

# :Women in Science and Technology: Worldwide Initiative and Indian Needs

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IISc



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IUPAP WGWIP



# Outline

- x Connection between participation of Women in S&T and the discussion of S&T and Society.
- x Worldwide Initiatives
- x Needs in the Indian Context and Steps being taken

# Science, Society and Women

Why the issue 'Women in S&T' pertinent for a discussion of 'Science and Society'?

✗ Contribution of the 50% of the Society to S&T

✗ Women have played traditionally a strong role in nurturing the young mind. Hence their participation in S&T can influence the relationship between Society and Science in more than one ways.

✗ The fact is recognized world over, e.g., look at the web site of EU for Science and Society:

[http://europa.eu.int/comm/research/science-society/women-science/women-science\\_en.html](http://europa.eu.int/comm/research/science-society/women-science/women-science_en.html)

# Science, Society and Women

(con.)

The screenshot shows a web browser window displaying the European Commission's website for Science and Society in Europe. The browser's address bar shows the URL: <http://europa.eu.int/comm/research/science-society/women/science/women.htm>. The website features a navigation menu with links for Home, Bookmarks, WebMail, Calendar, Radio, People, Yellow Pages, Download, and Channels. The main content area is titled "Science and Society in Europe" and includes a sub-section for "Women and Science".

**Women and Science**

In most European countries, the numbers of women scientists and professional engineers are higher than those of male graduates. However, the gender balance in the labour market remains unequal. Women have unequal access to their scientific work, especially in senior positions, and are under-represented in the academies and in the decision-making bodies concerned with scientific issues. Achieving equal and full participation of women in a scientific profession and at all levels of education, diversity, and providing further progress are excellent in European science. Achieving such a real and lasting change will go beyond women currently working in science, or aspiring to work in science, to help create a more inclusive European science research area for the benefit of the economy and society as a whole.

**Mainstreaming Gender and Collocating Scientists in HEIs**

To contribute to the promotion of women in science research, the European Commission is undertaking measures to ensure gender mainstreaming in the Sixth Framework Programme (FP6), from 2002 to 2006. The Commission will monitor any progress made in the participation levels of women scientists in FP6. To this effect, statistical data on gender distribution will be gathered and will thus provide improved breakdowns and interpretation based on gender.

**The Helsinki Group on Women and Science**

The role of the Helsinki Group on Women and Science is to exchange views, experiences and best practice on measures and policies devised and implemented at local, regional, national and European level, encouraging the participation of women in scientific careers and research. The group first met in Helsinki in 1999, since its name, and consists of five scientists and gender experts from the 15 EU Member States and 17 countries associated to the Framework Programme.

**Women and Science Networks**

Networking is an essential tool for empowering women scientists in Europe. In 1999, the Women and Science Unit produced a comprehensive directory of female scientists and researchers. This directory is the "Women and Science" directory.

The left sidebar contains a navigation menu with the following items:

- Introduction
- Science & governance
- Ethics
- Scientific awareness
- Youth & science
- Women & science
- Action plan

Below the menu is a section for "FP6 CALLS" and a logo for "SCIENCE AND SOCIETY".

# Science, Society and Women

(con.)

Mainstreaming Gender in Science recognized to be necessary. Part of large number of measures being taken for gender equity in all parts of life

Why particularly relevant for Science?

50% 'intellectual reserve' underutilized in the quest for broadening the horizons of Human knowledge. Full involvement can help us realize the human potential to its full capacity.

## :World Initiatives:

1999: International Union of Pure and Applied Physics (IUPAP) formed a Working Group on Women in Physics (WGWIP).

Site:

<http://www.if.ufrgs.br/~barbosa/conference.html>

Charge: survey the current situation and suggest action points.

# :World Initiatives:

APS study of Status of Women in Physics:  
started in 2000.

Working groups formed at National Levels in  
different countries

March 2002: International Conference on  
Women in Physics in Paris

# :WGWIP:

## Questions asked by this group:

- 1) Attracting Girls into Science,
- 2) Launching a Successful Science Career,
- 3) Getting Women into the Science Leadership Structure Nationally and Internationally,
- 4) Improving the Institutional Climate for Women in Science.

## :World Initiatives:

European Union had also initiated Study group for Women in Science(ETAN report) 1999. A special program on Women and Science started with a view to gender mainstreaming.

**ETAN:** European Technology Assessment Network for Women in Science.

## :World Initiatives:

For better dimension of the gender integration in research policy networking of women extremely important

Special programs instituted by the European Commission.

# World Initiative (con.)

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RESEARCH



English

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## Science and Society in Europe

■ Latest updates ■ Highlights ■ Documents ■ Links ■ Contacts

- Introduction
- Science & governance
- Ethics
- Scientific awareness
- Youth & science
- Women & science
- Action plan



### Women and Science Networks: Towards a European Platform of Women Scientists

- [Study](#)
- [Publicities](#)
- [Events](#)
- [Media Links](#)

In its 1999 Communication [Women and Science: mobilising women in world European research](#), the Commission recognised that networks of women scientists have a key role to play in ensuring a better integration of the gender dimension in research policy.

The primary work was published in 1999 to create a directory of networks of women scientists and a Network Guide was published containing their profiles and contact addresses. A conference that same year resulted in the adoption of a [Declaration](#), which emphasised the importance of networking with entrepreneurship and industry, and set out mechanisms for future cooperation and action.

These ideas have been taken up in the [Action Plan on Science and Society](#). Under Action 24, the Commission announced its intention to set up a European Platform of Women Scientists to bring together networks of women scientists and organisations committed to gender equality in scientific research.

**Action 24:**  
**Establishing a European Platform of Women Scientists**

There is a need for a framework to make use of women's experience and good practice while working to improve gender equality in science and research. This would create the mechanism for involving women scientists more actively in the European policy process, by disseminating information and supporting teaching and laboratory work. It would encourage women scientists in their careers, with training courses and networking activities, a database of role models and mentors, awards and awareness-raising initiatives.

The aim for the European Platform of Women Scientists to be a democratic

Done

# :Some Lessons:

## Lessons:

- 1) In western world, at least, fraction of girl students in Science very small. i.e. The fraction is small at the entry level.
- 2) The difference between fraction of women and men in Science and Technology, goes on increasing with increasing position in Hierarchy.
- 3) The leak factor for women Physicists (WGWIP) and, actually all Scientists (ETAN), goes on increasing with increasing level of education as well as scientific hierarchy.

# :Some Lessons:

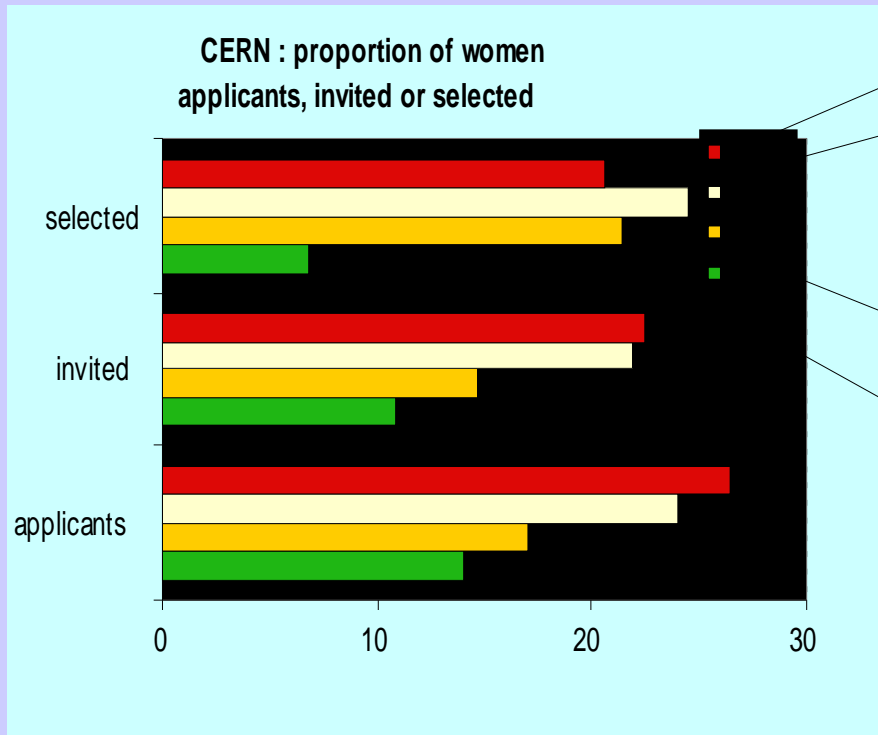
University Physics faculty  
in Italy in 1999

Women in U.K. Physics  
academecia in 96/97 from  
ETAN report

Position	Women	Total	%Women	Position	%Women
Researcher	187	757	25	Lecturer	9
Assoc. Prof.	142	963	15	S.Lecturer	4
Full Prof.	29	645	4	Prof.	1
Total	358	2365	15	Total. Reg.	5

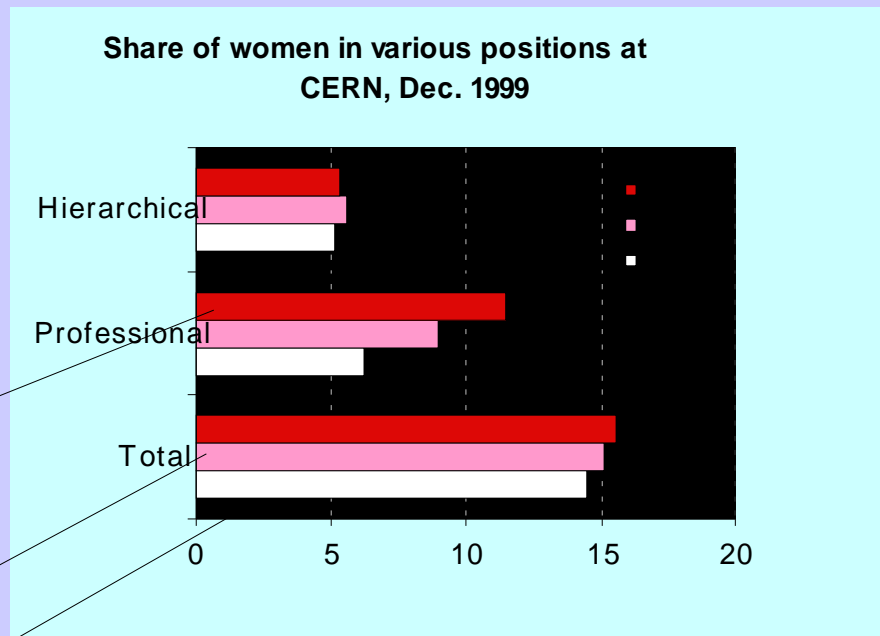
Even in countries with considerable participation of women in Physics (Italy) at the level of students and postdoctoral fellows (25%) the fraction of women professors is about 4-5% which is about the same as that in England, for example.

# Some Statistics from High Energy Physics in Europe:



1998 Percentage of selected women small, slowly increasing.

Data Dec. 1999



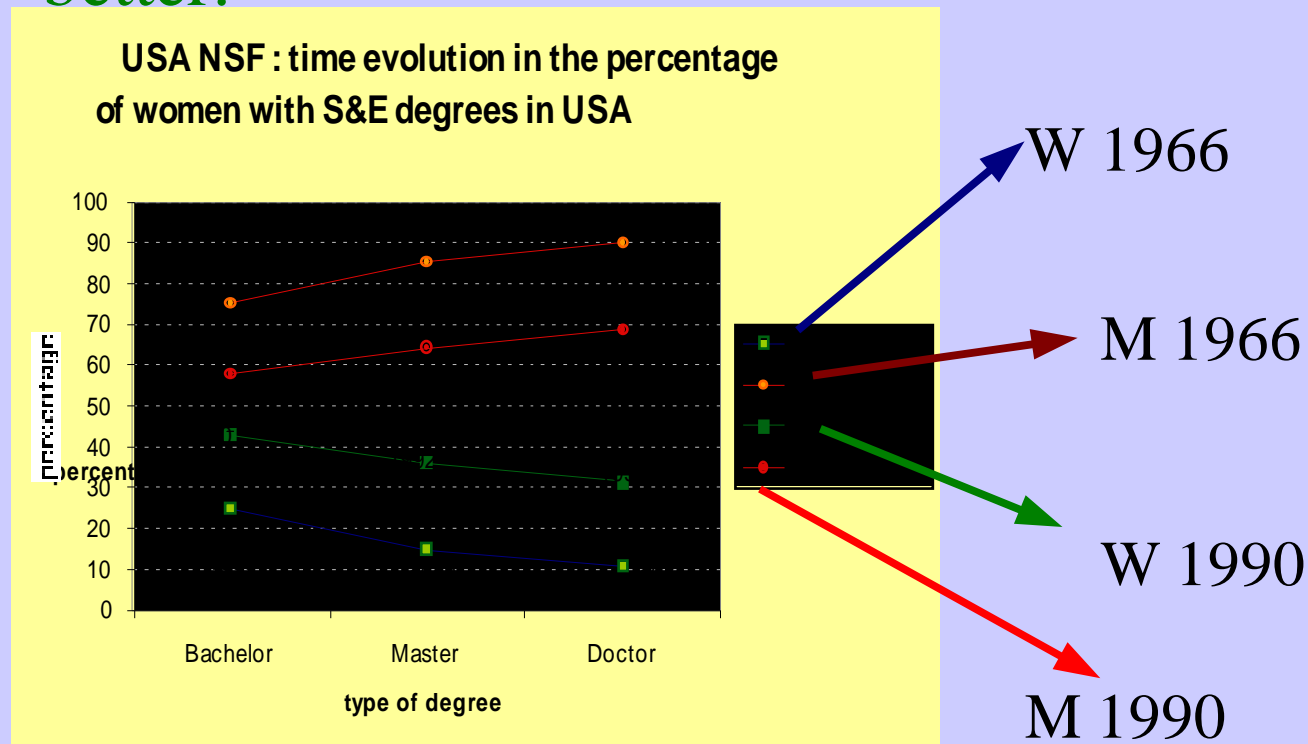
At CERN (HEP) Percentage of Women in Prof. Positions increasing but still small. Hierarchical remains small.

1999  
1998  
1996

# :Some statistics from US:

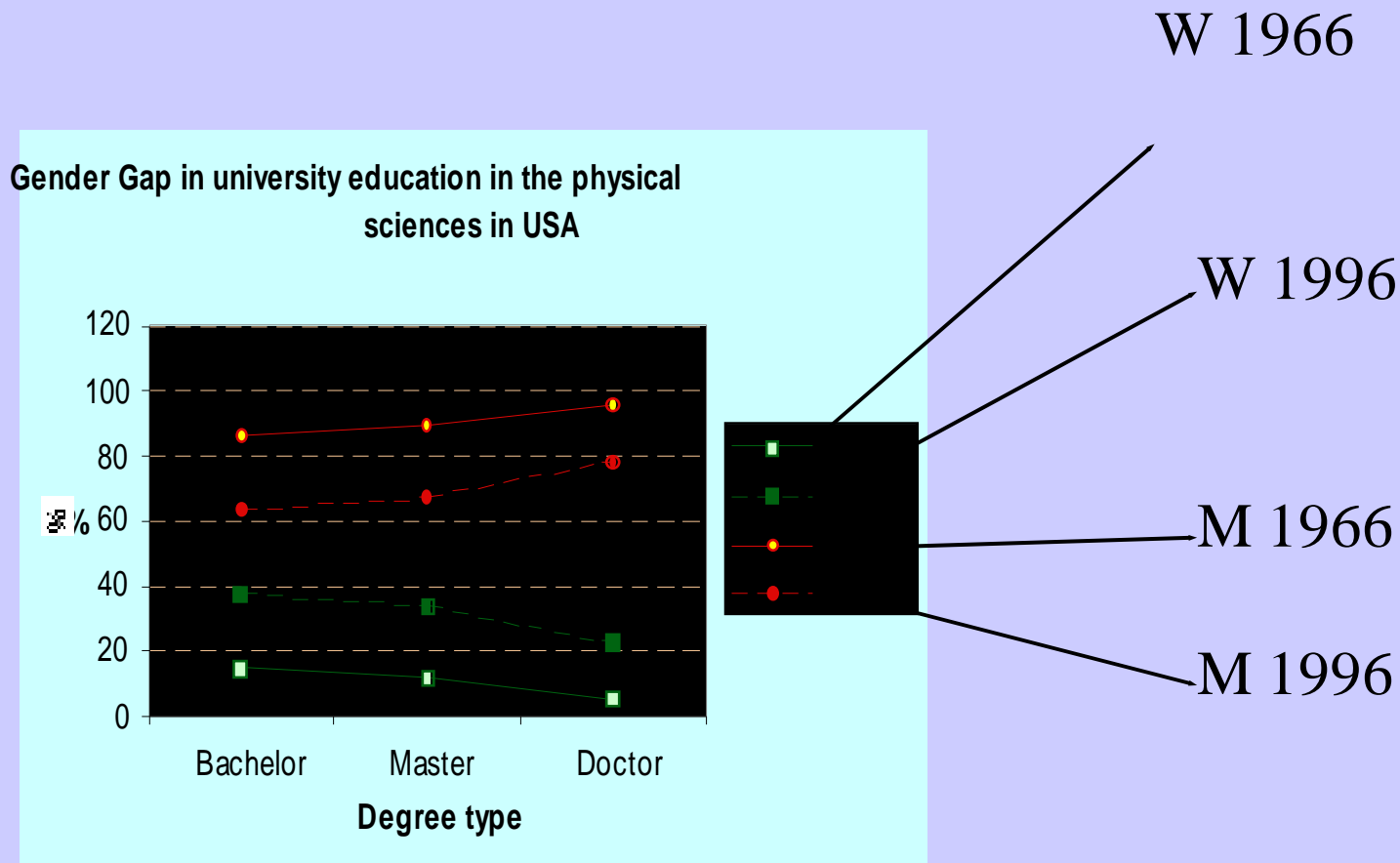
Typical scissor diagram :

Situation IS improving with time, but could be better.



# :Some statistics from US:

Gender gap increases with increasing level of Education. Women percentage less in physical sciences as compared to S/E.



## :Some More Lessons :

- 4) In Fermi Accelerator Laboratory fraction of women in Postdoctoral positions 17.8% and in permanent staff positions is only 9.7%. This is not very different than seen in the data from CERN, in Europe.
- 5) There exists a glass ceiling for women in Science and Education too!
- 6) Reasons for this related to social attitudes, time women have to take off to start family, social pressures, unfair gender bias in hiring policies.

# What do we conclude?

It is clear what the ills are.

Question: What is the cure?

The IUPAP group formulated a certain set of resolutions and recommendations for different groups in the society which would aid in bettering the situation.

These were adopted by the General Body of IUPAP in October 2002. They can be found at the site

Site: <http://www.if.ufrgs.br/~barbosa/conference.html>

## :Indian Context :

What is the situation in the Indian Context? At least for Physics the information available from the

**Registrar General of India, Ministry of Human Development.**

was included in the International Survey of IUPAP

India, not surprisingly, is rather high in the list, i.e., the fraction of Women who receive training in Science is not at all small

see the table on the next page:

## :Some data for the Indian case:

Country	Ph.D %	First-Level %
France	27	33
Poland	23	36
Norway	23	20
Ukraine	23	-
India	20	32
U.K,	16	20
U.S.	13	18
South Korea	8	30
Japan	8	13

The drop off factor smallest in France. Can be traced back to some very proactive policies instituted by the French Research system already in the late 80s.

So the situation CAN be improved by proactive steps.

India is in the top half of the table. So situation is already not so bad in this aspect.

# :Leaking Pot:

What is the situation AFTER Ph.D. in India?

- 1) Drop off factor large in going from Ph.D. to postdoctoral positions and OF COURSE even larger in Faculty positions.
- 2) **Data need to be collected and no numbers can be presented yet**
- 3) Latter is clear if we look at the percentage of women in Faculty Positions. Even in teaching positions percentage of women higher in colleges than in Universities (where both exist in the same city/area).
- 4) Compared to Universities women presence in high profile institutes smaller. Even there percentage of women in high level positions is yet smaller. In I.I.Sc. only 6% Full Professors. I.I.T/TIFR etc. not ANY different.

## :Some numbers from IISc:

	Prof.	Asso. Prof.	Asst Prof.	Prin. Res. Sci.	Sen. Sc. Off.	Tech. Off.
F	10	6	6	3	9	7
T	134	91	69	48	39	29

Few comments:

- 1) Fractions large only for Sen. Sc. Officers and Tech. Officers  
There women are in engineering divisions as well as in pure science divisions, in Biological , Physical/Mathematical and Information Sciences.
- 2) Academic (AP,AcP and P) positions almost entirely in Biological, Physical/Mathematical Sciences.
- 3) Situation is sure to be similar in some of the major research centers.

## :Major differences in Indian case:

Official stated hiring policies have no gender bias.

To be fair the official norms and procedures are not discriminatory.

The discrimination is far more subtle and indirect.

So the action plan in the Indian case has to be different.

Happily some of the corrective measures suggested in the Western World are already in place in India.

Proactive measures have already started.

# :Needs in the Indian case:

In India the needs ( as I see, from a strictly personal and urban point of view are)

- 1) To collect the statistics of participation of women in Science research as opposed to only science training
- 2) Encourage girl students to take up research in science as a vocation
- 3) Help women get back into research after they take a break for family (*Balancing Career and Family*)

## :Needs in the Indian case:

- 4) Bring about a change in the societal attitude which will encourage pure science career for women
- 5) Remove the famed glass ceiling and increase participation of women in the power structure.

**Question: Does glass ceiling exist in the Indian Scene?**

Answer is certainly Yes. BUT we DO need numbers to state the case strongly.

# :Glass Ceiling in the Indian case:

6) At least in physics the fraction of women in fellowship of the academies, funding committees, decision making bodies is extremely small. In physics 2 out of 279 fellows of the Indian Academy are women, for INSA also it is 2 out of 112. Certainly much smaller than the 20% that was seen at Ph.D level. Of course nobody asking for *proportional representation*. But the disparity is clear.

7) In biological sciences the participation of women is higher in the power structure. does not necessarily reflect the percentage at the student level which are higher both in undergraduate and doctoral level. But still the situation is better! So having women in power structure does affect things for the better.

# :Steps being taken in Indian case:

What are the Actions being taken by the Scientific organizations and community in India?

- 1) The department of science and technology has started a special fellowship scheme for women to get back in to a research career. The program covers all sciences and the committee has already met a few times and awarded fellowships. Committee for physics is headed by Prof. Chanchal Oberoi, a Plasma Physicist, who retired as the Dean from IISc recently.
- 2) National Board of Higher Mathematics (NBHM) has instituted a committee for women in mathematics and has started a few programs
- 3) *One of the recommendations of this committee is to involve the academies and bodies like IPA, for example.*

# :Steps being taken in Indian case:

Indian National Science Academy has constituted a committee chaired by Dr. Mahtab Bamji to bring out a report on Statistics and Status of Women in Science in India. Some of the members are  
1) Rohini Godbole 2) D. Balsubramanian 3) Sushanta Dattagupta

The committee has commissioned a study to be done by the SNDT University to look into some behavioural aspects. questionnaires have been prepared to be circulated among women science students and active women scientists. Report should come out soon

**IPA for example could take a lead in this to collect such data for Women in Physics using its membership.**

## :Steps being taken in Indian case:

A committee was formed by the Indian Academy of Sciences as well to look into the issues of women in science.

The convener Rohini M. Godbole along with members Prof. R.J.Hans-Gil and Prof. D. Balasubramanian, has formulated a certain action plan which needs to be implemented with the help of scientific community and establishment in India. Various action points have been identified:

## :Actions being planned:

1. A database of women in sciences at all levels needs to be created. Facts and figures need to be compiled. Started already.
2. Implementation of specific action plans to increase participation of Women in Indian Science, at all levels, need not wait for the completion of such a report
3. A web page for "Women in Science", as part of the Academy website, should be designed which would summarize the aims of the working committee and the initiatives it plans to undertake. Similarly, an article discussing the issues involved to increase the awareness of the Scientific Community to them in "Current Science" is being planned.

## :Steps being taken in Indian case:

4. Experts from diverse fields such as social scientists and psychologists to be involved in the discussion of the working group. Reports brought out by other agencies (such as IUPAP) could be useful for its work for the work of this working Committee. Involve Men!!
5. A session on "Women in Science" should become a regular feature of the Academy's Mid-Year and Annual Meetings.
- 5' Need to bring a change in the mindset of parents of girl students. So newspaper articles etc to increase the social awareness. **IPA can again help in this.**

## :Steps being taken in Indian case:

6. An informal meeting was held moderated by Indira Nath, at the Guwahati Annual Meeting, which included participants of the Annual meeting of the Academy, the faculty of IIT, Guwahati, the University, Assam Science Society etc. **The participants necessarily involved women but was not limited to them.**

## :Steps being taken in Indian case:

7. A role model program named after some of the famous women fellows of the Academy should be started by the Academy. This will involve special lectures, mentoring, holding special workshops for girl students in Science etc., on lines somewhat similar to the activities of the Educational Panel of the Academy.
8. Books and reading material which give biographical sketches of eminent women scientists and teachers should be brought out by the Academy. Plans for doing this have been formulated. *Again such activities could be coordinated with a body like IPA.*

## :Steps being taken in Indian case:

9. A Workshop on Women in Science to be held next summer to discuss the basic issues. This could culminate in a national meeting later.
10. Funding support for organizing the various programs of the working Group could be sought from the Central and State Women Welfare Ministries.

## :Steps being taken in Indian case:

11. Representation of Women in the Academy committees (Sectional Committees, Editorial Boards etc.,) should be increased. Proactive steps should be taken to increase the number of women fellows.
13. The committee should bring to the notice of the Fellows recruitment policies etc., which are counter-productive to the development of the career of women scientists, as many of the Fellows of the Academy are involved in the hiring process. Giving due weight to possible breaks in the professional careers taken by Women Scientists for starting a family and being alive to the problem of dual careers are some of the issues that need attention. Since the unfairness is not due to some written rules but rather some unwritten biases, shift in the mindset is the only correct way to deal with this.

# :Major Policy changes which we should aim for:

Steps needed to take to affect the Science Policy:

12. Women Friendly practices on Campuses as well as enlightened Hiring Policies:

- a) Creche on every campus,
- b) Accommodation close or on the campus, even in the form of hostel for working couples which they can use when necessary.

Proactive measures in Hiring Policies:

- c) Part time jobs when women are having family so the contact with research is not broken

:Major Policy changes which we should aim for:

- d) Give due weight to possible breaks in the professional careers taken by Women Scientists for starting a family (considering Academic Age, allowed to split a postdoctoral position etc.)
- e) Being alive to the problem of dual careers. Not rule cases *out of hand* with an artificial, unwritten restriction of no jobs for a couple in the same Institute.

Cases of four spouses of faculty on IIT Guwahati campus:

They were present in the Panel Discussion held there in the meeting mentioned.

Since the unfairness is not due to some written rules but rather some unwritten biases, shift in the mindset is the only correct way to deal with such things.

## **:Short summary:**

**Similarities in the problems with the International experience.**

But in many ways situation much better than our western counterparts

for example, official policies, participation of girls in science education

solutions to achieve gender equity therefore some what different.

**Most important is to bring about a change in the social attitudes, but some policy changes are required too.**

Many efforts are on way. Much needs to be done. But the situation is not bad.

*Thank you*