



Overview

Science and technology are often viewed as the powerful engines driving the new knowledge-based global economy. Yet in many nations, it is the innovations and sustainable practices of traditional and indigenous knowledge systems that underpin community food security and provide a parallel source of understanding. Taking these together, the challenge for countries is to facilitate the opportunities of all citizens to contribute, by fostering an innovation system that is inclusive and a science that serves rather than threatens society. Gender-based analysis is a powerful public policy tool that can assist in achieving these goals.

The *Science and Technology* manual suggests three themes as a proposed framework for approaching issues of gender in science and technology:

- science by whom?
- science for whom?
- science in the service of global stewardship.

It presumes that local and indigenous knowledge systems can offer much value and understanding to modern science. In particular it calls for recognition of the gender dimension of these systems and their protection. It also illuminates the gender dimension of selected issues, providing a road map and agenda for action with specific recommendations for the following:

- local and indigenous knowledge systems
- the environment and sustainable development
- agriculture, biodiversity and food security
- science and technology education, careers and decision-making
- the differential impacts of science and technology
- biotechnology and ethical issues
- information and communication technologies
- habitat development
- natural and human-created disasters

It proposes tools for creating enabling environments and carrying out a structures and links survey in government ministries. The manual also includes a section on networks, online resources and websites.

Points of entry

- Basic education for all, with particular emphasis on scientific and technical literacy;
- Equal opportunity to acquire advanced training in science and technology, and to pursue careers;
- Gender mainstreaming within government and institutions, including policy- and decision-making bodies, responsible for science and technology;
- Research priorities and new technologies to take account of needs and aspirations of women and men;
- Equal access to scientific and technological information and knowledge;
- Recognition of local knowledge systems and their gendered nature as complementary to modern science and technology;
- Systematic and comprehensive collection of sex-disaggregated data – on participation rates and differential impacts; and
- Appreciation of gender dimensions across the range of activities identified above to provide fresh way of viewing and formulating public policy.

Barriers

- The 'leaky pipeline' with the high attrition rate of women involved in science and technology, from school right through to reaching the top decision-making positions;
- The fact that science and technology and the rising tide of new research are not gender-neutral in their impact; and
- Failure to recognise the gender dimensions of ethical and social issues of science and technology.

What's in this module?

The module first addresses the basic issues of achieving gender equity in science and technology (H1 'Goals for gender equity') and of access and attrition in this sector (H2 'The leaky pipeline'). Turning to solutions, the third activity examines factors to encourage the full participation of women, relating this to participants' own experiences (H3 'Creating enabling environments'). The next two activities cover issues of knowledge: women's traditional knowledge vs 'expert' knowledge (H4 'Science by whom?') and evaluation of the gender impact of selected issues in science and technology (H5 'Science for whom?'). Finally there is a solutions-oriented activity about environment and sustainable development and the role women play.

Checklist

- Make sure you are familiar with the contents of the *GMS Science and Technology* manual before you start to deliver the training activities in this module.
- The Toolkit Action Guide Unit 4 'Using the GMS sector manuals' will give you an overview and help you find out what is in the manual and where, and which sections will be most useful.
- Look through the 'To help you choose' table in the Introduction to this Trainer's Guide for activities, topics, methods and handouts from other modules and sectors that you can adapt to fit your purposes.
- Always start planning your training with an analysis of your learners and their needs.
- Use the 'How to' briefings in the Introduction to this Trainers Guide to help you design your training.

Background

Besides *Science and Technology*, relevant manuals are *Education, Trade and Industry*, and *Agriculture and Rural Development*.



ACTIVITY H1

Gender equity in science and technology

Aim To introduce some of the basic issues in achieving gender equity in science and technology

Outcomes

- Draw up arguments to support goals for gender equity in science and technology
- Evaluate goals and arguments

Time 1 1/4 hours

Materials Handout H.1 'Declaration of Intent', flipchart and markers

Steps

- 1 Give out copies of the handout. Ask participants if they are familiar with the Declaration. Explain for any who are not that it was the result of deliberations by a Gender Working Group of the United Nations Commission on Science and Technology for Development (UNCSTD). The Declaration formed part of UNCSTD's 1995 report on gender equity in science and technology and was approved by governments at the Economic and Social Council (ECOSOC). Read (or ask a participant to read) it out loud.
- 2 Divide participants into six small groups and give one goal to each. Ask them to assume that their government has agreed to put all its energies into reaching *one* of these goals. The group's task is to come up with four or five key points that will prove to the government that their goal is the most important one to achieve. They should write these reasons on flipchart paper. (30 mins)
- 3 Bring the groups back together and have each present their reasons to the rest (20 mins)
- 4 Have participants look at all five points again and think about the various arguments that have been presented. Then take a vote on which goal participants would recommend to government. Discuss whether it can be achieved without also pursuing one or more of the other goals. (15 mins)



Declaration of Intent on Gender, Science and Technology for Sustainable Human Development

- 1 To ensure basic education for all, with particular emphasis on scientific and technical literacy, so that all women and men can effectively use science and technology to meet basic needs.
- 2 To ensure that women and men have equal opportunity to acquire advanced training in science and technology and to pursue careers as technologists, scientists and engineers.
- 3 To achieve gender equity within science and technology institutions, including policy- and decision-making bodies.
- 4 To ensure that the needs and aspirations of women and men are equally taken into account in the setting of research priorities and in the design, transfer and application of new technologies.
- 5 To ensure all men and women have equal access to the information and knowledge, particularly scientific and technological knowledge, that they need to improve their standard of living and quality of life.
- 6 To recognise local knowledge systems, where they exist, and their gendered nature as a source of knowledge complementary to modern science and technology and valuable for sustainable human development.

Source: UNCSTD-Gender Working Group (1995)



The leaky pipeline

ACTIVITY H2

Aim To look at the reasons behind the small number of women working in the science and technology fields and suggest some strategies

Outcomes

- Identify underlying problems and issues
- Suggest strategies to tackle problems

Time 1 1/2 hrs

Materials Flipchart and markers, five index cards (or five pieces of paper approx. 4" x 5")

Steps

- 1 Refer participants back to the Declaration of Intent (Handout H.1) and its emphasis on science and technology education and training.
- 2 Using the flipchart, explain that the drawing shows some reasons why so few girls and women are to be found in the field of science and technology. Through discussion, bring out the points that:
 - a disproportionate number of girls do not have the opportunity to go to school
 - two-thirds of the world's illiterate are women
 - once in school, fewer girls than boys select and stay with science streams of study
 - many of them are diverted into the 'social' sciences as the education 'pipeline' begins to develop 'leaks'
 - girls begin to drop out at different stages for various reasons, so that a gender gap becomes apparent.
- 3 Tell participants that in this activity, they are going to 'plug the leaks' in the pipeline. Divide them into five small groups and give each of them one issue (institutional, financial, social, cultural, familial). Give each group flipchart paper, a marker and an index card/small piece of paper. They should identify on flipchart paper the problems raised by the issue and then write one to three short ideas to tackle them on the piece of paper. (Example of an institutional problem: science subjects are scheduled at the same time as cooking, with girls channelled into the latter.) (30 mins)
- 4 Bring the groups back together and ask each group to briefly present the problems that they have identified. (20 mins)
- 5 Have one person from each group read their three ideas. They should then come up and tape the paper over the spot on the flipchart to 'plug' the leak. (15 mins).
- 6 Open up the floor to discussion. Do other groups agree with the problems and solutions identified? (15 mins)
- 7 To conclude, ask participants what they see as the impacts of girls' lack of access to science and technology education (e.g. it limits their opportunities to meet their basic needs and improve the quality of their lives and those of their families; it restricts their access to employment and ability to create businesses; it deprives the country of the contribution of many talented citizens). (5 mins)

Notes

- Draw a large version of the 'leaky pipeline' from p 49 of the *Science and Technology* manual on flip chart paper. Make sure there is space for a piece of paper about 4" x 5" to be stuck over the various 'leaks'.
- Prepare for the session by reading pp 47-53 of the *Science and Technology* manual.

ACTIVITY H3

Creating enabling environments

Aim To examine the factors for an enabling institutional environment that encourages the full participation of women

Outcomes

- Apply checklist of factors for creating an enabling environment to their work environment
- Assess whether an enabling environment exists there

Time 1 hour

Materials Handout H.3 'Creating enabling environments'

Steps

- 1 Refer back to Activity H.2, which looked at how women in science and technology often face gender bias in education. Explain that this activity is going to look at the need for an 'enabling environment' at the next stage, in employment, that encourages the full participation of women. This involves a number of different factors, including recruitment, promotion and training.
- 2 Give participants copies of the handout. Explain that this checklist is adapted from a list identified by the UNESCO 1996 World Science Report. It identifies areas where policy intervention is needed to eliminate overt and covert bias in organisations. The aim is to remove barriers and to encourage the full participation of women.
- 3 Go through the checklist, asking participants to answer as it relates to their ministry, department or institution. If they come from different institutions, get responses that show the differences and draw comparisons. If all the participants work in the same environment, try to get agreement on the answers. (35 mins)
- 4 Use the responses as an 'overview' of the general situation. Ask participants to what extent they think an enabling environment currently exists, based on what they have heard. (10 mins)
- 5 Sum up by emphasising the need to introduce gender-sensitive policies and programmes in an organisation's cycle of hiring, training, promoting, re-entry and re-skilling. This will help to ensure equity by creating a gender-inclusive institutional environment.

Notes

- This activity should ideally be preceded by Activity H.2 'The leaky pipeline'.
- If the group is made up of participants from two or three particular departments or institutions, it could be divided into those groupings to work on Step 3 and then report back in plenary.



Checklist on enabling environments



Assessment of the environment:

- Have institutional self-evaluation questionnaires been conducted?
- Has there been a climate evaluation?
- Have monitoring surveys been conducted?
- Are there clear centres of responsibility for equity evaluation, monitoring and reporting?

Recruitment

- Are positions advertised openly and competitively?
- Are pro-active search techniques used to seek qualified female candidates, using women's professional science and technology networks, other NGOs and the Internet?
- Are the interviewing teams and recruitment committees gender balanced?
- Are gender-neutral interviewing techniques, language and formats used?
- Are targets in place for proactively hiring qualified female professionals?
- Are study fellowships available to women?

Retention

- Is there a corporate policy on gender with senior management support?
- Are there equity action plans?
- Are there enforced corporate policies on sexual harassment?
- Are there corporate guidelines on language, illustrations and visual materials?
- Are there high visibility ombudspersons and women represented on grievance committees?
- Have women been appointed to powerful and high visibility committees?
- Is there institutional support for professional science and technology women's networks and Internet groups?
- Are role model and mentoring programmes recognised and supported?
- Are there supportive spousal employment programmes for husbands?
- Are there on-site child-care facilities and assistance with 'elder care'?

Promotion

- Are there flexible tenure and promotion criteria?
- Is there succession planning and career counselling?
- Have equity targets been set with timelines and statistical tracking?
- Is there regular public reporting of corporate performance?
- Has a pipeline of female candidates been created?
- Is the performance appraisal system gender-neutral and bias free?

HANDOUT
H.3

Re-entry

- Is there scope for flexi-time, flexi-location and job sharing?
- Is there a return to work directory on refresher courses, child-care options, mentors, role models and career counselling?
- Are there career-break schemes and re-entry courses?
- Is there a child-care allowance for applicants?
- Are there progressive parental leave policies?

Training and development

- Is there gender sensitivity training for teachers, students and staff?
- Has the curriculum been revised to remove gender biases?
- Are the language, images and visual illustrations used gender-neutral?
- Are the diverse ways of doing science and differing gender patterns in communication and learning styles taken into account?
- Is training provided on gender, interviewing techniques, combating harassment, etc.?
- Are there executive level internships for women?

Separation

- Are separation packages gender equitable?
- Are exit interviews conducted with women?

Pay and funding

- Is there pay equity?
- Is there equity in research funding?



ACTIVITY H4

Science by whom?

Aim To encourage discussion about ways women's traditional knowledge is often passed over in preference for an 'expert' opinion

Outcomes

- Through case study/role play assess the part women play in consultations and discussions
- Observe how and why women's knowledge may be passed over

Time 1 1/2 hours

Materials Set of role cards, Handout H.4a 'Story of the nkejje fish', flipchart paper

Steps

- 1 Explain that the participants will play the role of a village committee trying to decide on a new development project. Some members are in favour, others are in opposition and some are undecided.
- 2 Have the participants pick their cards at random. Give them time to read their cards, and then read out (or have someone read) the radio report.
- 3 Begin the role-play by calling the council meeting to order. Ask participants with character cards to introduce themselves to the group, saying, "My name is... and I believe that". Ask Mr Nambuya to go first.
- 4 Once everyone has introduced herself or himself, ask them to get together in two groups, one in favour of the project and one against it. Those who are not totally committed one way or the other can drift between the groups. The groups should come up with as many reasons as possible for their position to present to the council. They can list these on flipchart paper. (30 mins).
- 5 Call the groups back together and ask each group to make a short presentation. Individual characters can also add their arguments (including appeals to other specific characters). Then take a vote on whether the Nile fish project should go ahead or not. (15 mins)
- 6 After the vote, distribute and read out Handout H4 'Story of the nkejje fish' describing what really happened. Lead a discussion that focuses on why participants voted the way they did, whose opinion carried the most weight in the small groups and why, why the women weren't consulted in the first place, and whether participants have had similar experiences in real life. (20 mins)
- 7 Sum up by stressing the important role that women play in science and technology at the community level and the need to respect their knowledge.

Notes

- This activity is adapted from a role-play described in IWTC, 1997, based on Appleton, 1995.
- Make sure that there are enough character cards for all the participants; make as many 'individual member' cards as necessary.

ACTIVITY H4

Radio Announcement

New 'wonder fish' brings riches to the people of Jinja District.

A council meeting is scheduled to take place this evening on the shores of Lake Victoria, Uganda. Tempers are high and arguments are flying in this usually quiet and happy village in Jinja District. Members of the community have called an emergency meeting to discuss and finally resolve a community disagreement arising from a government project that many say has brought ruin to the community. This introduced Nile perch fish to the lake as a commercial venture but has made the local nkejje fish almost extinct. Everyone from the village will be present, together with representatives from the project and council officials, all of whom will be asked to vote on whether or not to continue the project.

Character cards

Mr Nambuya, Project Development Officer

You are the head of the project that was responsible for introducing the Nile perch fish to the lake. You and your colleagues call this perch the 'wonder fish' because it is both delicious and commercially profitable. You have come to the council meeting because you have heard that some of the women are against the project. They say the Nile fish has eaten the local nkejje fish, which is high in protein, that there is an increase in illness due to the change in diet, and that the lake is being polluted by algae. You find this argument unscientific and based on tradition and hearsay. You are pleased that so many in the community can see the commercial rewards of the new fish and have noticed that some of the men have new bicycles and other goods. You suggest that the money earned from the project could be used for medicine. You try to convince those present of the value of the fish but will leave the decision to a vote.

Mr Sizomu, local tradesman who sells the Nile fish to the commercial market

You stand to get rich from this project and you support it. You claim that people in the community should work in order to buy medicine, and eat more westernised food. You don't agree with the women that lack of nkejje fish causes illness. What do they know? While you are really just interested in making money, you want everyone to believe that you are working for the good of your fellow man.

Mr Sengendo, husband of Mrs Sengendo

You strongly believe the project should go forward. You believe in government-sponsored projects, particularly when they help the community earn more income. You are constantly arguing with your wife to get her to see that her 'women's talk' is irrational. You try to curry favour with the Project Development Officer, Mr Nambuya, and to make an ally of Mr Sizomu.

Supporters of Mr Sengendo (two cards)

You strongly believe the project should go forward. You believe in government-sponsored projects, particularly when they help the community earn more income. You are constantly arguing with the women that their knowledge is based only on what their grandmothers taught them or on rumour.



ACTIVITY H4

Mr Mugawe, bachelor with contacts in the city

You are training to be an engineer and would like to see your village modernised. You agree with most of the men that the project is worthwhile, but disagree with them that the women's view is ill-founded. You believe that protein deficiency does relate to the lack of nkejje and have been conducting research with someone from the Uganda Fresh Fisheries Research Organisation. On the other hand, you believe that future income from the Nile perch will allow the community to purchase protein-rich foods, among other things.

Mrs Nasingwa, wife of Mr Nasingwa

You have been involved in the processing of fish products for years. Your primary concern is the nutritional needs of your family. You find that the nkejje fish keeps them healthy. Although you want to preserve the fish, you think that the new project will provide enough cash for you to buy the medicines or protein-rich food your family needs. You believe it may be too late to reintroduce the nkejje fish now that the Nile perch have taken over.

Mr Nasingwa – husband of Mrs Nasingwa

Your son, Joseph, is ill. You tend to agree with many of the women that nkejje fish contains protein that seems to have kept the villagers healthy. You are suspicious of government projects, thinking they benefit local businessmen rather than the people. You think the nkejje fish should be reintroduced. Team up with Mrs Sengendo and the members of the Women's Municipality Committee, even though you find them a bit radical.

Mrs Sengendo, Chair of Women's Municipality Committee

You believe women are suffering because the nkejje fish are disappearing. You are strongly against the project because you feel it will replace a very nutritional, cheap source of food that is also a valuable medicine. Profits from the project are not reaching women, who are unable to afford subsistence food and medicine. Also, the lake is becoming polluted with algae and from the factories processing the Nile perch. You think the Project Development Officer is completely misinformed and not interested in women's opinions. You believe Mr Sizoomu is out to make an easy profit. Mr Nasingwa may be a possible supporter. Mr Mugawe and Mrs Nasingwa might also be persuaded.

Members of the Women's Municipality Committee (three cards)

You agree with Mrs Sengendo that women are suffering because the nkejje fish is disappearing. You feel that the project will replace a very nutritional, cheap source of food that is also a valuable medicine. Profits from the project are not reaching women, who are unable to afford subsistence food and medicine.

Undecided members of the community – You don't really know what to think about the project and are prepared to be convinced by the arguments.

HANDOUT**H.4**

Story of the nkejje fish

For years the people living along the shores of Lake Victoria in Uganda have been using the lake as a rich source of food. Women processed and sometimes fished for the various species of fish in the lake. They found the small nkejje fish, with its high protein content, to be especially valuable in preventing malnutrition and other common childhood illnesses. It is thought to be so potent that even the stick it is dried on has healing power.

In 1965, as a result of a joint Uganda Overseas Development Programme, a new fish species called the Nile perch was introduced to the lake as an income-generating venture for the community. The result, however, was that the Nile perch ate the nkejje fish almost to extinction and completely altered the ecological balance of the lake. The nkejje fish, which kept down the algae, were disappearing, and the algae was poisoning the lake. Factories built to process the Nile fish were also polluting the lake.

Few women were consulted about the project, and almost all of them were against it. When children began to fall ill, the women began to try to find ways of preserving the nkejje fish, such as transforming it into medicinal powders. As this became more widely known, research was done on the fish. It was found to have a very high protein and calcium content. Local nutrition clinics then started using nkejje fish in the treatment of various childhood diseases and, ironically, a government campaign began encouraging mothers to feed their children with nkejje. The uses of the fish, known to women for years, were now being fed back to them as 'scientific knowledge' for them to adopt.



ACTIVITY H5

Science for whom?

Aim To raise awareness that science and technology are not gender-neutral in their impacts

Outcomes

- Evaluate the gender impact of four issues in science and technology
- Suggest possible ways of introducing gender sensitivity to the issues

Time 1 1/4 hours

Materials Handout H.5 'Science and technology issues', flipchart and markers

Steps

- 1 Explain to participants that this activity is going to look at how science and technology have different effects on women and men.
- 2 Tell participants that one of the two central conclusions of the 1995 UN Commission on Science and Technology for Development (UNCSTD) Gender Report was that: "To ensure that science and technology benefits all members of society, attention must be paid to the respective needs and interests of men and women equitably".
- 3 Divide participants into five small groups and give them copies of the handout. Tell them that they are going to look at four different issues and, drawing on their own experience as well as the handout, answer the following questions as a group:
 - will the issue affect: (a) men more; (b) women more; or (c) both men and women equally?
 - if (a) or (b), how will it affect one gender more than the other (there may be several ways)?
 - again, if (a) or (b), what are some ways of introducing gender-sensitivity to the issue?

They should record their responses on flipcharts. (40 mins)

- 4 Bring the groups back together and have them post their charts around the room. Give participants time to look at each other's points. (5 mins)
- 5 Choose one group that have chosen 'women more' for the first issue. Check this on the prepared flipchart. Have them present their reasons and suggested remedies. Write their answers on the prepared flipchart. Ask for the input of the other groups. Add any different ideas. Then select another group which has chosen 'women more' for the second issue, and so on until the flipchart is completed. (20 mins)
- 6 Sum up that while science and technology may appear to be objective and hence gender neutral, they in fact affect women and men differently. This needs to be kept in mind in policy formation and implementation.

Notes

- During Step 5, be sure to allow time for groups who have selected 'men more' or 'men and women equally' to have a say. Ask the groups who have selected 'women more' to defend their position.
- Prepare a flip chart as shown on the next page.

Prepared flip chart

	Women more	Men more	Women and men equally	How affected	Possible solutions
Genetic engineering and TRIPS					
Biotech. and ethics					
ICTs					
Arms/armed conflict					



Science and technology issues

HANDOUT
H.5

1 Genetic engineering and TRIPs

Genetic engineering is altering the way that agriculture is practised. The most widespread application of genetic engineering in agriculture is herbicide resistance, that is, the breeding of crops to be resistant to herbicides. When introduced to farming systems in developing countries, this technology leads to increased use of agri-chemicals thus adding to environmental problems. It also diminishes agricultural biodiversity. Under the Trade-Related Intellectual Property Rights (TRIPs) agreement of the World Trade Organisation (WTO), parts of plants such as genes, cell lines and characteristics are patentable. An example of this is the Neem tree in India – used for generations to treat skin infections, control pests and in many other ways – which now has 35 patents in Europe and North America. Similarly, American scientists have isolated a protein from brazzein, a West African berry traditionally used as a sweetener, which they plan to patent and develop into a US\$100 billion a year market. Intellectual property rights (IPRs) on seeds have the potential for making seed saving and seed exchange illegal.

2 Biotechnology and ethical issues

Issues concerning science and ethics can be divided into the lack of (or need for) ethics frameworks, both within the scientific research enterprise and for government and intergovernmental bodies; and the ethical implications and impacts of science and technology on the lives of women and men in society. Medical technologies now touch us intimately at every stage of our lives. Technology gives us the unprecedented power to create, manipulate and alter human life in the laboratory; to keep people alive in a state of living death; to use one person's organs and tissues so that another can live; and to create clones of ourselves. Our very definition of who we are and what it means to be human is challenged. The essential question has become: How do we balance the ability of science and medicine to enhance our lives with our obligations to protect individual and collective rights? Many implications of these fast-emerging technologies have particular impact on vulnerable populations. The so-called miracle advances and development of the new reproductive technologies in particular raise many ethical issues.

3 The new information and communications technologies (ICTs) and employment

The present phase of globalisation and economic liberalisation is very much driven by ICTs, mainly controlled and dominated by multi-national corporations located in the industrialised countries. Enormous disparities in terms of access to the National Information Infrastructure (NII), a necessary precondition for IT application, are reflected among Commonwealth countries as well as within the countries themselves. There is a gender gap between the information 'haves' and 'have nots'. ICTs have an enormous impact on employment and work. The introduction of ICTs leads to a fragmentation of the labour process in manufacturing: low-skilled and repetitive work on the one hand; and an upgrading of workers' high-grade skills in multi-task jobs using ICTs on the other. Those in low-skilled work are often paid very little and are not protected by existing labour laws. The use of non-regular workers weakens the ability of workers to organise themselves as well as the ability of unions to organise those who fall under the 'informal sector'.

4 Arms technology and armed conflict

The world now has 26 million people in the regular armed forces, another 40 million in military service and a stockpile of 51,000 nuclear weapons. Investment in arms technologies is often at the expense of health, education and social programmes. Further, most recent and on-going conflicts are civil wars that make the entire country a war zone and cause a major increase in the number of civilian casualties (from around 5 per cent in the First World War to 90 per cent currently). When war occurs, it affects most heavily those who, by their assigned social role, provide social safety nets to society when governments fail to deliver.

ACTIVITY H6

Gender, the environment and sustainable development

Aim To raise awareness of the gendered nature of environmental perceptions and the role women play in the environment and sustainable development

Outcomes

- Identify solutions to problems women face to do with environment and sustainable development
- Relate to such issues as women's knowledge, participation and enabling environments

Time 1 1/4 hours

Materials Handout H.6 'Seeking a sustainable human future', flipchart and markers

Steps

- 1 Explain to participants that, following on the last activity, this one is going to look at one issue in the area of science and technology in more detail.
- 2 Give participants a copy of the handout and an index card (or piece of paper) and a pen. Allow them time to read through the handout. (5-10 mins)
- 3 Ask participants to pick out three problems from the handout or their own experience, related to women in the area of the environment and sustainable development, and write them on the card. (5 mins)
- 4 Get participants to put their chairs in two lines facing each other. Give the lines names. (e.g. A and B).
- 5 Ask participants in line A to tell the person opposite one of the problems that they have identified. The participant in line B should then think of a solution or recommendation for tackling the problem from his/her experience, or see if there is one in the passage, and tell this to the participant in line A. If there is no answer, participant A should note this on her/his card.
- 6 Ask everyone in line A to move down one space (with the person at the end of the line moving round to the other end). The participants in line B should then tell the person opposite one of the problems they have identified. That person should suggest a solution or recommendation (from experience or the passage) and the questioner should note if there is no answer given. Continue in this way, with the questioner moving after each question, until participants have all presented their three problems. (20-30 mins)
- 7 Have participants return their chairs to their original positions. Ask them whether they have any problems that did not have suggested solutions or recommendations. Let other participants answer if they can. List any outstanding problems on flipchart paper and ask for recommendations from participants to solve them. (15 mins)
- 8 Sum up that women face many problems to do with the environment and sustainable development, while also being the ones most responsible for environmental management and sustainability. Many solutions and recommendations exist but have yet to be put into effect.
- 9 Conclude by referring participants back to the Declaration of Intent. This stressed the value of women's local knowledge and the need to ensure that women have access to information. It also states the need for women's participation in science and technology decision-making. This again goes back to the need to fix the leaky pipeline and create enabling environments. (5 mins)



Seeking a sustainable human future



"Greater attention to environmental health, especially women's environmental health, in all science and technology development interventions, is essential for sustainable development" (UNGCSTD, 1995).

Women's health and environmental health are closely linked. Women's roles in the use of water, preparation of food and tending of the sick all reveal that they possess considerable knowledge about how to use the environment in a sustainable way. At the same time, however, women's health can be threatened by changes to their local environment resulting from such things as the introduction of irrigation schemes, hydroelectric dams, monocropping, pesticides and herbicides. Findings presented at the 1998 World Renewable Energy Congress meeting in Florence, Italy, showed that women are the group most affected by energy scarcity and related environmental degradation, both economically and through negative health impacts.

Women (and children) are also more exposed to the 'indoor air pollution' that comes from burning coal, wood and other fuel for cooking and heating, leading to problems such as lung disease, acute respiratory infection, lung cancer, adverse pregnancy outcomes, chronic bronchitis and eye conditions. *Energia News*, the newsletter of the International Network on Women and Sustainable Energy has pointed to the fact that "in most developing countries, cooking is a major, if not the major, use of fuel." The editors conclude that improved cooking technology would reduce women's fuel gathering burden, conserve energy and lead to better health (Issue 2, May 1997).

Women and men may have a different focus and level of awareness with regard to the eco-systemic associations that link various aspects of nature. Research carried out by the WEDNET team in Africa suggests that environmental perceptions are often gendered, and that the elements of the natural environment known and valued by women and men may be different, regardless of the cultural or regional setting. The gendered nature of people's perceptions about the environment is not limited to knowledge of different plant and animal species. It is reflected in the prevailing gender-based division of labour, in the various responsibilities and rights that women and men have in the use and ownership of land, trees, animals, plants and water, and in the different knowledge of particular natural resources and ecological zones.

Ironically, while women own only 1 per cent of the world's land and have fewer economic rights than men, they play a vital role as the primary managers of both environmental resources and community life. A recent ECOGEN case study, for example, reported that women in Kenya played a central role in helping their community survive a drought that sent every resident into the fields and hedgerows to scour the natural environment for food. Women, as the majority of the poor people of the world, have the biggest stake in protecting the natural resources that provide the basis of their livelihood. They are also less likely than men to have access to alternative economic opportunities.

Over the last few decades, a great deal of scientific research and technological innovation has been devoted to improving living standards and raising incomes. Science and technology have allowed the constant testing of nature's limits in pursuit of ever-greater efficiency, productivity and profits. However, two profound dilemmas have arisen:

- Many of these scientific and technological interventions, no matter how well meant, have been limited in their success and, all too often, ultimately detrimental to the sustainability of the natural environment. In spite of all the scientific and technological effort, women's poverty, especially compared to men in their own households and communities, has continued to rise.
- Women have been disproportionately exposed to the consequences of environmental degradation, in both rural and urban areas, particularly through their activities in the collection of fuel wood and water, the production of food crops, and through their work in the maintenance of homes and neighbourhoods.

HANDOUT**H.6**

Ignoring the perspectives of women, who are more closely connected with the environment, may mean that the resulting science and technology may not be the most appropriate for sustainable development. In fact, the invisibility of women's 'landscape' in scientific and technological research and application has had profoundly negative impacts on women's income and well-being. Nature has been viewed through only one eye, and with one side of the collective human brain. Careful use and sustainable management of local – and planetary – ecosystems, however, requires full human sight and insight.

The failure of development planners, scientists and technological innovators alike to recognise that women may see and understand the natural environment differently from men, and have very different interests and goals in the use and management of their local environment, has also had a profoundly negative effect on the sustainable management of local ecosystems. Most policies on environmental conservation do not take into account the different impact that they will usually have on women and men and therefore the livelihoods of the communities. For example, policy makers have generally not recognised that deforestation has multiple impacts on women, who typically use forest products as food, fuel, fodder for livestock and medicine. This lack of gender awareness has led to reforestation schemes that have advocated the planting of trees such as eucalyptus that do not provide women with these resources.

Women's views and goals generally include the welfare of three generations, including their children and care-giving for older generations. This inter-generational appreciation and accountability, a care ethic embodied in women's work and perspectives, should be accorded comparatively greater weight than the male-derived policy framework currently driving science and technology systems – including the war machinery industry – in the global quest for a sustainable human future. Women's advice and knowledge about cooking, water, food and medicine, and their roles in energy supply and use, can be actively used to improve the effectiveness of sustainable energy technologies and to support sound economic development that improves the quality of life for families, communities and for the women themselves.

Recommendations

- Take women's environmental health as a starting point for ensuring the appropriateness of all science and technology interventions.
- Use science and technology in a gender-sensitive manner to alleviate women's poverty through research and policy to meet their expressed environmental perceptions, needs and interests.
- Support women's micro-enterprise activities through environmentally sound and relevant science and technology interventions.
- Ensure women's environmental literacy through their increased access to formal and informal environmental education, and to relevant science and technology expertise and information, as a basis for their increased participation in community-based environmental decision-making.
- Support women's participation in national-level environmental decision-making.