving non-experts in biotechnological development. The primary objective of this third CSTD panel on biotechnology was, therefore, to create a process for building public awareness of opportunities and challenges presented by biotechnology development and promoting dialogue amongst scientists, the biotechnology industry, policy makers and the public.

6. A wide range of mechanisms have been instituted across different countries, mostly industrialized countries, in support of such a process. Some of these mechanisms may be more appropriate or replicable, than others, outside their original socio-political context. Consideration of all existing options for building public awareness and/or involving the public in science policy-making, will eventually lead to the question of responsibility and – inevitably – the provision of resources for these activities. Therefore, discussions would have to take into consideration the costs of the various mechanisms and options, and the extent to which, in a developing country context, they could be justified.

### 1. BACKGROUND

7. The meeting was opened by Professor Abdelkrim Zbidi, Secretary of State for Scientific Research and Technology, Tunisia. He pointed out that biotechnology encompasses a wide range of technologies, many of which have their origins in ancient human civilizations. The new 'biotechnological revolution', using very recent techniques, is best illustrated by advances made in the diagnosis of human, animal and plant diseases, although improvements in more traditional areas of biotechnology such as industrial fermentation processes are also of key importance. He identified modern biotechnology, together with other new generic technologies, including information technology, as playing a major role in the global economy. Because of this and the rapidity with which new techniques and applications are emerging from biotechnology, the hopes and fears of people across the world have been provoked. He expressed the hope that the panel meeting would foster real partnerships between countries to improve public awareness of the benefits and challenges of emerging biotechnologies.

8. In his opening remarks, the Chairperson of the CSTD, Professor S. Morávek, noted that it is something of a paradox that, at a time when science is opening up so many new possibilities for addressing problems of human welfare, there is also a growing public mistrust of science. Public trust in science and particularly biotechnology, cannot be achieved without:

- Open communication about the potential or perceived risks associated with the technology;
- Dialogue between the public, the policy makers, and the scientific community;
- Listening to and taking account of public concerns and recommendations.

9. Professor Morávek stated that, for the public to participate effectively, it must be presented with balanced biotechnology information. In industrialized countries, scientific literacy is considered to be very low, despite universal access to higher education, the mass media and other sources of information about science. For developing countries, then, the task of building greater scientific awareness will not be an easy one. It will depend on the ability and willingness of many different groups of people – particularly, policy makers, the scientific community and the public themselves – to improve information flows and engage in meaningful dialogue. It will also depend on choosing the most appropriate and cost-effective mechanisms to promote public awareness and to facilitate public participation in decision-making.

10. Dr. P. Teta, coordinator of the panel, pointed out that the two previous CSTD panels on capacity building and regulation had highlighted the need for the general public to gain a better understanding of the potential benefits and risks associated with gene technology. The task of this panel was to address ways and means to put the agreed principle into practice. This required the panel to consider some fundamentally complex questions:

- First, what are the objectives of raising public awareness?
- Who is the public?
- What level of awareness is needed to fulfil the stated objectives?
- In respect of public participation in policy-making, what does ‘participation’ mean in practice?
- What channels of communication can be used to transmit information and what mechanisms are appropriate for involving the public in decision-making?
- What resources would be needed to implement such mechanisms, who will provide those resources and what justification would they have for this?

11. The issue of public awareness raises more fundamental questions about the relationships between science and society. To aid discussion, the meeting considered background information from the European public response to biotechnology and the efforts and barriers to address problems arising from this response. These were then compared with a background study from a developing country, to pinpoint similarities and differences that might affect the choice and potential success of different mechanisms.

## 1.1 Biotechnology and the public in Europe

12. A resource person<sup>1</sup> reported that surveys in Europe show that the public are on the whole quite optimistic about biotechnology, though attitudes are less positive than they were. Overall, Europeans see new applications of biotechnology in the medical field – new therapeutic drugs, vaccines and diagnostics – as useful, but are more sceptical about food made from transgenic crops. There are obvious reasons for this concern, given that the potential long-term impacts of transgenic crops and food products on human health and the environment are uncertain. These concerns, in themselves, will be complex to address. Questions are being raised about “substantial equivalence” as a principle of food analysis<sup>2</sup>, and the application of the “precautionary principle”<sup>3</sup> in risk assessment of genetically modified organisms (GMOs).

13. However, there are also less obvious, cultural, political and socio-economic reasons for public fears and scientific risk assessment will be limited in its capacity to allay these concerns. First, the underlying science of gene technology is extremely complicated and difficult for the public to understand. The credibility of Governments to ensure food safety has been damaged in some European countries – particularly the United Kingdom – following the outbreak of BSE in British cattle and the incidence of its human equivalent (CJD) in people. Public trust in Governments to place their concerns over the interests of business is low. In respect of biotechnology, this problem is compounded by the apparent dominance of the United States-based transnational corporations over global transgenic seed production. Public perception of biotechnology is that the benefits of genetically-modified (GM) crops are largely confined to seed companies and large scale farmers in North America and in some countries of South America. There are concerns about the loss of traditional small scale farming and traditionally produced food: the consumer perceives food that is produced from genetically modified crops as less natural and wholesome.

14. This side of the gene technology debate has been brought into the public arena very forcibly by some interest groups – notably, environmental NGOs, organic farmers, and some consumer groups. In some European countries, these groups have strong political influence. However, it can be argued that these groups, together with public bodies mandated to address environmental concerns, themselves stand to gain from stimulating public fear about the new technologies. The GM debate has raised the profile and influence of these organizations and in many cases, this has brought in financial contributions essential to their existence.

15. In this polarized debate, the potential benefits of transgenic crops – especially to developing countries – are not clear to the public. The resource person reported that a recent

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<sup>1</sup> Professor Richard Braun, Chairman of the European Federation of Biotechnology’s Task Group on Public Perceptions.

<sup>2</sup> In essence, this principle holds that a genetically-modified food product that is indistinguishable (in terms of scientific testing, or chemical composition) from an equivalent conventional food product is deemed safe, irrespective of the processes involved in its production, or the production of its ingredients.

<sup>3</sup> This principle holds that an absence, or lack, of scientific evidence of risk does not, in itself, justify claims that a product or process is safe.

joint study by the National Academies of Science from India, China, Mexico, the United Kingdom, Brazil and the United States concluded that the world needs transgenic crops, but that socio-economic conditions need to be such that crop production addresses the needs of the poorest people and countries. This was also the conclusion of a recent report by the Nuffield Council on Bioethics in the United Kingdom. However, it has to be fully recognized that technology alone will not solve the world food problem – many other social, economic and political problems in food production, including equity of distribution, have to also be addressed.

16. The biotechnology industry can improve its own credibility by developing products with more obvious consumer benefits, particularly those with relevance to nutrition-poor populations, such as the new variety of rice with increased Vitamin A content. In the meantime, tackling the problem of consumer confidence in Europe and encouraging realistic public debate about the potential risks and benefits of transgenic crops, will depend on an open and comprehensible dialogue. The debate must be realistic, and the public must be made aware that there is no such thing as zero-risk technology. The factual knowledge held by scientists is the logical starting point for ethical debate. The way forward will of necessity include greater willingness on the part of the scientists themselves to understand public concerns and to communicate with the public.

## **1.2 Science communication in Europe**

17. A resource person<sup>4</sup> pointed out that, in the broad relationship between science and society, effective links need to be built up between various stakeholder groups, including industry, policy makers and the scientific community. One problem dealing with the public's perception of science is that science is not clearly recognized as supplying high returns to the public which supports it. The development of research agendas which aim to resolve contentious issues that are of concern to the public, including the potential risks to the environment from biotechnology, are important in this respect. Also, ties between science and society depends on better communication and this communication is most often effected through the mass media. The resource person distinguished three aspects of this communication process: the obligation of science to inform; the duty of the public to become informed; and the appropriate role of journalists relative to science and the public.

18. It is essential that journalists and scientists are willing, and able, to communicate with each other effectively. There have been concerns from scientists that journalists do not understand the basics of scientific methods, including the peer review process, the incremental nature of scientific enquiry and the interpretation of risk. On the other hand, journalists feel that scientists often fail to explain their work effectively and in lay terms.<sup>5</sup> It has been suggested that all journalism schools should introduce a science writing course as part of their curricula and also that training workshops be held outside the academic system for editors and

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<sup>4</sup> Professor Vladimir Bales, Dean of the Faculty of Chemical Technology, Slovak University of Technology, Bratislava.

<sup>5</sup> Citing Hartz & Chappell.

professional journalists. To complement this, training in communication should be provided for scientists, perhaps as part of their university degrees.

19. The public are interested in science stories, provided that they are well-written. However, improved ability on the part of scientists and journalists to communicate with each other will be insufficient to ensure better coverage of science issues in the mass media. This is because the media, particularly editors, are first and foremost looking for “good stories” rather than balanced scientific information. This can lead to a breakdown of trust between scientists and journalists, where neither fully understands nor respects the professional culture of the other. Journalists, by choosing one science story in preference to another, influence what scientific issues are brought to the public. In their presentation of the story, they may also influence public attitudes towards the science or technology involved. It is therefore important that journalists play a responsible role in their mediation between the scientific community and the public and help the public to distinguish fact from speculation.

20. Whilst bridging the gap between scientists and the media is important, direct interaction between scientists and the public is critical and mechanisms which facilitate this communication should be encouraged. This may require that existing constraints, such as demands on scientists’ time, institutional secrecy or business interests and disapproval of peers, are addressed. Employers should encourage their scientists to take time away from research to educate the public about the nature and importance of their work, including through public speaking engagements, visits to schools and through school visits to scientific laboratories.

### **1.3 Raising public awareness about biotechnology in a developing country**

21. The background information thus far was given from a European perspective, and the options for actions in a developing country context may be more difficult, especially given greater budgetary constraints. A resource person<sup>6</sup> reported on attempts to raise public awareness about biotechnology and involve the public in decision-making, in Ghana. He pointed out that Ghana presents a difficult socio-economic context for biotechnology development, with Gross Domestic Product (GDP) per capita of only \$420 and adult literacy estimated at only 65 per cent. Most research and development activities are funded from the public purse and science and technology activities are already severely constrained by more pressing priority needs on government funding, such as health, education and social welfare (which together account for nearly 30 per cent of all government expenditures). However, gene technology research is on-going in Ghana, though no commercial releases have yet been made from the public research system. More pressingly, external anti-biotechnology groups are now lobbying the Government of Ghana to oppose development of the technology in the country and it is felt that there is a need to sensitize the public to some of the issues being raised in this way.

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<sup>6</sup> Mr. George Essegbey, Senior Scientific Officer, Science and Technology Policy Research Institute, Accra, Ghana.

22. In a recent project to undertake a national technology assessment of biotechnology development in Ghana, it was recognized that stakeholders in this development include not only those who might impact on technological progress, but also all those who might be impacted upon by the technology. This includes the general public. The project, therefore, attempted to address, in part, issues of improving public awareness, and involving the public in the decision-making process. It became clear at a very early stage that these would be difficult objectives, especially given the short-term schedule (18 months) and relatively low budget for the project as a whole. In the first major participatory process, a Stakeholders' Priority Setting Conference, it was clear that the Ghanaian public, as a very diverse whole, could not be truly represented. Rather, journalists from the mass media were invited to participate on behalf of the public interest. Of those invited, only one chose to attend and this first conference was a learning process for him – he did not sufficiently understand the scientific or policy issues to play a major role in the proceedings. This suggests that awareness needs to be built up over greater periods of time in order for the public to have an effective representative voice in decision-making.

23. It was also clear at the start of the project that public awareness about biotechnology was very low in Ghana and in fact, there is little real public interest as yet. The mass media still only has limited outreach capacity in the country. The combined circulation of the top three newspapers is less than 300,000 (in a population of 18 million) and there are only 231 radios and 16 television sets per 1000 head of population. Despite this and the problems of illiteracy and language<sup>7</sup>, the mass media is still the most effective channel of communication between the scientific community and the general public. The project had not been especially successful in stimulating and maintaining media interest in biotechnology, albeit over a very short time scale. Therefore, two studies were commissioned to examine science communication in the country, with the aim of gaining a better understanding of the barriers to awareness-raising.

24. The first of these set out to question scientists about the communication of their work. This produced some very interesting insights. Nearly half the scientists questioned claimed that raising public awareness was a major objective of disseminating their results. A lesser, but still substantial, proportion of those interviewed (nearly 20 per cent) claimed that the general public was their main target audience. On the other hand, the channels through which the scientists preferred to disseminate their findings told a different story. Seventy-two per cent chose to publish in science journals, with a further 19 per cent disseminating their findings through research conferences and workshops. Only 5 per cent of the scientists interviewed targeted the mass media.<sup>8</sup> From these findings, it might be concluded that, whilst scientists want the public to know about their findings, they do not consider that they themselves should take an active role for this. One slightly surprising result was that nearly 90

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<sup>7</sup> There are several major indigenous language groupings in the country, but the mass media mostly uses English, the language of education in the country. There is therefore some link between English language ability and literacy rates.

<sup>8</sup> These data matched other data on dissemination of research project findings which was carried out as part of the main project.

per cent of the scientists claimed to have confidence in Ghanaian journalists to effectively communicate science information to the public.

25. The second study involved a content analysis of science reporting in the two most widely circulated newspapers in Ghana. The study found that science reporting is in decline in the country, after peaking between, 1992 and 1994. Furthermore, science news and features are not given prominence, but are usually relegated to inside pages of the newspapers, rather than appearing on the front, back and centre pages. Science stories in Ghana, according to established “readability” methodologies, are categorized as “very difficult” to read. It was reported that, when reporting on science and technology, journalists used long sentences, cluttered with too much information and a lack of supporting diagrams, graphs and other visual aids. The problem is partly that Ghana has very few specialist science reporters. Staff reporters in the mass media generally cover hard news, politics and other areas as well as science. Science stories are often only written when the reporters “get a scoop”, and journalists tend not to follow up on science stories – public interest is therefore likely to be short-lived.

26. The study also noted that, according to journalists’ perceptions of public interest, the public is more interested in applied science than basic science. This is supported by an analysis of the science articles analysed for the study, where 75 per cent featured applied science. Furthermore, and this is particularly interesting in a largely agricultural economy, the public are apparently more interested in health and medicine than in agriculture. This is reflected in the science stories analysed in the study, where less than 20 per cent of the science stories covered agricultural applications.

27. This difficult task of raising public awareness in Ghana is likely to be common to many other developing countries.

## **2.4 Summary**

28. There are some clearly identifiable similarities and differences, between the European and developing country contexts. It seems that a key similarity is the need for scientists to actively engage with the public and in public debate, concerning biotechnology and its products. Furthermore, better relationships between the scientific community and the mass media are needed if more balanced information is to reach the general public and here the scientists themselves may have to initiate the process of building these relationships. On the other hand, it is clear that many developing countries face a more difficult task to raise public awareness about biotechnology. Constraints common to many developing countries include poor access to channels of mass communication, low levels of literacy and education and language differences. Given the existing general low level of public awareness and even interest, it will be extremely difficult to encourage the public to have a genuine voice in the policy process.

## 2. COUNTRY REPORTS

29. It was generally recognized that biotechnology and genetic engineering are perceived to involve risks, as well as benefits and this has become of increasing public concern. However, whilst many countries have established mechanisms at the national level to regulate advanced biotechnology, or are in the process of doing so, few have implemented comprehensive policy measures specifically, to inform and educate the public about these technologies and their products. Even fewer countries have established mechanisms for involving the public in science and technology policy decision-making. Of the country reports received for this meeting, the following reported some activities or national perspectives in respect of public awareness.

30. The report of the Russian Federation expressed concern that some interest groups tend to emphasize the perceived risks of biotechnology and its products to the general public. This has contributed to an increasingly discerning global public who now wants greater reassurance from the scientific community concerning the safety of new products. This tends to place increased responsibility on scientists themselves and also may force the development of new scientific criteria for risk assessment. The role of the State, as the regulator of both scientific research and its commercial applications, is key to bridging the gap between the scientific community and the general public. In the Russian Federation, several ministries are working together with the Russian Academy of Sciences to build a legal framework for biotechnology. A federal Act “On the State Regulation in the Field of Genetic Engineering Activity” was introduced in 1996. This Act, which is subject to update and amendment as new areas of technology develop (for example, gene therapy) has been implemented with transparency and public access to biosafety information as a basic characteristic. A new Act, “On a Temporary Ban on Human Cloning”, now under preparation, resulted from a participatory process involving research scientists, medical practitioners, lawyers, philosophers and ministry officials. The inclusion of philosophers indicates that the ethical questions related to some areas of biotechnology are taken very seriously – in fact, there are three bioethics committees at the federal level. However, to date, the public have not specifically been targeted for participation in decision-making. Mechanisms through which the public can make inputs into decision-making would be useful.

31. In the Philippines, the primary agency promoting capacity building in biotechnology is the Department of Science and Technology (DOST). DOST has a twin-track policy approach: one area of policy covers exploiting the opportunities presented by biotechnology, particularly in agriculture and natural resources; the other addresses the possible risks to human and environmental health. Within this framework, DOST is encouraging greater participation at the sectoral level and also initiating programmes aimed at enhancing public awareness. This is commensurate with participatory approaches in other areas, such as the Ministry of Agriculture’s “Agriculture for the Masses” programme. One sectoral planning council under DOST, the Philippine Council for Agriculture, Forestry and Natural Resource Research and Development (PCARRD) has, this year, started a programme of information, education and communication strategies. To date this has involved the production and dissemination of materials and the establishment of a biotechnology database. Its proposed activities for the

medium term (to 2004) include awareness building seminars at national and local level for different groups of stakeholders (legislators, farmers, etc), and increased education about biotechnology through television, radio and exhibitions. One objective of PCARRD in implementing this programme of activities is greater public acceptance of biotechnology, particularly in respect of field trials of GM crops and in generating opposition to a proposed ban on the release of GMOs into the environment. In April 2000, PCARRD and the Biotechnology Association of the Philippines jointly coordinated a workshop on "Information Campaign Strategies for Biotechnology". It was recognized, at this workshop, that PCARRD's activities have so far not been able to effect a real counter-balance to the anti-GMO lobby in the Philippines. A bill, "Genetically Engineered Food Right to Know Act", currently under preparation, will require mandatory labelling of food and food products containing GMOs.

32. In Portugal, a public survey on attitudes towards science was conducted this year, which produced some interesting results in respect of the theme of this panel. Presented with three statements concerning the levels of awareness and participation wanted by the public in respect of science, the largest single group (43 per cent) felt that the public should be made more aware of scientific developments. A smaller group (31 per cent) felt that not only should awareness be enhanced, but that the public should actively participate in decision-making. A sizeable minority (13 per cent) felt that science was so specialized that only experts should be involved. In respect of biotechnology, or more specifically, transgenic foods, 81 per cent of those who participated in the survey did not know anything about them. This compared to 41 per cent in respect of air pollution and 62 per cent for the greenhouse effect, both of which have been debated in the public arena for much longer. The indications from the survey are, therefore, that the majority of the public feel that they are not well informed about biotechnology and would like to be informed, but do not necessarily want to participate in decision-making. The report from Portugal notes that the public debate on GMOs is relatively low-key, compared to other countries in Europe. The Ministry of Science and Technology is directing its awareness-raising activities mainly towards school age young people, particularly through an umbrella programme called "Science Alive", which involves teachers, scientific institutions and companies. However, a network of interactive science centres is also being built up. In respect of public participation in policy-making, it is apparently not an issue of concern at the present time. The survey indicated that only a minority of the public feel that it is needed. It was noted with interest that the anti-GMO lobby within the NGOs has not promoted public participation. At present the authorization for the use and release of GMOs in Portugal does not necessarily include public hearings, though these are an optional part of the authorization process.

33. In Tunisia, no GMOs have not yet been released outside the research environment, although there is some question as to whether imported animal feed may contain genetically-modified corn or soya. It was noted that there is a wide gap between the knowledge embodied in the new technologies and the general public's capacity to understand complex science. Therefore, public choice in respect of biotechnology would be affected by many more factors than just raising the level of technological education in the country. Other key factors included cultural and religious values, expected socio-economic benefits, confidence in risk

management and other national, social and economic policies. Using public acceptance of two other areas of scientific application (organ transplantation and medically assisted human reproduction) as a guide, the report from Tunisia derived some lessons for building public awareness about genetic modification. Organ transplants were legally accepted in the country, where political will for acceptance was greater than the expressed public need, whereas medically assisted reproduction has been limited due to religious considerations, despite public pressure for its acceptance. It was observed that political will may perhaps provide a greater impetus for information dissemination, legislation and institution building than the public's need for the technology. In respect of biotechnology, neither public demand nor a significant national economic need for the technology has yet been demonstrated. Despite recognition of the importance of the technology, the conditions for its promotion in the public arena are, therefore, not particularly favourable at the moment.

34. In Austria, public awareness about gene technology is relatively high, perhaps in part because a referendum on gene technology in agriculture was conducted quite recently. However, the problem at present is that awareness is biased toward fear of perceived risks than on scientific information and therefore, this "awareness" has not led to greater acceptability of the technology. There is no shortage of balanced information available. For example, several ministries provide information which can be accessed by the public and a comprehensive website<sup>9</sup> exists which contains links to publications by national and international organizations and by individual scientists. Nevertheless, this balanced information is not promoted effectively to the public through the mass media, which tends to highlight the polarized views of anti-GMO activists and the biotechnology industry. In the long term, the most effective and sustainable way to enhance awareness about the opportunities and risks emerging from gene technology is through the formal education system. In the shorter-term, there is a need to find ways to improve communication between scientists and government agencies, on the one hand and the mass media on the other. Even then, this in itself may be insufficient for balanced scientific information to be given prominence in the popular press, or to be broadcast at peak TV viewing (or radio listening) times. The Government may need to introduce other political or financial measures to enhance public awareness that is based on balanced and dispassionate information.

35. Greece, despite being without a significant market for GM seed and with only one major research institution involved in gene technology, has a fairly well informed public according to the most recent "Eurobarometer" survey on public attitudes towards biotechnology. Whilst public acceptance of biotechnology has not been systematically studied in the country, press reports and the "Eurobarometer" results suggest that the public in Greece are very sceptical about the technology and its potential to contribute to future welfare and sustainable development. Acceptance seems to be higher for medical applications than for food production and manufacture. This may well be due to a tendency to favour traditional food products and processes, but also because of a lack of trust in political agencies seeking to promote the technologies. Bioethics committees have been established in the Ministries of Health, of Environment and of Development, which provide the General Secretariat for

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<sup>9</sup> At URL: <http://www.gentechnik.gov.at>

Research and Technology in Greece. Furthermore, a National Committee on Bioethics, comprising senior academics of wide-ranging disciplines, has been set up directly under the Office of the Prime Minister. All these committees are mandated to address policy issues and provide policy advice. The Greek Bioethics Committee, based at the Ministry of Development, is further mandated to promote public awareness through a variety of mechanisms including participation in public events and dissemination of information via the Internet. However, whilst it has issued opinions on biotechnology-related matters, it has been less successful in its aim of enhancing public awareness. The Ministry of Agriculture has so far reacted only defensively (in respect of raising public awareness), issuing press releases when challenged by environmental lobbies.

36. In Indonesia, the anti-GMO lobby sponsored by NGOs has stimulated public debate and therefore, arguably, raised public awareness and driven the public into participating in the policy arena. The debate has so far centred on the commercial planting of imported transgenic cotton seed through the local subsidiary of a Trans-National Corporation. The seed had been authorized for commercial planting by the National Commission for Food and Agricultural Biosafety (NCFAB) and the farmers reported a substantial increase in yield from the new seed. However, since the public debate intensified, the Ministry of State for the Environment has suggested that commercial planting of transgenic seed should be halted, though contained research could continue. This has been publicly opposed by farmers and private firms. Both the Ministry of State for Research and Technology (MSRT), and the Indonesian Science Academy have issued statements supporting the use and development of biotechnology and the Indonesian Parliament has initiated programmes to provide public access to objective information. The MSRT conducts routine scientific briefings to Members of Parliament, the press and the public and recently held a briefing on transgenic products. In Indonesia's case, the Government has tried to react to public controversy based on extreme positions taken by commercial interests and NGOs, respectively, by intervening as a supplier of balanced information.

37. In Paraguay, whilst public awareness has been raised through the national and international media, there does not seem to be a high level of public interest in, or concern about, biotechnology. Despite a lack of public concern, it was agreed in 2000 to maintain the existing moratorium on the commercial use of GMOs until clearer scientific evidence on their alleged risks emerges. Whilst there is as yet no central national policy on biotechnology, sectoral ministries have developed their own policies and positions. Public awareness raising activities are being implemented, for example through the Biosafety Commission which has been organizing information workshops since 1998.

38. In Uganda, apart from a small minority of scientists, there is a general lack of awareness about biotechnology. Whilst there is recognition at the sectoral level that biotechnology may provide the means to improve crop yields, increase disease and pest resistance, contribute significantly to improve human healthcare provision and enhance animal health, there is also significant concern about the potential negative impacts of the technology. However, little is understood beyond this outline of opportunities and challenges and there is therefore a perceived need for awareness raising in general. The National Biosafety

Committee, already established, may be the best national body to undertake this task, but is likely to be severely constrained by resource problems.

39. In Cuba, biotechnology development dates back to the early 1980, and has been very dynamic in the health sector. The Cuban report suggests that public awareness is high and that acceptance of the technology is correspondingly high. In other countries where capacity in biotechnology applications is still low, including Saudi Arabia, Angola and Cameroon, the potential benefits of biotechnology are recognized by Government and experts and initiatives are underway to build capacity. In these countries, public awareness is generally low and public perceptions about the technologies are mixed, according to information received from the national and international media.

### **3. DISCUSSION AND EMERGING KEY ISSUES**

40. Increasing public acceptance of gene technology is a major incentive for national authorities and the scientific community to invest in raising public awareness and involving the public in science policy-making. However, in Europe it seems that where the level of public awareness is relatively high, public acceptance of gene technology is not necessarily higher – and is often lower – than countries with lower levels of awareness. This suggests that public awareness alone will not help gain public acceptance of the technology. Rather, the problem is one of awareness that is based on balanced, science-based information reaching the general public. Some Governments have initiated activities to provide such information, to balance the often adverse and scientifically inaccurate coverage of biotechnology in the mass media. Again, supply of balanced information has been found to be insufficient in raising awareness, if it is not actively disseminated through channels routinely accessed by the public. Furthermore, in some countries, the public does not necessarily trust Government to provide unbiased scientific information.

41. There is a perceived need for scientists to become more directly active in raising public awareness about their work. Some constraints to their involvement exist and must be addressed. First is the demands placed on their time where research, dissemination of research results, and – for academic scientists – teaching is the key professional requirement on which careers depend. Second, free discussion of their findings, particularly through the mass media, may be subject to institutional or project funding agency restrictions where intellectual property rights or other issues force secrecy. Third, scientists may not necessarily have the training or ability to communicate their work in lay terms, to the general public or to journalists. Mechanisms and incentives which enable and encourage scientists to communicate their results are needed.

42. The mass media is likely to play a key role in raising public awareness. It was felt that journalists need to be responsible in their reporting of science news, but at the same time, it was recognized that the first priority for the mass media is to provide “good stories” to the public, thereby increasing circulation and attracting advertisers. However, the quality of the scientific content of these stories could be improved if journalists and editors gain a better

understanding of science and receive training in science communication. Editors, as “gatekeepers” of information to the public, are particularly important and efforts should be made to keep them constantly aware of the importance of emerging science news. Better liaison with scientists is needed, but it may be up to the scientists themselves to initiate the forging of such relationships. Journalists tend to obtain “scoops” from tip-offs, rather than go looking for balanced science news and features.

43. Where public awareness is very low, as in many developing countries, public interest in science is also often low. This limits the potential success of activities to raise public awareness and to involve the public in science policy decision-making. In this context, it could be argued that investing resources trying to engage the public's interest cannot be justified. However, public fears about new technology are easily and rapidly stimulated, as has become evident in Europe, where anti-biotechnology interest groups very successfully engaged the interest of the media in their campaigns. Therefore, countries where public awareness and concern are low at present cannot afford to be complacent, but face a difficult task in encouraging public interest.

44. The general public represents very diverse levels of education and literacy, language divisions (in many countries) and channels of mass communication often reach only a minority of the population. Furthermore, the allocation of resources for mechanisms to involve the public in policy decisions is constrained by extremely limited public funds. The recommendations on public participation in decision-making were, therefore, based on the premises that:

- Public participation must be justified in terms of expected benefits against expenditure;
- Mechanisms must be appropriate to developing countries;
- The limitations of these mechanisms must be recognized.

45. The advantages of participation, both for people and for policy, come from the potential changes in public attitudes. In practical terms, policies developed with public participation are likely to be easier to implement, because the public (as policy “consumers”) has “bought into” the process of policy formulation.

#### **4. CONCLUSIONS AND RECOMMENDATIONS**

46. Three sets of recommendations were produced. The first two dealt with the major themes of the panel: raising public awareness and public participation in science policy-making. The last set was directed to the role of various types of organizations – including international agencies and NGOs – in facilitating activities to support public awareness and participation.

#### **4.1 Raising Public Awareness**

47. The meeting concluded that the public has both a right and a responsibility to be informed about scientific and technological developments. Efforts from all stakeholders are needed to contribute to the process of building public awareness, using whatever means available and appropriate. These stakeholders include policy makers, the education system, and the scientific community. Governments should be prepared to invest some financial and other resources in promoting public awareness about biotechnology.

48. The meeting agreed the following suggestions be put forward, as an initial guide:

1. National committees should be established for a continuous dialogue among:
  - a) scientists and policy makers
  - b) scientists and journalists

The CSTD may be able to facilitate similar dialogue at international level.

2. Curricular activities in academic institutions should include courses on responsibility and communication of science.
3. Public debates of experts and journalists should be presented in the mass media and information materials should be provided on videotape and other electronic media.
4. Schoolteachers should regularly attend courses to update their understanding of recent scientific and technological development, in order to educate pupils adequately.
5. Relevant scientific, regulatory and policy information related to biotechnology should be provided to professional associations by national Governments, and appropriate international organizations.
6. Scientists should publish their work in popular style in the media, in regular intervals and whenever important new information becomes available in the field of biotechnology.
7. Every international conference on biotechnological issues should devote a part of its activities to the information sector. International organizations should provide packages containing the necessary basic information concerning their involvement and knowledge in biotechnology.
8. Governments should provide specific budgets to assist the process of objective information to the public and ensure the awareness of biotechnology-related issues.

9. Academic institutions such as universities and national academies of science should offer specific courses/seminars for journalists.
10. Studies on the perception of science and technology by the public should be carried out in each country and results compared internationally. The CSTD should encourage, support and facilitate this process.

49. The meeting also recognized that other groups, including the private sector, religious denominations, and public interest groups, will be able to contribute to raising public awareness, according to their mandates and the local context. In addition, special attention should be paid to informational needs arising from gender and youth concerns.

50. Furthermore, it was recognized that the public have a role to play as communicators of their concerns about biotechnology to the policy and scientific communities. However, the problem of how to attract public interest and participation where this is currently very low, remained unresolved during the discussions.

#### **4.2 Public Participation in Science Policy-making**

51. It was recognized that there are different categories of mechanisms. First there are those which involve the public – for example, public representation at general ‘stakeholders’ conferences – and those which specifically target the public. The recommendations focus on the latter group. Within this group, there are two further categories:

- Representative, where the general public is represented by a selected sample of the populations – mechanisms include focus groups, consensus conferences and citizens’ juries;
- Random, where the activity (or mechanism) is open to all, or a random sample of, the public – mechanisms include referendums, opinion polls, public meetings, Internet forums, and debates and competitions in the mass media.

52. The main advantage of the first type of mechanism is that a representative group can be chosen that has the same language and educational abilities and where awareness-raising can be carried out as part of the process. This is more likely to lead to a more elevated level of dialogue and more informed inputs into policy-making. Furthermore, these mechanisms often generate media interest and coverage. The limitations include a relatively high cost for this type of activity,<sup>10</sup> organizational resources and the difficulties in bringing together a truly representative sample from the general public. These difficulties include geographical distance, public interest, language differences and a widely variable level of education. Some of these problems could be addressed by operating the mechanisms at the local level as far as possible, by encouraging donor support, by establishing a national coordinating body for these activities and by increasing awareness-raising activities.

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<sup>10</sup> For example, the cost of the national stakeholders’ conference reported in Ghana, involving less than 60 participants, exceeded \$30,000, excluding organizers time. Consensus conferences in Europe have been reported to cost around \$45,000, but this may be underestimated.

53. The main advantage of a “random” type mechanism is that the cost is relatively low. A limitation is that the level of comprehension of issues relating to biotechnology will also be lower, on average (and certain as a lowest common denominator). Furthermore, public access to the channels of communication used is limited. There may also be political and cultural constraints which exist in some countries, both in terms of freedom of individual expression and freedom of the media to act as effective forums for debate. However, in many countries, especially where public awareness and interest is low, this type of mechanism may be a good starting point for developing countries to both stimulate interest and gauge the general tide of public opinion on biotechnology.

54. In view of these conclusions, the panel proposed the following recommendations on public participation:

1. The CSTD should request national Governments to identify an existing appropriate institution to coordinate activities relating to public participation in science policy-making. This national body should be able to take responsibility for liaising with local coordinating organizations. At the international level, the CSTD could facilitate cooperation – especially, south-south collaboration – between countries, via this newly established network of national coordinating bodies;
2. The CSTD should, in collaboration with identified national institutions, promote and facilitate a search and review of participatory mechanisms already used in developing countries, with a view to disseminating information about best practices in a systematic way;
3. National Governments, with the support of the CSTD, should promote and facilitate the interest of donor organizations in appropriate mechanisms for public participation, in order to:
  - Incorporate them into their own policies related to activities in developing countries. This would include involving public representatives in general stakeholder activities, as well as implementing mechanisms which target the public specifically.
  - Provide financing for more resource-intensive mechanisms in the short-medium term, recognizing that a new socio-political culture will have to be built up to sustain the use of such mechanisms in the longer-term;
4. In promoting best practice, the CSTD should consult with national Governments concerning implementation of mechanisms identified and where appropriate and possible, encourage implementation at the local level, with feedback to the national policy level.

### **4.3 Role of key stakeholders**

55. Three groups of stakeholders were targeted for key roles in building public awareness and encouraging public participation. These were: international organizations, national Governments, and non-governmental organizations (NGOs).

#### CSTD and International Organizations

1. Participants agreed that the CSTD is well-placed to serve as a catalyst in raising public awareness and improving public understanding of biotechnology-related issues such as food production and food safety. In this connection, the CSTD should identify a respected biotechnology institution or centre to collaborate in setting up guidelines for raising public awareness. The outcome should be a succinct easy-to-read handbook on ways and means needed to educate the public and inform the media and policy-makers about biotechnology and to determine the institutional requirements needed to identify and manage concerns associated with biotechnology.
2. The CSTD should promote international cooperation in the areas of public awareness and participation with regard to biotechnology development. It should also provide a forum for the exchange of experiences, knowledge upgrading and consensus-building on transnational issues such as biotechnology-related trade, biosafety, social, environmental and ethical issues.
3. International organizations should, within their areas of competence, facilitate the setting and harmonization of standards applicable to different fields of biotechnology to ensure efficacy, quality, safety and the comparability of data.

#### Governments

56. Governments should be key players, not only as investors but also as coordinators of scientific and industrial organizations in order to promote biotechnology development. It must create the basic infrastructure and promote collaboration amongst these organizations.

57. In public awareness and participation, Government should:

1. Help to define the national interest and priorities with regard to biotechnology. This should be done through dialogue mechanisms such as national stakeholders' conferences, public forums and consensus conferences.
2. Listen and take the results of these conferences and forums as serious inputs into the policy-making process.

3. Restore its role as a neutral arbiter in the provision on accurate information. This is evident from recent experience in the management of crises associated with the food chain and blood contamination.
4. Take the lead in creating dialogue that involves all stakeholders in a process of consensus-building for preventive measures and remedial action.
5. Develop a regulatory framework for biotechnology development and application and also the means to enforce it to become credible.

58. It was noted that social relevance and social acceptance would create the conditions for public support for investment in both basic and applied research at the national level.

#### Non-governmental Organizations

59. The meeting acknowledged the positive role that NGOs can play in biotechnology development, but noted that some NGOs are very active in opposing introduction of gene technology. This can be seen in a positive way, by encouraging:

1. The active participation of NGOs in public policy forums, such as consensus conferences, where they can gain a better understanding of the technologies and also represent public concerns. This applies both at national and international levels and the potentially positive contribution of NGOs should be encouraged, both by national Governments and international organizations and bodies;
2. NGOs, on the other hand, to be open and transparent concerning their mandates, campaign objectives and activities – whether they support, or oppose, gene technologies.

#### **4.4 Summary**

60. The meeting agreed that greater public awareness about biotechnology is needed, though it was recognized, from the European country experiences, that greater awareness does not necessarily lead to increased public acceptance of new technologies. This seems to be largely because the dominant messages reaching the general public, mostly through the mass media, are clearly biased against gene technology, especially in respect of agriculture and food processing. It was therefore agreed that provision of balanced information was necessary, but not sufficient, to redress the balance: there is a need to ensure that the information actually reaches the public. Journalists are unlikely to take responsibility for seeking out and transmitting balanced science stories. Scientists, with support and encouragement from their employers and Governments, could play a key role in actively seeking channels of communication to disseminate their findings. However, in many countries, there is a lack of public interest in science and the meeting was unable to suggest solutions to this problem. This is likely to require the gradual build up, from within and without the education system, of an improved science culture within developing countries.

61. Until greater public awareness is achieved, it will be very difficult for the public to have an effective voice in, or provide valuable inputs to, decision-making in science policy. The options for public participation are therefore limited at present, especially given the potential high cost and low level of public interest. However, it was recognized that even an uninformed public – as consumers and perhaps as voters – may have an adverse impact on the application of gene technology if they do not trust Governments, firms and scientists to regulate their activities according to the public interest. National Governments, international organizations and NGOs can play key roles here, both by providing balanced information and by establishing and supporting public forums for open and transparent dialogue on the potential opportunities and challenges related to biotechnology.

## ANNEX 1

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