

United Nations Division for the Advancement of Women (DAW, part of UN Women)  
United Nations Educational, Scientific and Cultural Organization (UNESCO)

**Expert group meeting**  
**Gender, science and technology**

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**Addressing Global Challenges:  
Focusing Science, Technology and Innovation (STI) Policy and Funding  
Through a Gendered Lens**

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Globally we are facing many challenges related to environment, health, energy, water, and food security – challenges which are exacerbated by conflict, disasters and climate change. We know that women experience these challenges in different ways and use a range of strategies to address them. We also know that science and technology (S&T) have much to offer in addressing these challenges, while science, technology and innovation (STI) also create the conditions for national economic development in general (UNESCO, 2007; Odhiambo, 2010; AAAS, 2000).

As well as using and benefiting from the results of STI, women should be developing and implementing STI solutions as a significant proportion of any nation's human resources base – they are an important pool of talent for science, engineering, technology and innovation. How can we encourage more women to enter and become leaders in the study of these fields, moving into the science, engineering and technology workforce? How do we incorporate a gender perspective into STI research and the development of strategies and products to support a development agenda? How do we provide a gender lens to STI policymaking?

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\* The views expressed in this paper are those of the author and do not necessarily represent those of the United Nations.

Specifically, STI policies need to be formulated in ways that support development that contributes to women's empow

## **2. Gender equality in science, technology and engineering, including research institutions, the private sector, government and scientific decision making**

Key issues include education at primary levels for girls and boys, getting girls and women into S&T education at secondary and tertiary levels, supporting women's recruitment, retention, advancement and leadership in the S&T workforce in both the public and private sectors, and promoting gender equality in scientific decision making, including national scientific institutions, grant and hiring committees, and government.

## **3. Women in innovation systems**

A neglected area of focus relating to gender equality and S&T is the innovation system. Innovation relates to the role of S&T for promoting long-term economic growth, creativity and research in a country. It involves the ability of countries and their public and private sectors to create, acquire, assimilate, use and diffuse scientific and technological knowledge as a major determinant of competitiveness in the global economy (David and Foray, 2003; Huyer and Hafkin, 2007). Issues for women include preconditions for participation (including access to education, capital and markets), and "innovation by women for women's needs" which involves improving livelihoods of women, adding value to farming products and accessing markets as collectives (Murenzi et al, 2010).

A strong international policy framework exists to implement all of these goals, derived from various topical communities (women, science and technology, sustainable development) and areas of intervention (education, employment, popularization of science, etc.). In addition to the international policies referenced in the Aide-Memoire prepared for this meeting, the "Seven Transformative Action Areas" developed by the Gender Working group of the Commission on Science and Technology for Development (CSTD) endorsed by ECOSOC in July 1995 are based on concrete and evidence-based recommendations for actions in each area. They are intended to support governments to implement policy and programmes which work towards gender equality. The seven Areas are:

1. Gender equity in science and technology education
2. Providing enabling measures for addressing gender inequalities in scientific and technological careers
3. Making science responsive to the needs of society: the gender dimension
4. Making the science and technology decision-making process more "gender aware"
5. Relating better with "local knowledge systems"
6. Addressing ethical issues in science and technology: the gender dimension
7. Improving the collection of gender disaggregated data for policy makers.<sup>1</sup>

Gender Advisory Board, CSTD

Transformative Action Area 8: Equal opportunity for entry and advancement into larger-scale science, technology, engineering, and mathematics (STEM) and innovation systems

Advancement into management and leadership

the development of products and processes. As a cross-cutting goal, gender equality and the empowerment of women also play a key role in the development and implementation of successful strategies to use science and technology to help achieve targets in all the Goals (see Appendix One).

This international policy framework is supported by an increasing number of regional and national STI policies which target differing areas and sectors, depending on regional context and priorities.<sup>3</sup> The three regional policies discussed here provide a good overview of the three different approaches to gender and STI policy, all of which reflect important aspects of incorporating women and gender balance into STI at the national and global levels.

The Gender Policy of the Southern Africa Development Community (SADC) refers to the importance to “advance women’s equal participation in decision making, trade and economy, agriculture and food security, health and HIV and AIDS, education and training and ICT” as a specific policy objective including “equal access for girls and boys to education, especially in science and mathematics” and “enhancing access of women and girls to quality education, including tertiary education, especially in non-traditional subject areas”. In relation to poverty, food security and nutrition, the policy calls for research on “appropriate, affordable and beneficial technologies” as well as inclusion of women in programmes to promote food production, processing and accessing natural resources, including promoting their training and employment as extension workers, researchers and agricultural workers.

In Latin America, a workshop on Gender and Science and Technology was organized in 2004 by the Organization of American States (OAS), the Inter American Commission on Women (CIM) and GAB-CSTD under the framework of Inter-American Program on the Promotion of Women’s Human Rights and Gender Equity and Equality (IAP). The workshop developed a set of recommendations for the Fourth Summit of the Americas (2005). The recommendations addressed gender mainstreaming of regional science and technology policies programmes, integration of a gender perspective in the creation, acquisition, utilization and dissemination of knowledge; gender equity in education and the workforce, science and technology for economic and social development and a gender equal knowledge society. These recommendations were presented at the Meeting of First Ministers and High Officials of Science and Technology of the OAS which met in Lima, Peru in November 2004. The "Declaration and Plan of Action of Lima", includes the statement:

Science, technology, engineering, innovation, and education are fundamental to promote the integral development of the countries of the Americas, which encompasses the economic, social, educational, cultural, scientific, and technological fields, as well as job creation to confront poverty, in the framework of protection of the quality of the environment and integration of the gender perspective in policies and to strengthen democracy.

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The Organization for Women in Science for the Developing World (OWSDW) and the Gender Advisory Board – CSTD, with funding from Sida, are collaborating on a series of regional surveys to review and assess regional policy frameworks and priorities around gender and STI, as well as the understanding of decision makers of the importance of these issues.

The Lima Plan also includes a commitment to "foster the expansion of human, institutional, and infrastructural capacities to undertake scientific and technological research in a framework of environmental protection, gender equity and equality, and openness to the inter-relation between the public and private sectors". The Summit Plan of Action into which this Declaration was submitted, specifically includes references to improving the quality of science education, including science, technology and innovation in national action plans, and recognizing the role of S&T in sustainable national development. It also includes a commitment to ensure equal opportunities for all to employment, remuneration and access to education and training, and "pay special attention to gender-differentiated needs".<sup>4</sup>

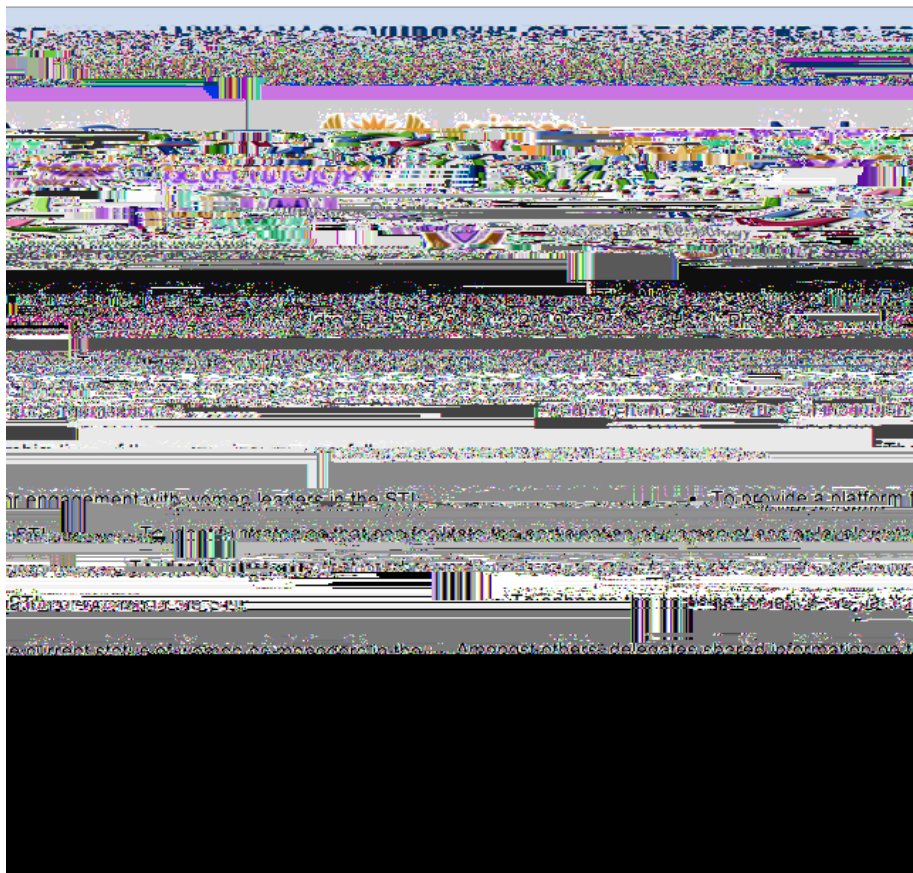
In Europe, the European Parliament in 2008 adopted a report calling for greater efforts to be made to address the under-representation of women in science, raising the target of female representation in 25% for evaluation panels, selection and other committees, as well as nominated panels and committees to 40% of all such positions. This is a non-binding target, raising awareness of the importance of moving towards greater parity. It also called for universities, research institutes and private businesses to adopt and enforce equality strategies and conduct gender impact evaluation in decision-making processes (Cordis News, 2008).

At the national level, a range of STI policies reflect all of these streams of emphasis – South Africa, Brazil, Rwanda, India, Ghana, China and the Republic of Korea are just a few countries which have developed policies in one or more STI areas in attempts to more effectively integrate women and gender into national STI systems. However, unless there is a translation from policy into action at national and local levels, policies will remain ineffective. Unless there is full integration of gender dimensions (both men's and women's) throughout the structure of the enterprise of producing and applying knowledge, unless there are capacity building structures in place, and unless there are systems to monitor and assess progress in gender integration, policies will mean little.

I will here present a range of examples of strategies for STI in Africa, Asia, Europe and Latin America. (8) JEMC /P D 6 BDC 0 Tc 0 Tw T(9)TjE

programme for Historically Disadvantaged Individuals (Government of the Republic of South Africa, 2002). The Reference Group was constituted to meet a number of requirements defined to address the priorities of its constituents: diversity of membership, including of race and gender (i.e. several members were male); representation from other regions which could provide advice based on experience (the United States of America, Europe); representatives from different sectors – university, private and civil society. SARG also oversaw the initiation of the first comprehensive sex-disaggregated data collection initiative in the country in S&T, which was also disaggregated by race. The data are updated every four years.

SET4Women is now a 10-person standing committee of the National Advisory Council on Innovation and undertakes a number of regular activities, including regular seminars and symposia on topics in women in science and engineering. The Department of S&T also presents awards in Women in Science to distinguished scientists.



Source: [www.naci.org.za](http://www.naci.org.za)

Similarly, the Department of Science and Technology in the Ministry of Science and Technology in India convened a Taskforce on Women in Science in 2005. The Task Force was made up of members representing different disciplines of science and technology. The Task Force was set up to take up the following issues: to identify the areas where women are under-represented; to identify the reasons for the under-representation; to recommend measures to improve the situation; to recommend measures to improve the situation of women in science and technology education; to recommend measures to improve the situation of women in science and technology education; to recommend measures to improve the situation of women in science and technology education.

recommend any other measures to increase the involvement of women in science and technology in the country. The Task Force held 10 meetings in different parts of the country. At each meeting a half day was built in for interaction with local women scientists. Along with a comprehensive set of recommendations for the public and private sectors and research institution to promote the participation of females in S&T, a set of projects was initiated to showcase women's achievements in S&T and to encourage girls and women into S&T fields. These include examination of gender stereotypes in science textbooks, development of a website [www.indianwomenscientists.in](http://www.indianwomenscientists.in), and a book and national conference highlighting achievements of women scientists. (Ministry of Science and Technology, 2009)

At the national and sub-national levels, a range of programmes exist to implement, support and finance policies to promote gender and STI initiatives – presented here are a sample of models of activities in specific sectors and levels of STI related to gender equality and women's participation.

### **1. Gender and STI for women**

From work done by the Regional Secretariat for Gender Equity in Science and Technology (RESGEST), we know that in Southeast and East Asia some government agencies are working on the ground to promote gender integration into agriculture, natural resources management programs, as well as rural extension.

- 1) All-China Women's Federation. The Federation has been very active in promoting the developing of women and children, especially in enhancing women's knowledge of science and helping women out of poverty using science and technology. With Government support it has provided education and skills training to eliminate illiteracy among young women in rural areas, and has worked with women in the central and eastern parts of the country to help them learn new technologies and gain knowledge of the market economy to generate income.
- 2) Indonesia – The Agency for Agricultural Research and Development (AARD) of the Ministry of Agriculture promotes the integration of a gender perspective in agricultural research. Researchers are trained in integrating gender into research as well as in socio-economic analysis of agricultural programs.
- 3) The Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) is the national policy planning and coordinating council for agriculture and forestry. It is mandated to address gender issues and build institutional mechanisms to support gender and development. It provides training and advocacy with officials, policy makers, planners, program implementers and development workers, including creation of a pool of resource persons and trainers. It publishes and distributes gender-related communications materials and provides support and tools to develop programs on gender and development as well as integrate gender equality into R&D programs and projects (RESGEST, 2004).

Programs pairing women scientists with rural women are also effective strategies to develop technologies that support women in their everyday activities. An example is the Scientific Pj-0.TJ0.0E0.000adivitiu025 -1pA8iu02a young5 -T.TJ0.



with poor and rural women to bring improved science and technology to the grass roots. This program builds capabilities of both women scientists and rural women in the development and adaptation of S&T and ICT for poverty reduction. The Association was instrumental in the introduction of locally made solar water-heaters, solar cookers, refrigerators and solar dryers into urban communities. Solar dryers were used to dry vegetables for storage and income generation. Solar stills were developed to distil salt water in isolated communities, a particularly useful technology in dry areas. The Association has also promoted the introduction of biogas technology in rural villages (Hassan, 2007).

## **2. Gender equality in S&T**

### **2.1 Education and research**

Brazil is a global leader in the participation of women in STI nationally. Women are today 44% of the workers in the labour force, with an activity rate related to education levels. In 2000, women with university degrees had an 82.3% “activity rate” or representation in the labour force, while the average rate for all women is 45.2%. This was still lower than masculine activity rates – 90.6% for those holding university degrees and 72.6% in average – but they are high compared to other countries in Latin America and the Caribbean. This is the result of a well established science and technology system, strong women's representation– both governmental and nongovernmental – and a regional policy context for S&T development. Recent policy initiatives include the creation in 2003 of a Special Secretary for Policy for Women with Ministerial status which replaced the National Council for the Rights of Women in existence since 1985. The Secretary has built on the work of the Council, and in recent years has taken on S&T as an area of focus. Conferences were organized in 2006 and 2009 on “Thinking gender and science”, bringing together an existing network of feminist research groups to discuss the issue of gender in science. The Secretary also awards a prize on “Building Gender Equality” for schools and undergraduate students. Both programs are part of the second National Plan for Politics for Women, addressing the issue of “strengthening the participation of women in an equal, plural and multiracial way in spaces of decision making; motivating the participation of women in scientific and technological areas”. (Secretaria Especial de Política para Mulheres. II Encontro Nacional de Grupos e Núcleos de Pesquisas Pensando Gênero e Ciência., in Abreu, 2010). One important strategy for the high representation of women in the science system is the structure of the university system. In 2008 women represented 45% of university teachers at the national level. One reason is that in Brazil all MSc and PhD students accepted in graduate programs of excellence, irrespective of nationality, receive a scholarship; the percentage decreases at schools evaluated at lower levels of evaluation. Additionally, recruitment for public sector universities is by public competition, including achievement of rank of full professorship. These programs among others – including a strong grant system and established S&T institutions – seem to be having some effect: in 2008, women represented the majority (around 60%) in Arts and Linguistics, Health Sciences and Human Sciences. They show equal participation (around 50%) in applied social sciences and biological sciences. Surprisingly, they make up a third of researchers in engineering; exact and earth sciences; and agrarian Sciences (around 30%) (Abreu, 2010). Few countries can make the same claim.

In Canada, a public-private funding scheme has been implemented to promote the role of women

in science; and to encourage young women to take up science and engineering careers, and encourage the private sector to support the development of young women scientists and technologists. Five Chairs have been set up across Canada in co-sponsorship with the federal scientific funding body, the National Science and Engineering Research Council (NSERC). NSERC matches contributions of sponsoring organizations up to a pre-set limit, on an annual basis. Contributions are accepted from industry, government, the university, or any other private or public sector organizations, communities or individuals. Currently there are Chairs at universities in five regions in the country. Recently RIM, makers of the Blackberry, have partnered with the University of Guelph on the NSERC/RIM Chair for Women in Science and Engineering.

**Objectives of the NSERC Chairs for Women in Science and Engineering Program**

1. Develop, implement, and communicate strategies to raise the level of participation of women in science and engineering as students and as professionals, specifically to:
  - encourage female students in elementary and secondary schools to consider careers in science and engineering;
  - increase the enrolment of women in undergraduate and graduate programs in science and engineering in all Canadian universities and colleges;
  - increase the profile and retention rate of women in science and engineering positions;
  - eliminate barriers for women who wish to pursue careers in science and engineering; and
  - promote the integration of female students and professionals both within and outside academia.
2. Provide female role models who are accomplished, successful and recognized researchers in science and engineering.
3. Develop and implement a communication and networking strategy to ensure a regional and national impact on opportunities for women in science and engineering.

Source: [http://www.nserc-crsng.gc.ca/Professors-Professeurs/CFS-PCP/CWSE-CFSG\\_eng.asp](http://www.nserc-crsng.gc.ca/Professors-Professeurs/CFS-PCP/CWSE-CFSG_eng.asp)

The Arab world is seeing the rise of efforts to educate women at the tertiary level, through different government-implemented programs. Th

## 2.2 Workforce

An example of a policy-supporting activity to promote a woman-friendly workplace in the S&T sector is the European Commission WiST2 (Women in Science and Technology) working group which is made up of representatives of the private sector and academic world to discuss the status and working conditions of women in private sector research. The group focuses on reducing the 'leaky pipeline' for women in science and technology, and on building the business case for work-life balance. Several studies have been published to date with an upcoming exercise to identify best practices in Europe and present an overview of initiatives to identify and promote a new working culture and environment in research and technology.<sup>5</sup>

## 2.3 Advancement, Retention and Leadership

The seventh Framework Program of the European Commission for the funding of science research in the region is currently supporting actions to support cultural and structural change in the way gender and diversity are managed in universities and research organizations. Universities and research bodies applying for funds are expected to develop common actions to incorporate systemic organizational approaches to increase the participation and career advancement of women researchers. “Institutions are encouraged to exchange best practices and create action plans that address essential structural changes, tackle specific organizational problems, and make better use of diversity”.<sup>6</sup>

In the United States of America, the National Science Foundation (NSF) provides funds through its NSF ADVANCE Program to increase the participation of women in the scientific and engineering workforce. It attempts to promote this through funding programmes intended to increase representation and advancement of women in academic scientific and engineering careers and leadership. It provides opportunities for both individuals and organizations: Fellows Awards, Institutional Transformation Awards and Leadership Awards. Through ADVANCE awards, NSF seeks to support new approaches to improving the climate for women in U.S. academic institutions and to facilitate women's advancement to the highest ranks of academic leadership.

For example, the Georgia Tech (GT) NSF ADVANCE Institutional Transformation Program from 2001-2006 created an inter-college network of termed professorships to promote communication, mentoring, and exchange among female faculty; it institutionalized a formal training process for committees involved in tenure and promotion decisions; it collected resource-allocation data to assess equity issues and developed a set of best practices; it held annual retreats of women faculty, provosts, deans and school chairs; strengthened and extended the scope and impact of family-friendly practices such as the Active Service Modified Duties process, lactation facilities, and a daycare center; it defined the problem/issues and developed strategies for advancement for women faculty.

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<sup>5</sup> <http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=1297>

<sup>6</sup> <http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=1297>

## **2.4 Decision making**

Biotech Park for Women was launched as a tripartite initiative of the Department of Biotechnology, the Tamilnadu state government, and the M. S. Swaminathan Research Foundation, which provided technical support. The Governing Body of the

One example of a national initiative to support, promote and encourage women in science is the National Science Foundation in the United States of America. It has a legal mandate to collect sex-disaggregated data on opportunities in education, training and employment in S&T fields and to incorporate gender research into its work.

The United States of America in 1980 instituted the Science and Engineering Equal Opportunity Act (1980), which states it is national policy that men and women have equal opportunity in education, training and employment in scientific and technical fields. The National Science Foundation is authorized to support and undertake research, data collection and other activities to assess, measure and increase the participation of women in science, technology, engineering and mathematics, including:

- activities designed to increase the participation of women in courses of study leading to degrees in scientific and technical fields;
- programs in science and mathematics in elementary and secondary schools;
- activities in continuing education in science and engineering to provide opportunities for women in the work force or women whose careers have been interrupted to acquire new knowledge, techniques, and skills in such fields;
- research designed to increase understanding of the potential contribution of women in science and technology and facilitate the participation and advancement of women;
- National Research Opportunity Grants and

More recently, a reassessment of review criteria by the National Science Board for award of grants from the NSF led to the addition of a criterion of “broader impacts” in proposal assessment, with the intention of supporting those initiatives which are meant to address social issues and benefit society at large, in addition to the more narrow “technical merit” criterion.

**National Science Foundation**

**Broader Impacts Criterion: What are the broader impacts of the proposed activity?**

gender dimensions of science research<sup>11</sup> and will bring in experts to consider gender equality actions in programme areas. In terms of specific program support, the FP7 supports actions in pursuit of change (both cultural and structural) in the way gender and diversity are managed in universities and research organizations. Universities and research bodies are expected to cooperate on common actions in order to implement the best systemic organizational approaches to increase the participation and career advancement of women researchers and are encouraged to exchange best practices and create action plans that address essential structural changes, tackle specific organizational problems, and make better use of diversity. Examples of areas supported include:

- recruitment, promotion and retention policies;
- updated management and research assessment standards;
- course content development;
- leadership development;
- supporting policies for dual career couples;
- returning schemes after career breaks.<sup>12</sup>

At the national level, several countries are implementing women-targeted funding schemes for research and education in science, including India, South Africa, the Republic of Korea, and China, while internationally there are a range of fellowship programs targeted to supporting women's education in science fields, including the L'Oreal-UNESCO Fellowships, the Organization for Women in Science for the Developing World doctoral fellowships (funded by Sida), the Schlumberger Foundation Faculty for the Future grants, the International Atomic Energy Agency fellowships, and the Gates Foundation grants for agricultural research in Africa which target women as well as men.

In assessing the impacts and results it may also be important to investigate the potential to measure or assess the extent to which women are participating in and benefiting from STI policies and programmes. One attempt to develop a measurement framework of this kind is the Gender Equality-Knowledge Society (GEKS) framework developed by Women in Global Science and Technology (WIGSAT) with support from the International Network of UNESCO Chairs in Communications (Orbicom) and the International Development Research Centre (IDRC). The framework combines sex-disaggregated indicators from major STI indexes with indicators from ICT and gender equality indexes to arrive at a more comprehensive picture of the enabling conditions, opportunities and benefits that women experience in the knowledge society and in national innovation systems. It provides a benchmarking and assessment framework to understand the rates of women's participation in various sectors of the knowledge society, and the opportunities and barriers encountered. To do this it combines data on STI education, workforce participation, labour force, and technology access among others, with gender equality indicators on economic status, life expectancy, and health etc. to help policy makers make the connection between providing the base enabling conditions for women to the generation of an expanded and diverse workforce that will contribute to national economic development (Huyer and Hafkin, 2007).

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<sup>11</sup> See Gender in EU Research Toolkit and Training, [http://www.yellowwindow.be/genderinresearch/index\\_downloads.html](http://www.yellowwindow.be/genderinresearch/index_downloads.html)

<sup>12</sup> <http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=1297>





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**Appendix One:**

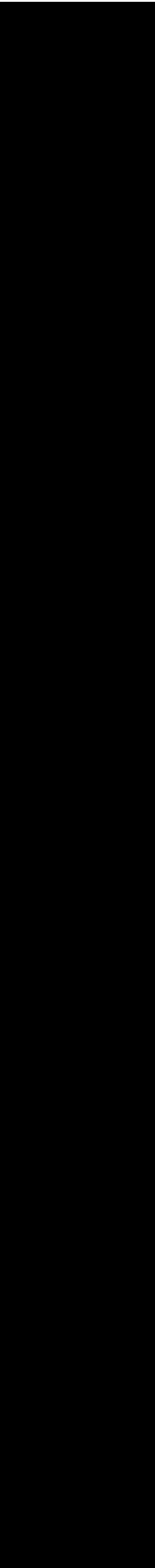
**Box: S&T and Gender Implications of the Millennium Development Goals**

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MDG

S&T Contribution

Gender Implications



	- Need for more educational content development	
3. Promote gender equality and women's empowerment	Improve technologies for women's daily work: <ul style="list-style-type: none"><li>- Improve energy</li><li>- Agricultural technology</li><li>- Access to clean water and improved sanitation technologies</li></ul>	

<p>7. Ensuring environmental sustainability</p>	<p>collaboration between groups at the Universities of Havana and Ottawa, producing a joint patent. The synthetic version is cheaper and easier to manufacture than the non-synthetic vaccine on the market.</p> <ul style="list-style-type: none"> <li>- monitor and improve drug quality</li> <li>-</li> </ul>	<ul style="list-style-type: none"> <li>- Women are caregivers of the sick</li> </ul>
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