# 11

# Initiating Science Communication in the Organization of Islamic Conference Countries

**Muhammad Iqbal Choudhary and Sammer Yousuf**

The Organization of Islamic Conference (OIC) is an international multilateral organization with 57 member states spread in four continents of the world, including regions such as East Europe, North Africa, West Africa, Middle East, Central Asia, West Asia, South Asia, Southeast Asia, Far East, and South America. The OIC has a permanent representation in the United Nations. Politically, the OIC is the voice of 1.2 billion Muslims, one-fifth of humanity and over one-fourth of independent nation states. Population in member countries is predominantly Muslim, although exceptions do exist. Large population of minorities of Muslims live in countries like India, China, and Russia and are not members of the OIC system.

The heads of over 35 Muslim States met in 1973 in a summit held in Lahore, Pakistan and decided to combine their resources and work together for

the socio-economic well being of Muslim nations all over the world as well as large population of Muslim minorities in other countries. This led to the genesis of OIC. The official languages of the organization are Arabic, English, and French.

Geographically, OIC nations live in countries which are scattered over a large proportion of the globe: from tropical regions of Asia and Africa to arid areas of Middle East and West Africa, and to dry and cold regions of Central Asia and Balkans. As a result, the economies of Muslim states vary from pure agriculture to oil export as well as manufacturing and service-based economies. Most populous OIC countries are in the Asian continent including Pakistan, Bangladesh, and Indonesia. Although most of the Muslim states have agriculture-based economies, OIC countries are net importers of food and other products (ISESCO, 2003). Per hectare production of various crops is among the lowest in OIC region, sparing a few countries. Surprisingly, only three OIC countries have official cultivation of biotech crops, although cases of illegal cultivation of GM and other biotech crops are known. Table 1 lists OIC member countries with biotech crops cultivation along with available statistics.

**Table 1. OIC countries with official biotech crops cultivation**

| Country | Biotech Crop/ Variety | Population/Total Area under Biotech Cultivation |
|---|---|---|
| Burkina Faso | Bt cotton/Bollgard II | 15.21 million / 115,000 million hectares |
| Egypt | Yellow maize/(Ajeeb YG) | 80 million / 1,000 hectares |
| Pakistan | Bt cotton/IR-3701,<br>Ali Akbar-703,<br>MG-6,<br>Sitara-008,<br>IR-1524,<br>FH-113,<br>AARI,<br>Neelam-121 | 166 million / 3.2 million hectares |

## Agro-biotechnology in OIC Region

As most of the Muslim states have agro-based economies, biotechnology has an immense potential to enhance agricultural productivity and livelihood of people associated with farm-based businesses. Although huge arable lands are available in major river basins of the OIC member states along with the human resources to engage in agricultural activities, the agricultural sector receives low priority. For example, the total arable land area in the OIC member states is 277,321,000 hectares or about 11.57% of the total area. At the same time population engaged in agriculture is 261,163,000 inhabitants or 46.2% of its total workforce. Agriculture is the dominant sector in many of the OIC member countries, namely, Pakistan, Bangladesh, and Indonesia as well as the OIC Least Developed Countries (LDCs) such as Chad, Guinea-Bissau, Mali, Sierra Leone, Burkina Faso, and Togo.

The major problems which the agriculture sector faces in OIC include natural factors such as scarce water resources, desertification, natural calamities, erratic and unpredictable rainfall, and salinity. They also include management issues such as primitive agriculture practices, non-availability of agriculture inputs (seeds, fertilizers, and pesticides), lack of farm to market roads, poor post harvest practices, crop loss due to insect pests, and lack of value addition.

Biotechnology started playing its role relatively late in the OIC states. This is due to the impediments that include lack of trained manpower, institutional infrastructure, sustainable financial support, and commitment by the national governments. There is a growing realization in OIC nations that biotechnology can play an important role to increase production, decrease production costs, and improve the living standards of people. Despite this realization, the level of biotechnology research in majority of Islamic countries is at a fairly low level. The first few Muslim states which have started benefiting from the biotechnological innovations in agriculture include Iran, Malaysia, Egypt, Turkey, Indonesia, and Pakistan. As a result, many Centers of Excellence have emerged in different regions of the Muslim world. Table 1 shows OIC countries which are already into biotech crop cultivation.

The urgent need of harnessing the benefit of biotechnological advances for sustainable economic development is also reflected in the establishment in June 1997 of the Islamic G-7 or developing-8 (D-8) which includes Bangladesh, Egypt, Indonesia, Malaysia, Iran, Nigeria, Pakistan, and Turkey.

## People's Republic of Bangladesh

With a population of over 162 million, Bangladesh is one of the most densely populated areas in the world. The country suffers from frequent natural calamities and enduring question of food security for its massive population. The work on plant biotechnology in Bangladesh was initiated in 1970s at the University of Dhaka (Choudhary and Islam, 2004). Since then, over a dozen biotechnology laboratories have been established in various universities and R&D institutions. Hybrid rice cultivation in Bangladesh is a major success story. Salt and cold tolerant jute is also widely cultivated in large areas of the country (Islam, 2008).

Bangladesh also hosts a regional network called ANRAP (Asian Network of Research on Antidiabetic Plants) focusing on use of medicinal herbs in the treatment of diabetes. It has also a number of non-governmental organizations (NGOs) working on the propagation of important medicinal plants by using tissue culture technologies. The Bangladesh Biotechnology Information Center (BdBIC), based in Bangladesh Agriculture University at Mymensingh is actively serving the biotechnology stakeholders in information and knowledge dissemination.

## Islamic Republic of Iran

Iran has been in the forefront of biotechnological development and applications. It has over 45 institutes and centers involved in biotechnological research. Nineteen of them focus on agricultural biotechnology. National Research Center in Genetic Engineering and Biotechnology, a very large institution in the west of Tehran, is involved in basic and applied bioscience, medicine, agriculture, and pharmacology. The Iran Organization of Science and Technology (IROST) is the premier institution with notable contributions

in various aspects of biotechnology. The Agriculture Biotechnology Research Institute of Iran, established in 1980, is among the most prestigious research establishments in the developing world. It is involved in cutting edge research and development in various fields of agro-biotechnology (Ghareyazie, 2000). Scientists in IROST are actively engaged in the development of bacterial pesticides against common agriculture pests, as well as in the production of useful chemicals by using fermentation technology.

Along with public sector institutions, there are a number of private sector organizations and industries, such as Rana Agro-Industry Corporation, which are also involved in applications of agricultural biotechnology.

Very recently, Iran Biotechnology Information Center (IrBIC) was established under the auspices of the OIC's Ministerial Standing Committee for Science and Technology (COMSTECH) and the Pakistan Biotechnology Information Center (PABIC).

## Islamic Republic of Pakistan

Pakistan has a massive population of 180 million and an unpredictable agriculture productivity due to primitive agriculture practices and rain-fed agriculture. It is the fourth major cotton producer in the world and was among the first few countries which realized the potential benefits of biotechnological applications in early 1970s. A large number of institutions such as the Nuclear Institute for Agriculture and Biology (NIAB), National Institute for Biotechnology and Genetic Engineering (NIBGE), Center of Excellence in Molecular Biology (CEMB), Husein Ebrahim Institute of Chemistry, and Dr. Panjwani Center for Molecular Medicine and Drug Research were established. NIAB (Faisalabad) is involved in plant biotechnology and saline agriculture, while production of biofertilizers for rice, chickpea, and soybean is studied in NIBGE (Faisalabad). The CEMB Lahore is focusing on recombinant DNA biotechnology of agriculture and health relevance.

Various institutions in the University of Karachi, such as the Halophyte Research Center, Biosaline Agriculture Research Unit, and Biotechnology division of the H. E. J. Research Institute of Chemistry are coordinating

research among institutes in Syria, Morocco, Jordan, United Arab Emirates, Egypt, Qatar, Azerbaijan, Kuwait, Saudi Arabia, Sudan, and Bahrain.

In 2009, the Government of Pakistan officially allowed the cultivation of eight varieties of GM cotton crops, although unofficially a large area of Punjab and Sindh province already have GM cotton cultivation.

The Pakistan Biotechnology Information Center, located at the Latif Ebrahim Jamal National Science Information Center, University of Karachi, is providing services for the dissemination of information regarding biotechnology development in the country.

## Republic of Indonesia

Indonesia, the largest Muslim nation, has identified biotechnology as strategic technology to help attain sustainable agriculture production since 1988. The National Committee on Biotechnology was established to formulate a national biotechnology policy and development program. Several centers of excellence were established and tasked to set up networks of institutions in various fields of biotechnology and genetic engineering. The biosafety guidelines were put in place in 1997 and have gone through many revisions (USDA GAIN Report, 2007).

Many Indonesian universities have academic and research programs including University of Airlangga, Institute of Technology Bandung, University of Indonesia, and Bogor Agriculture University (Sukara and Slamet-Loedin, 2000).

The Indonesian Biotechnology Information Center (IndoBIC), is located in Bogor, Indonesia. It serves as a hub of the regional network for current science-based information on agricultural biotechnology.

## Arab Republic of Egypt

Egypt is among the forerunners in acquiring biotechnological capacity in the

Muslim world. It was the first country in the Arab world to commercialize biotech crop by planting a variety of hybrid Bt yellow maize (James, 2009). Egypt has a clear national policy and strategy for the promotion of genetic engineering and biotechnology research and application. The National Commission for Biological Safety was set up in 1995 and is responsible for the safe use of genetic engineering products and processes. It also provides consultations on biological safety principles. Transgenic potato, maize, faba beans, and tomato are the country's main biotechnology crops (DaSilva, 2002).

Many Egyptian universities such as Ain Shams University, American University of Cairo, University of Cairo, Al Azhar University, Al Mansoura University, and Suez Canal University have well established biotechnology teaching and research departments.

The Desert Development Center, American University, Microbial Resource Centre at Ain-Shams University, all located in Cairo, and a number of other government agencies are involved in active research in areas such as arid land biotechnology, agroforestry, clonal propagation of stress-tolerant plants, biofertilizers, fermented food, bioenergy production, plant tissue culture, mushroom cultivation, and genetic engineering.

Along with academic institutions, many Egyptian R&D institutions are involved in biotechnology research. These include the National Center for Research, Academy of Scientific Research and Technology, and Mubarak Complex for Scientific Research and Technological Applications (USDA GAIN Report, 2009). Egypt has a thriving agriculture and health-based biotechnology industrial sector which is contributing to the creation of jobs for biotechnology graduates and bringing biotechnology innovation to the market place. This sector includes seed production units and vaccine production industries.

The Egypt Biotechnology Information Center (EBIC), housed at the Agriculture Genetic Engineering Research Institute (AGERI), is rendering valuable services to stakeholders by disseminating objective information about biotechnological development. The EBIC also organized an international workshop on "The Development of Agricultural Biotechnology in Islamic

Countries: Sharing the Experience on Issues and Challenges," in collaboration with the Inter-Islamic Network on Genetic Engineering and Biotechnology (INOGE) in 2006.

## Republic of Turkey

Biotechnology has played a significant role in achieving self-sufficiency of Turkey in agricultural production. The first plant tissue culture laboratory was established in 1997 at the Aegean Agriculture Research Center Institute in Izmir. The regulations for the commercial use of genetically modified (GM) crops were issued in August 2010 and now the research is mainly focused on plant tissue culture and agriculture technologies. The main plant tissue culture research laboratories are at Aegean University, Ankara University, Cukurova University, and Dicle University. These also include various laboratories working in private sectors and those under the Ministry of Agriculture and Rural Affairs, and Ministry of Environment and Forestry. Various disease-free plants such as citrus, strawberry, grape, chrysanthemum, and potato were produced by the laboratories of the above mentioned universities. The Research Institute of Genetic Engineering and Biotechnology (Marmara Research Center) is involved in innovative research in the fields of agriculture, health, industrial, and environmental biotechnology.

## Malaysia

Malaysia is a non-recipient of food aid and its government has expressed strong interest in using biotechnology to help invigorate the agricultural sector. The National Biotechnology Policy was launched in April 2005 to provide strategies and initiatives to develop biotechnology.

Although Malaysia is not producing any biotechnology crop commercially, the government places no restriction on the import of biotech food or feed. The biotechnology research is supported directly by the government and many GM crops are at the experimental level. The tungro virus resistant rice, ring-spot virus infection resistant papaya, and black heart infection resistant pineapple are being developed at the Malaysian Agriculture Research and

Development Institute (MARDI). Research is also on-going to develop GM palm oil with high levels of vitamin A and E, and oleic and stearic oils.

Many Malaysian universities have academic and research programs including University Putra Malaysia (UPM), University Kebangsaan Malaysia (UKM), University of Malaya (UM), and University Sains Malaysia (USM). A number of research institutions that includes MARDI, Malaysian Palm Oil Board (MPOB), and Malaysian Rubber Board and are working for the establishment of biotechnology R&D in Malaysia.

The Malaysian Biotechnology Information Center (MABIC) hosted by the Monash University Malaysia, Kuala Lumpur is working to develop close relations among various stakeholders in order to enhance the exchange of information and knowledge. MABIC is also helping many other BICs in the region in their capacity building as well as in other regional activities.

## Centers of Excellence

Along with the above cited national programs, several centers of excellence exist in the entire breadth of OIC region. These include the International Center for Agriculture Research in Dry Areas, with headquarter in Aleppo, Syria, which is focusing on three areas of agro-biotechnology: (1) tissue culture applications in the development of double-haploid breeding systems in cereals (bread wheat, barley, and durum wheat), (2) molecular markers and genetic finger printing to identify particular desirable genes for specific breeding projects, and (3) genetic transformation to produce transgenic chickpea and lentil.

Other prominent biotechnology institutions include the International Center for Biosaline Agriculture (United Arab Emirates); Institute of Agronomy and Veterinary Sciences, Rabat (Morocco); International Institute of Tropical Agriculture, Ibadan (Nigeria); Food Research Center of University of Khartoum (Sudan); Center of Biotechnology at the University of Sfax (Tunisia); and Kuwait Institute of Scientific Research.

## Role of COMSTECH

The OIC has constituted a standing committee on scientific and technological cooperation referred to as COMSTECH (OIC's Ministerial Standing Committee for Science and Technology) during its third summit in Makkah tul Mukarrama, Saudi Arabia in 1981. The COMSTECH is directly mandated to promote science and technology and its applications for the development of Muslim Ummah. Its headquarter is in Islamabad, Pakistan.

In the field of life sciences, COMSTECH has identified four priority areas for R&D:

1. transgenic plant technology for insect resistance and drought tolerance (plant tissue culture technology has been developed in Malaysia, Indonesia and Pakistan to exploit worldwide demand for specialized ornamental plants from these regions);
2. development of molecular diagnostics;
3. biotechnology of minerals; and
4. biodesulfurization of fossil fuels.

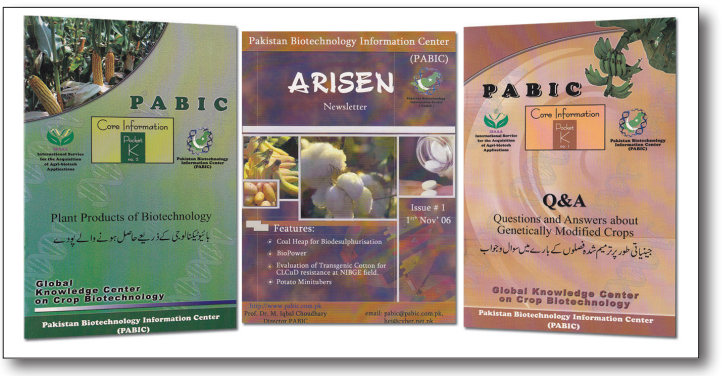
To fulfill its mandate, COMSTECH has initiated a number of programs, including the establishment of and support to various inter-Islamic networks during the last ten years. One of these networks is called Inter-Islamic Network on Genetic Engineering and Biotechnology (INOGE), constituted in 1987 and is based in Egypt. The INOGE is an inter-state, non-political and non-profit agency conducting research in the fields of genetic engineering and biotechnology. It aims to promote and cooperate in research areas of common interest to build capabilities in the fields of genetic engineering and biotechnology through training of quality manpower. The network also initiates joint R&D projects of common interest to the member countries. The exchange of information and continuous dialogue on developments in these fields are also important activities of the INOGE. The network is supported both by COMSTECH and the Islamic Development Bank, Jeddah. This network has organized a number of training workshops, courses, conferences, and symposia on biotechnology-related issues in various OIC member countries in the last decade. The INOGE publishes a newsletter three times a year. In its 13th ministerial meeting in Islamabad (2008), COMSTECH approved a project submitted by PABIC for the establishment of biotechnology information centers, initially in five OIC member countries.

Apart from supporting networks and BICs in OIC countries, COMSTECH has a vigorous program focusing on emerging technologies including biotechnology. Under the leadership of Prof. Atta-ur-Rahman (Coordinator General) and Dr. Anwar Nasim (President, Federation of Asian Biotechnology Associations and Chairman of the National Biotechnology Commission), it has organized a number of training courses and workshops in Islamabad. The courses covered various aspects of biotechnology such as molecular medicine, stem cell, bioethics, and bioengineering. COMSTECH has also played a key role in the development and approval of the biosafety laws in Pakistan.

## Role of Pakistan Biotechnology Information Center

The PABIC is a non-governmental organization (NGO) supported by the International Service for the Acquisition of Agri-biotech Applications (ISAAA) and the Husein Ebrahim Jamal Institute of Chemistry, University of Karachi. It is one of the most active organizations working to promote biotechnology and its applications in Pakistan. In close collaboration with the National Commission on Biotechnology (NBC), it has organized many programs for various stakeholders. Its main emphasis is on the training of media personnel and journalists on objective reporting of biotechnology and related issues.

PABIC was tasked by the COMSTECH General Assembly to help in the establishment of Biotechnology Information Centers in OIC member countries, initially in five countries including Iran, Turkey, Kazakhstan, Qatar, and Sudan. In 2009, PABIC launched a major program to help in the establishment of the Iran Biotechnology Information Center. PABIC arranged




*PABIC's publications on biotech crops*

*A media workshop conducted by PABIC*

the training of staff of the newly established IrBIC in Kuala Lumpur, Malaysia in collaboration with MABIC. Efforts are now underway to establish the Turkish Biotechnology Information Center at Sabanci University, Istanbul, Turkey by the end of 2010. In early 2011, PABIC is planning to organize an Inter-Islamic Agricultural Biotechnology Information Dissemination Conference, with wide participation of OIC countries in various regions.

## Activities of PABIC

Realizing the importance of biotechnology in health and economy and its tremendous potential to overcome the food shortage, PABIC serves as the largest resource center to disseminate relevant information about biotechnological innovation and applications to the general public and stakeholders. To achieve this objective, PABIC has initiated the following programs:

1. **Capacity building for journalists and media representatives**
   To enhance the capacity of electronic and print media to objectively cover biotechnology-related issues, PABIC organizes media workshops and training courses where distinguished speakers from the country are invited to share their insights and activities.

2. **Raising awareness among youth**
   PABIC initiated a nation-wide internship program in collaboration with various departments and institutions in the following fields: agricultural biotechnology, molecular biology, stem cell research, cell biology, bioassay screening, and molecular and cellular immunology.

Selected candidates are placed in various institutions for 2-3 weeks to gain hands-on experience in the above mentioned fields.

3. **Public lecture series on biotechnological innovation**
   To raise the understanding of the processes and procedures employed in biotechnology and other related issues, PABIC organizes a lecture series for the general public by well known biotechnologists and scholars in related fields every month. The lecture series hopes to generate interest among young students about the importance and recent advancements in biotechnology.

4. **Interviews and publication of articles**
   PABIC plays a vital role in informing people about the latest advancements in the sciences and biotechnology. It invites journalists, students, and science communicators to share biotechnology information with the general public through print and electronic media. PABIC staff are interviewed by many national and international newspapers and TV channels. The official newsletter of PABIC (Arisen) and translated ISAAA publications are also disseminated to the general public, and educational and R&D institutions.

5. **PABIC library**
   PABIC maintains a library with many popular journals related to biotechnology and other life sciences. The library is open to the general public and students of the University of Karachi. PABIC guests also benefit from the large digital resources of the LEJ National Science Information Center, which include 31,000 journals and over 40,000 e-books, many of them relevant to biotechnology and life sciences.

## Biotech Science Communication Initiatives in OIC Region

Science communication has been the weakest link in the implementation strategy for agricultural biotechnology in the OIC region. Except for a few countries, science communication on biotech crops is not a mainstream

activity. A critical mass of journalists and media persons capable of delivering objective information about biotechnology crop, is non-existent in most of the OIC member countries. Biotechnology Information Centers, which exist in only five countries out of 57 member states (i.e., EBIC, BdBIC, IndoBIC, MABIC, and PABIC) are rendering valuable services in biotech science communication in their respective countries. The Islamic Educational, Scientific and Cultural Organization (ISESCO), INOGE, and COMSTECH have also conducted a few workshops for journalists and scientists in various countries; however, their impacts have been very limited. There is a need for an approach where the creation of new BICs are encouraged and facilitated in the OIC region, jointly by OIC, COMSTECH, and ISAAA. Support for inter-Islamic workshops for journalists and other stakeholders is also a need at this time. Existing BICs can take the lead in these initiatives through their existing expertise and partnership with the bigger BIC family.

## Summary

Political leadership in the OIC member countries has been slow in accepting the fact that agricultural biotechnology can immensely contribute to sustainable socio-economic development. When they realized the importance of biotech, they faced serious impediments in terms of human resources and institutional capacity within their countries. Regional and international collaboration and linkages are also non-existent, further complicating the situation. In many countries, only a few trained agricultural biotechnologists are present and are spread out in many academic and R&D institutions. Thus, there is practically no critical mass of experts to initiate any meaningful project.

The other main bottleneck is the absence of national biosafety guidelines in most of the OIC nations. As a result, indigenous capacity in agricultural biotechnology remains at a very low level and fruits of human ingenuity in this most useful science have not reached the common people despite the political will. Brain drain and the recent economic recession have also contributed to the slow progress in this field.

There are many oil-rich countries in the Middle East and Central Asia which have made no progress in this field, despite availability of financial resources, mainly due to their tendency to buy everything abroad. A few exceptions, which can be regarded as success stories, are countries such as Pakistan, Malaysia, Turkey, Egypt, and Iran, which have human resources, institutional capacity, required legislation, and implementation strategies. These countries not only provide examples for others to follow but also serve as focal centers of manpower training, joint research projects, field studies, as well as a consulting pool for the development of national biosafety guidelines and biotechnology capacity.

Science communication initiatives in many of the OIC countries have not received deliberate and focused attention. Nevertheless, COMSTECH is now providing initial resources to institutionalize such efforts. Existing BICs are taking the lead in public awareness campaigns. It is envisioned that an additional five centers will be established in the next few years.

## References

Ghareyazie, Bhezad. 2000. Iran: Hopes, Achievements and Constraints in Agricultural Biotechnology. Agricultural Biotechnology and the Poor. An International Conference on Biotechnology. pp. 99-104. http://pdf.usaid.gov/pdf_docs/PNACH833.pdf (Accessed August 19, 2010).

Choudhury Naiyyum and M. Serajul Islam. 2004. Biotechnology in Bangladesh. Chapter 12 of Biotechnology and Development: Challenges and Opportunities for Asia. Edited by S. Chaturvedi, and S. Rao. Academic Foundation Press, India (2004).

DaSilva, Edgar, Elias Baydoun, and Adnan Badran. 2002. Biotechnology and the Developing World. Electronic Journal of Biotechnology. Vol. 5, No. 1: 64-92.

Islam, Ahmad. 2008. Future of Biotechnology in Bangladesh. http://www.baptcb.org/Future%20of%20%20biotechnology%20in%20Bangladesh.doc (Accessed October 15, 2010).

James, Clive. 2009. Global Status of Commercialized Biotech/GM Crops: 2009. ISAAA Brief No. 41. ISAAA: Ithaca, New York. 290 pp.

Islamic Educational, Scientific and Cultural Organization (ISESCO). 2003. Strategy for the Development of Biotechnology in the Islamic World.

Sukara, Endang and Inez Hortense Slamet-Loedin. 2000. Agricultural Biotechnology

in Indonesia. In Biotechnology Research Policy: Needs and Priorities in the Context of Southeast Asia's Agricultural Activities. Edited by E.M.T. Mendoza. Proceedings of Regional Conference on Biotechnology. Bangkok, Thailand. pp. 1-67

USDA Foreign Agricultural Service. 2009. Egypt Biotechnology. GAIN Report. http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biotechnology_Cairo_Egypt_7-15-2009.pdf (Accessed August 19, 2010).

USDA Foreign Agricultural Service. 2007. Indonesia Biotechnology Annual. GAIN Report. http://www.fas.usda.gov/gainfiles/200707/146291737.pdf (Accessed August 19, 2010).