Abstract

Women and Formal and Informal Science

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Gender imbalance among various streams of professionals is a constant cause of concern to policy planners and institution builders. The situation becomes more serious when we notice that girls often perform much better academically at secondary school level and then there is a sharp decline in their performance at graduate and postgraduate levels. The situation in the field of science and technology is no less serious. There are very few scientific institutions, which have women scientists as directors, or senior leaders of programmes.

In this paper, we compare our insights from the formal scientific sector with our investigations in informal scientific sector. The effort to blend excellence in formal and informal scientific sectors would require overcoming the gender imbalances in both these sectors. A review of the current status and offer of some policy and institutional suggestions are also included, which could help in overcoming asymmetry in the knowledge and power of women in formal and informal sciences.

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Intuition is to science what the soul is to body. If intuition is a feminine attribute, then feminine science is expected to be more intuitive and accommodative of many other ways of enquiry, which might appear 'unscientific' to begin with. There is a strong case for increasing women's share in the scientific institutions and professions. This case might at a first sight appear to rest entirely on the grounds of fairness and equal opportunity. But that is not all. The contention in this paper is that the quality of discourse and institutional environment in which scientific enquiries are pursued might get significantly changed if more women participated in scientific pursuits. Further, it is not just the participation of women, which will bring science and society together but also the feminine qualities, which many male scientists may need to possess, which will help in this goal. There will always be questions in science, which would remain unaffected by the gender of a researcher. However, the fact is that the constraints under which women professionals have to balance their multiple roles at home and in the laboratory could lead to an appreciation of the constraints faced by users of science. But evidence on this account is mixed. There are many scholars who have argued that there could be unique perspectives that women scientists may bring to bear on a problem whereas there is an equally large number who think otherwise. Even if there is nothing unique that they may contribute, the case for increasing their participation in every human endeavour including science remains extremely persuasive. But what are the ground realities about the actual participation?

'Woman is the companion of man, gifted with equal mental capabilities. She has the right to participate in the minutest details, in the activities of man, and she has an equal right of freedom and liberty with them', said Mahatma Gandhi. But the realities in India tell a different story. R. A. Mashelkar identified a five point agenda or what he called a new '*Panchsheel'* for the new millennium, in his Presidential address at Indian Science Congress, January 3, 2000. The agenda included child-centred education, woman-centred family, human centred development, knowledge centred society and innovation-centred India. He observed:

Recently, the Hon'ble President of India said 'The best symbol of female values that has been created by nature is in the form of 'mother'. Mother is 'creativity' and 'innovation' personified in solving human problems in the family. She represents excellence, morality, equality not in material terms but as a living cultural symbol practicing these values. Out of all the management experiences in business, industry, public service and society, mother is the best manager nature has created. Mother's instinct has sustained Mother India. It is more specific than the word 'culture' itself. The growing alienation between man and society, which modern-day management practices have to contend with, may find its solution in the management practices which derive strength from the way a mother manages her family in small and big ways i.e. Mother culture![1]'

And yet harsh statistics stare us in the face. About 70 per cent of Indian women are illiterate. Ninety per cent of family planning operations are tubectomies**.** And sixty per cent of primary school dropouts are girls[2]. Sharp gender inequalities with unequal pay for equal work, discrimination in the labour market and so on are grim realities in today's India[3].

Although academically women have excelled in the last decade or so in practicality all the disciplines of science, they are grossly under-represented in science and technology in India at various levels. The share of women in higher education in arts and education has increased from 36 and 29 per cent in 1974-75 to about 48, and 50 per cent in 1999-2000. But in science subjects, the situation is very different. Their share in science, agriculture, veterinary science, medicine and engineering has changed from 32, 1, 1, 20 and 35 per cent respectively to 35, 10, 12, 32, and

16 per cent respectively over the same period (see Table I). Just a three percent increase over twenty years in science subjects. The major choice of the subject for women scientists continues to be life science. It has also been noted that whereas two thirds of the working women scientists are engaged in teaching, hardly three per cent go for R&D (see Table II),[4] and a very insignificant percentage gets engaged in industrial production, managerial and entrepreneurship (See Table 3)[5].

Advances in life sciences have placed in the hands of women opportunities that were unheard of earlier. However, technology is a double-edged weapon and if not well used, its advance can hurt the cause of women. For instance, today's technology enables the determination of the sex of a child during pregnancy. It was shocking to hear recently about some statistics on the number of pregnancy terminations, which in the case of the female child far exceeded that of the male child – and this was not in a village but in a metropolitan city[6]. The enactment of new laws, which will arrest this process of sex determination, is a welcome step.

There is an immediate need to reaffirm and reiterate the necessity for action regarding the participation of women in the decision-making process related to science and technology, including in planning and setting priorities for research and development, and in the choice, acquisition, adaptation, innovation, and application of science and technology for development. Also research and development serving women's needs should be given high priority. Conscious policies should be adopted to promote research and development that aims at relieving women from time and energy consuming and under-productive work, meeting their health and nutritional needs and promoting their general well-being.

At the most fundamental level, we will have to focus on improving the female literacy rate; ensuring equal access of girls to existing school facilities; minimizing the dropout of girl students; encouraging the participation of girls and women in existing technical training and vocational training programmes; and increasing educational and particularly scientific and technical education and training facilities for girls and women. But these measures will not succeed completely unless the institutional environment in which women scientists have to work also is modified. It is this goal which will require changes in the mindset and socio-cultural norms of our country. India, we are confident, is capable of attempting this change.

Saga of exclusion: Studies on women in science

There are several strands of thought in the literature on women and science and some are quite well known and familiar such as:

a) Strong economic and cultural barriers to the entry of women in higher science education within science, the barriers also exist for entry into different disciplines. Some of these barriers are psychological and some are institutional. For instance, some of the male heads of departments use their own biases not to encourage girls from pursuing certain disciplines or problem areas.

b) Indian scientists in general are westward looking and Indian women scientists are no exception. The parameters of success for many might be similar to the male scientists. There is no evidence that women scientists are more responsive to societal concerns and empathize more with scientific and technological problems of the disadvantaged sections of society or evaluate their success in terms of the social problems they solve.

c) Marriage based transfers, household chores and filial responsibilities weigh rather heavily on most women scientists and thus their ability to progress, even after they enter science, is generally restricted (some times because of their own constraints and many times because of lack of a supportive peer culture). Some times they internalize the constraints by

saying, "I am not ambitious".[7] The lack of achievements gets explained internally, or is internalized as some thing inherent in their way of doing things or responding to life.

d) Formal scientific research has seen very many important contributions by some of outstanding women scientists,[8] but did their being women affect the quality or the direction of science they pursued? Some feminist critiques have implied that the male domination of science in the western mould has made it far too dispassionately tool-oriented, more materialistic and less concerned for underprivileged. What is the evidence that in the hands of women, the scientific tools acquired a more humane touch? If such is not the case, then perhaps the more important issue is that women's presence needs to be high in science regardless of whether that will affect the content or quality of science. Though in some cases it might affect the outcomes (an unfair system, in terms of women's participation, can surely not produce fair outcomes).

e) Profiles of pioneers like Anna Mani are a beacon of hope particularly when they deny discrimination, refuse to see any connection between their being women on their role as a scientist, and underline the social and family privilege which helped them grow[9]. But even Anna Mani recalls the times when some male peers or superiors tried to highlight the mistakes of women students or scientists out of context and disproportionately. Professional seclusion is often forced upon even such pioneering scientists, because there are fewer women peers of that class. Socialization with male colleagues has its own attendant implications in the Indian mindset. Having worked with Sir C.V. Raman, Anna experienced Raman's biases no differently than any other women scientist. But being a believer in gender neutrality in science, she somehow never saw the need to promote women while selecting candidates in various positions.[10]

f) We have Bhama Srinivasan, Aarti Prabhakar, Radha Basu (one among the top 25 women on the Web, 2000)[11]. But they are so few and far apart that the story of Indian women in science is a story of indifference, neglect, and lack of sufficient encouragement to them to advance.[12] A small part of this story should be explained by the fact that the story of women in science is perhaps not very different from the story of women in other professions (except a few like nursing where they dominate).

The journey of women scientists/natural philosophers like Gargi, and Maitreyi to Geervani[13] and Indira Nath[14] (recipient of Loral award 2002), is a long one. But the new 'social contract' [15] that women scientists are supposed to buying about between the society and science is yet to be witnessed. The Third World Organization of Women in Science (1999) observed in a statement,

> Notwithstanding the lack of comprehensive and reliable statistical data, we testify our preoccupation at the heavy difficulties still encountered by women in accessing the domains of S&T; on the other hand, we testify that women play crucial roles in the preservation of norms, values and practices that richly endow the diverse societies of the world and are fundamental to human existence. Since S&T have become major influences in our times, it is urgent that women come to the forefront to participate in shaping the agenda for the future direction of the scientific enterprise. The creation of TWOWS was inspired by the conviction that women have a unique and valuable perspective to bear upon the application of S&T to development, a conviction that has been reconfirmed by the debates and the outcome of the present Conference

In a study it was noted [16] that curriculum developed by Women's Studies professionals (led by Maithreyi Krishnaraj in this case[17]) with respect to women's studies paid no attention to women as creative knowledge workers or innovators, or in other words, problem solvers. This is evident from lack of many studies on creative and innovative technological contributions by women. We are not saying that concern for women should be shown by women only, but we do feel that there is a perspective that women scholars might have brought to bear on the role of women in science.

The role of women in science needs proper appreciation and recognition. Barriers to their entry, inclusion and upward movement need to be removed. But at the same time, not many women scientists might like to move up because they were women (rather than being better scientists). The social recognition and mindset, which tends to belittle their achievements when they do make it, is a major barrier and that needs a careful handling. Social pressures, which segregate women and thus come in the way of forming similar social networks that male scientists make, also affect the peer support that they are able to harness in their work than, say, male scientists.

But a study of women above hundred years of age under way at SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions)[18] has thrown up some interesting insights about the "informal" scientists. The ease with which the centurion women carry stress and perform their multiple roles without feeling too great about it, without seeking sympathy and without suffering from victim's perspectives is noticeable. Their insights about nature and resources they handle are also very important. But if women were not given the tools of the trade like carpentry or black smithy for centuries, it is natural, is not it, that they learned to cope with inefficiencies rather than attempt to transcend them? Women tend to be very creative in coping (a cultural legacy as well) rather than transcending these constraints in many domains. They are encultured from an early age that they were supposed to adapt and adjust and this almost becomes their second nature. But some of them who have an opportunity to be "scouted", "supported" and "sighted" do demonstrate that their creativity need not be less than their male counterparts; at least in informal science.

Autumn Stanley, in her much neglected masterpiece, *Mothers and Daughters of Invention*, lamented at the share of women patent holders which was less than one percent during 1809 - 1985 in USA. She shows how many times men were given credit for the inventions by their wives.[19] This number has increased to about 4-8 per cent (by different estimates). Her contention is that women invent. There is no question of that. But they are not recognized as inventors.[20] It is an extraordinary study of women's creativity and inventiveness. And yet, despite the fact that the author spent thirteen years to write this book, and provided unassailable evidence of how women invented new technologies during the last 200 hundred years in USA, the work has remained obscure. It is not only that women's creativity is ignored, even evidence about this is ignored.

And could we disagree with this? Our specific suggestion would be that we need to take steps to increase their participation and visibility in formal and informal scientific expeditions. But the major socio-cultural problem might still remain, as Raman would remark when he saw male and female scientists socializing, "scandalous"[21]. However, this has become less of a problem today. Social space for women scientists is expanding in professions and also perhaps in male minds.

Genderization of science:

Even if it be argued that the direction, nature and quality of scientific pursuits would be no different whether the investigator was a male or a female scholar, the case for increasing space for women in scientific enterprises stands. The social discrimination against women begins at an early age in Indian society. Right from childhood a girl is always counseled to learn to be patient, to adapt, adjust and submit. After all, she was supposed to change her home after marriage and spend a major part of life in her adopted family. In addition, preference for the male child and discrimination in his favour is an everyday experience for a girl. The social safety or lack of it becomes another constraint when she grows up and recognizes that she cannot move around as freely as the boys in the family or neighbourhood. The dropout rate of children, and within them girl children, continues to be very high from primary school onwards. A few that reach the portals of colleges and universities face further constraints.

The historical bias in favour of male scientists gets reinforced through various institutional and non-institutional channels. The scientific enterprise cannot grow without dialogue, collaboration

and knowledge networking. With increasing complexity in scientific enquiries, the possibility of a scientist ploughing a lonely furrow is becoming less and less feasible. Our social customs and cultural taboos inhibit many initiatives that a woman scientist must take to make robust enquiries and pursue collaborative research. In the patrifocal society the conflicts between the three roles of mother, wife and professional have to be resolved everyday. The situation becomes more complex when some of the male scientists find it difficult to maintain boundaries of their roles, while pursuing professional enquiries. The predatory environment has become less so with increasing awareness among male scientists and self-empowerment of women professionals. But, the problem remains.

Some scholars believe that Women's Studies have now to grapple with the issue of 'women seeking equality at work and home' as compared to earlier model of 'educated woman as deviant reconciling dual conflicting roles'[22] We may not agree with the extreme eco-feminist view that western science produces "technologies that are violent, invasive and therefore sexist and racist"[23], and that greater participation by women would change the direction of technology development significantly. If such was the case, the nature of technologies both in the formal and informal sectors should have been significantly different in matrifocal societies. Such has not been the evidence. Biases exist in formal science and these biases often work against the incorporation of people's knowledge and within them, the women's knowledge. But that these biases are gendered in nature has not been conclusively proved. The nature of scientific questions and their implications for society have not been shown to be different when pursued by women scientists. In fact, in a study of women moneylenders vis-à-vis male moneylenders, Gupta observed little difference in the method of exploitation of poor people by moneylenders just because of their gender. If any thing, because of a more intimate knowledge of the personal conditions, the methods of rent extraction by women moneylenders were perhaps more ingenious. [24] The debate on this issue of science being differently pursued by women as against men has not been resolved. Quoting many western scientists,[25] Subrahmanyan recognizes that by removing masculine bias from science, it would not get 'purified'.[26]

The structure of scientific institutions, criteria of appraisal and processes of decision making would create their own logic whether in the hands of men or women. The contribution of people's knowledge, creativity and innovation was recognized for the first time in the 87 year old history of Indian Science Congress in Pune in 2000 by R. A. Mashelkar, a male scientist[27], though Indian Science Congress had women scientists as leaders in the past. It is no reflection on those outstanding women scientists who chaired the Science Congress. The fact is that even the other male scientists did not pay attention to this issue of building bridges with people's knowledge either before or after this Congress. The reason is not that the women would not have liked the scientific and technological constraints to be overcome particularly when faced by them for so long. The historical reality is that they were denied the skills and tools of, say, black smithy, carpentry, or casting, etc., such that they could not innovate tools to overcome their drudgery. The male bias in science and technology cannot be denied. But, the answer will have to go beyond getting more women in science. The very basis of scientific enquiry, influenced as it is by the design of scientific institutions, the incentives and disincentives for promotion and recognition, would have to be modified. And this task would need to be pursued by men scientists more than the women scientists. If technological problems of women did not get resolved for so long, it is not the responsibility of women scientists alone to resolve this now. The share of women in technological disciplines continues to be extremely low[28]. If this argument was allowed to persist, there would be a double fault. First we create barriers and stereotypes that prevent women from entering science and then expect them to solve those problems which male dominated science could not address adequately for so long.

Women and informal science: an empirical study by Honey Bee Network

The farmers, home makers, artisans and healers include many 'informal' scientists and technologists. Their representation in the total pool of knowledge experts scouted by Honey Bee

Network is quite small[29]. This is not because they are less creative but because of the lack of women field staff and volunteers, who could scout women knowledge experts and 'scientists' and 'technologists'.

Sita Ben, a healer from Dangs forests in south Gujarat was honoured at the Honey Bee annual function a couple of years ago by the award of SRISTI Samman for her knowledge as well as her spirit of service. She was one of the very few (and in that village the only one) expert woman herbal healers in that region in the tribal district of Dangs, Gujarat. She had learned it from her brother and had developed considerable reputation in solving problems of people in the nearby region.(see Table IV). At the award function she was exposed to a lot of attention, adulation, crowd and noise. When she went back, she got slightly disoriented. As soon as The Honey Bee network and SRISTI learned about it, they took her to a local clinic and she had to be treated for a few weeks for this psychological stress[30].

She has recovered and resumed normal functions now of collecting fire wood from the forest, dispending medicines to the needy, and collecting other forest products. The question is how to coordinate the two worlds of knowledge and acknowledgement? The subtlety of a tribal culture was absent perhaps in the function. The organizers were perhaps too loud and seemed less authentic. It created a stress. May be this is an extreme case[31]. But building bridges between formal and informal science and technology would require paying attention to such subtleties. Even empowerment of such knowledge-rich, economically poor, isolated and expert women required much greater sensitivity than had been shown by us

Can women only cope and not create? Why are there so few women innovators?[32]

Here we would like to share with our readers some of the findings of our empirical research. The Honey Bee network has been very self critically reflecting on the fact that the share of women innovators and traditional knowledge holders in our database of over fifteen thousand innovations and traditional knowledge mobilized by National Innovation Foundation (NIF) directly and through Honey Bee network has not been more than five per cent. This certainly reflects more on our incapacity and inadequacy than any innate inability of women to innovate. This was the case despite incorporating the resolve of women, 'if given some space to stand, they would move the world', in SRISTI's logo.

We had argued earlier that given the cultural context, a girl was taught from an early age to adapt, adjust and accommodate, since she was supposed to go to 'another' house after marriage. The general thrust towards compliance and conformity so deeply embedded in our culture was particularly underlined in the case of women. The women tended to be very creative in coping with stresses of various kinds. Historically, they were not given tools of black smithy and carpentry such that even if they felt dissatisfied with the given technologies of daily use, they did not have wherewithal to transcend the constraints. The every day technologies used by women seemed to have had much lesser technological innovations, thanks to the neglect by men artisans and scientific minds. Thus, we felt that there indeed were fewer innovations attempted by women, given the cultural, political and economic constraints under which they worked.

But then we also knew all along that no two women cooked the same recipe or dish alike. The stamp of personality of a lady was almost always imprinted on the way a dish was cooked. And this happened every time she cooked that particular dish. This indicated enormous degree of creativity, far higher than evident in any other human activity. Male farmers, or artisans or technologists would not be able to claim so much uniqueness in any human endeavour. Why did we miss it then so much?

We used several explanations: that we had much lesser number of lady researchers who were willing to go from village to village looking for odd balls, the women experimenters and inventors; the male researchers had difficulty in approaching women in the villages particularly in

the absence of the men folk at home; the biases of the researchers; and men often dissuaded field workers from looking for new ideas from women, since after all they (the men) knew all! And these seemed to become less and less acceptable as time passed. But our pedagogies seemed to have internalized various constraints rather than transcending them. Were we not behaving like the subject of inquiry ourselves, we were coping rather than being creative? Very slowly, as this realization dawned, our methods started becoming more creative.

We started having Shodh Yatras[33] involving walk through a number of villages for eight to ten days[34] The idea was to honour the innovators and traditional knowledge experts at their door step and share the experiences of innovators walking with us. Our hope was and is, that society would become innovative once inertia was overcome through presentation of real life examples of those who had done so in their neighborhood as well as in far way regions. During these Yatras, we also organized contests among women to cook recipes that had at least some uncultivated ingredients. The contests threw up women's innovations as well as outstanding traditional knowledge in utilizing lesser known biodiversity and meet nutritional and food requirements in normal times but particularly in stress periods like droughts and floods. We have now a large collection of such recipes (see Table V), many of which can put the best chef to shame in their ingenuinity and taste. For instance, we came across a delicious vegetable cooked out of leaves of Euphorbia in a recent Shodh Yatra. Who would imagine that the few leaves that this cactus bears could be put to such delicious use[35]? It is a different matter that while this plant may be neglected in India, it is a rich source of anti cancer drugs abroad[36]?

The biodiversity contest among young children also brought out several such uses. When we organized biodiversity contests among school children it was found that girl children knew more than boys in primary classes but as they moved to classes six or seven, they knew half as much as boys did, apparently because their freedom to move about outside the home was curtailed, and also their responsibility to look after younger kids increased. Discrimination in learning opportunities vis-à-vis boys began early for Indian girls.

While we pursued this and several other approaches including organizing specific meetings of only women experimenters, we adjusted to the fact that in most Shodh Yatras participation of women in various villages was much lower than men and often negligible in some villages. This time in summer of 2001, in Alwar district, Rajasthan we decided that it was time to change. Right from the first, in two villages, Bhikampur and Surajgadh, we decided to try out some thing different. We would start interactions by showing the multimedia multi-language data base on innovations which always attracted a very high attention. Invariably in every meeting there would be only men and children. After showing a few innovations, we stopped and insisted that unless women were invited to the meeting, we were not going to show any further. We were told that women were busy, that they had gone out (if it was afternoon time), and that the men would tell them whatever they saw. But we remained adamant and were pleasantly surprised that the approach worked in every single case during the recent Shodh Yatra. We not only could share with women what we knew but also learn from them a great deal about their own concerns, and creative approaches for solving their problems, through more of the first than of the latter. This was very inspiring but also very embarrassing. Why had we adapted to the absence of women even in a single meeting during previous seven Shodh Yatras?

There is no doubt that women excel in certain fields of knowledge domains in which they have greater familiarity and control. Whether it is the seed selection[37] or storage in agriculture[38], child care[39] or women's own health problems**,** the knowledge of women is indeed far superior and extensive compared to that of men.

The attributes of different grains or other foods which make experimentation with different recipes for processing these foods possible are known to women. But, the germplasm descriptors used in the national and international gene banks around the world do not still include the columns for recording the characterization done by women innovators as well as community

members. It is ignored that increasing share of processed food in consumer baskets would require newer and newer innovations in this sector. The indigenous knowledge of women if catalogued systematically could have expanded the scientific and technological options enormously. This should happen even if gene banks are headed by male scientists, as is the case in most countries including India. Likewise, selection criteria of local germplasm and varieties by male farmer breeders are also not recorded. The biases against people's knowledge are deep and institutional. The women's knowledge tends to get neglected far more than the men's local knowledge.

In a recent study of knowledge systems of old women, who had lived for a hundred or more years in Gujarat, SRISTI has begun documentation of the unique insights such women have gained over the years about environment, biodiversity, nature and life in general. Several lessons have already emerged from this study, perhaps the first of its kind. Nathi ben of Mentaal village knew about a particular plant used for animal care. However, she could not recognize it due to her weak eyesight. When about 20 women and men were shown various plants, only one could identify this particular plant for the purpose for which Nathi ben had experimented it. This lady had also learnt it from Nathi ben years ago when she used to go with her for collecting fodder and cutting grass in the nearby regions[40]. The erosion of this knowledge would have been complete if we had not stumbled upon at least one person who could continue the knowledge chain. It is quite obvious that such knowledge, developed decades ago or sometimes centuries ago and continued by a few women (or for that matter, men), would get lost if it was not documented with due credit to the traditional knowledge holders. In the case of 100 years old women, the risk of such knowledge being lost very soon is very real all over the country and in fact in the world. Local biodiversity, particularly agro biodiversity was monitored annually and managed by local communities through an informal institution. Mulee ben described how on the day of Sharad Poornima, a large variety of cultivated and uncultivated vegetables were collected, cooked and offered to God before eating[41]. Such an institution exists in different parts of the country. The one who would have maximum number of vegetables, particularly uncultivated ones, would obviously take a lot of pride and would be talked about in the community. The knowledge of diversity, its uses, institutions for its conservation are aspects of knowledge systems about which women may have unique insights.

There were occasions when certain vegetables were important for social occasions but not liked by the male members of the family. Gana ben and Nathi ben explained how they have to cook such vegetables when their husbands were away. The famine and stress foods were extremely important for survival in hard times[42]. Modern science might benefit a great deal from knowledge of such foods which many women who had survived through the famine of 1900 still recalled from their childhood. Which food processing tools should be made from which wood so that the weight was less was also a valuable insight. How much of impact should be made on paddy ears so that while beating the same, only the chaff got separated and the grain did not get damaged was found out in a very interesting manner. Shambu ben of Surendranagar district explained, if the beating stick made of 'rayan' wood could be lifted with two little fingers of the left hand, then the weight was considered appropriate. Nathiben asked the researchers to name a grain, which required maximum labour and energy to process after harvest. And when nobody could reply, she mentioned a minor millet called 'bunty' which was the most difficult to process and very nutritive.

There are a large number of other insights emerging from this study being pursued with the help of male researchers. Honey Bee Network had failed to scout more than five per cent of women innovators and outstanding traditional knowledge holders out of more than 10000 innovations and traditional knowledge examples in the database. New methods, perspectives and institutional arrangements have to be evolved to overcome the historical bias.

National Innovation Foundation (NIF) has instituted special prizes for innovations by and for women. But so far it has not been able to accomplish much in terms of tapping women's creativity in informal science and technology. NIF is determined to overcome this barrier and

achieve a balance in our search process. The question would still remain as to whether the scientific establishments can come forward, build bridges and add value to the local knowledge, particularly of women, and thus improve their livelihood prospects, help conserve nature, biodiversity and associated knowledge system with appropriate sharing of benefits. A MOU has been signed between NIF and National Botanical Research Institute, Lucknow, to accomplish this tough task. A similar effort is going on with ICAR and other institutions. Soon a major blemish on Indian science of having neglected local knowledge, especially that of women, might be overcome. How soon it will be, is an open question.

In conclusion, a major question that we need to answer is how to integrate more women in the study and pursuit of science. In other words, can we feminize science? Here are some suggestions that we offer.

Policy and Institutional Alternatives for 'Feminizing Science'

So long as tending children remains the mother's responsibility in our society, we have to create space in our institutions for relieving this stress on women professionals through high quality child care system affiliated to each institution. Likewise various facilities, which would make their participation in professional institutions possible, must be provided on a priority basis. However, there are certain specific interventions required for feminizing science:

a) Flexible timing and part time work have to become the rule rather than the exception for those women scientists, who desire such arrangements.

b) The use of Information Technology is necessary in networking women scientist, mentoring young scientists to help them cope with multiple roles, providing them high quality peer reference groups and enabling them to work from home wherever feasible.

c) The fact that science grows through interaction and group work, the collegial culture and social attitudes must change, enabling women to take up complex problems, requiring team work, and experiments at odd hours. Each professional society must be required to report in their annual conference the efforts it has made to involve women scientist in challenging research programs, and not just at membership level but also at leadership level.

d) The socialization of women scientists will have to be with male senior scientist for some time due to historical biases. The senior male scientists need to be made sensitive of their responsibility to create a more congenial atmosphere for new entrants as well as for middle rung scientists.

e) Travelling is an important means through which women scientists can move, learn and build contacts, which become so useful in profession. Special travel grants to women scientists might help in the matter.

f) It is not just the involvement of women, which is needed for feminizing science; it is the incorporation of feminine qualities in male institutions and mindset, which is necessary. Expression of emotions, seeing inter-connections, use of intuition and not being apologetic about it, and allowing family responsibilities to figure among reasons for changing priorities are some steps.

We do not think that making science more caring, compassionate and concerned with the interests of the under-privileged will require involvement of only women scientists. But we do feel that their involvement might make it more effortless and also more 'natural' to science institutions.

Table I

Faculty-wise Enrolment of Women in Higher Education, 197 to 1999-2000

(' 000)

Year	Arts	Commerce	Law	Education	Science	Agri.	Vety. Sc.	Medicine	Engg.	Others	Total
1974-75	363	22.1	5.9	29	106.2	0.3	0.08	21	1.3	4.1	553
	(34.0)	(5.6)	(4.4)	(37.6)	(22.9)	(0.9)	(1.2)	(19.7)	(1.5)	(32.6)	(23.4)
1979-80	397.9	68	11	34.5	140.1	1.1	0.2	24.4	4.4	7.4	689
	(37.0)	(13.2)	(6.2)	(47.3)	(27.5)	(2.8)	(2.7)	(21.8)	(3.7)	(38.8)	(26.0)
1985-86	576.3	156.7	17.6	38.6	215.7	2.3	0.6	37.5	12.2	9	1067.5
	(39.3)	(20.0)	(9.0)	(46.7)	(30.8)	(5.6)	(7.0)	(30.5)	(6.9)	(38.0)	(29.6)
1986-87	628	162	18.3	43.6	231.1	2.5	0.7	38.9	12.7	11	1148.8
	(41.4)	(19.7)	(9.2)	(50.5)	(31.4)	(5.9)	(7.0)	(30.5)	(6.9)	(38.6)	(30.6)
1987-88	671.1	172.2	19.2	46.3	245.7	2.7	0.7	40.5	13.6	12.2	1224.2
	(42.4)	(20.1)	(9.3)	(51.5)	(32.0)	(6.2)	(7.2)	(30.9)	(7.1)	(38.9)	(31.3)
1988-89	706.9	182	20	48.8	259.1	2.8	0.8	43.2	14.6	13.4	1291.8
	(42.9)	(20.4)	(9.4)	(52.0)	(32.4)	(6.5)	(7.4)	(31.5)	(7.3)	(39.1)	(31.7)
1989-90	748.9	192	21.8	50.7	274.5	3.1	0.9	45.3	15.8	14.4	1367.4
	(43.6)	(20.6)	(9.8)	(52.9)	(32.9)	(6.9)	(7.9)	(31.9)	(7-6)	(39.2)	(32.2)
1990-91	784.4	201.7	23.5	53.2	289.4	3.4	0.9	48.6	17.1	14.7	1436.9
	(44.0)	(20.8)	(10.0)	(5-3.4)	(33.3)	(7.2)	(8.2)	(32.3)	(7.9)	(39-4)	(32.5)
1991-92	824.9	212	24.9	58.1	302	3.6	0.9	51.1	18.3	15.1	1512.2
	(44.2)	(21.0)	(10.0)	(54.8)	(33.5)	(7.5)	(8.6)	(32.6)	(8.1)	(39.7)	(32.8)
1992-93	867.5	222	26.2	61.1	318.6	3.8	1	53.8	19.2	15.9	1590.3
	(44.6)	(21.2)	(10.3)	(55.3)	(33.8)	(7.6)	(8.7)	(32.9)	(8.2)	(40.0)	(33.1)
1993-94	905.1	235.3	30	65.1	334.4	%	%	%	20	74.1*	1664.1
	(38.5)	(18.4)	(9.7)	(48.7)	(29.3)				(7.1)	(23.2)	(28.6)
1994-95	1123.2	292	37.3	80.8	415	%	%	%	24.9	91.9*	2065
	(45.4)	(21.8)	(11.5)	(57.5)	(34.6)				(8.3)	(27.3)	(33.8)
1995-96	1191.8	309.8	39.6	85.7	440.4	%	%	%	26.4	97.6*	2191.3
	(47.4)	(22.0)	(10.8)	(58.0)	(34.9)				(8.4)	(27.4)	(34.1)
1996-97	1252.7	325.7	41.7	90.1	462.9	%	%	%	27.6	102.5*	2303.2
	(45.9)	(22.0)	(11.6)	(58.0)	(35.0)				(8.3)	(27.1)	(34.1)
1997-98	1330.5	332.6	48.9	83.2	469.6	14.7	2.4	80.7	51.3	31.8	2445.7
	(46.5)	(21.5)	(13.0)	(51.1)	(33.8)	(18.9)	(11.3)	(33.5)	(14.8)	(56.2)	(34.6)
1998-99	1400.3	350.1	51.5	87.5	494.2	15.4	2.6	84.9	54.1	33.5	2574
	(46.7)	(21.5)	(13.1)	(51.3)	(34.1)	(18.9)	(11.7)	(33.7)	(14.9)	(56.5)	(36.3)
1999-00	1489.5	381.4	54.8	87.6	520.9	15.5	2.7	90.5	63.1	35.6	2741.6
	(47.40)	(22.5)	(13.6)	(49.2)	(35.2)	(19.1)	(11.6)	(32.4)	(16.2)	(42.9)	(35.6)

Abbr. : Agri. : Agriculture.
Vety. Sc. : Veterinary Sciences.
Engg. : Engineering and Technology.

Note : * : Include Agriculture, Veterinary and Medicine.
% : Data included elsewhere with another category.
Figures in brackets indicate the enrolment of women as a percentage of total enrolment.

Source : Research and Development Statistics 2000-01, Ministry of Science and Technology, Govt. of India.

Table II

Full Time Equivalent of Women Employed in Research and Development Establishments (As on 1.4.1996 & 1.4.1998)				
				(Number)
Establishment	Personnel Engaged Primarily in R&D Activities	Personnel Engaged in Auxiliary Activities	Personnel Engaged in Administrative Activities	Total
1.4.1998				
Institutional Sector				
Major Scientific Agencies	3840	5025	7535	16400
Central Government Ministries/Departments	846	899	1547	3292
State Governments	1614	1836	6466	9916
Total Institutional Sector	**6300**	**7760**	**15548**	**29608**
Industrial Sector				
Public Sector Including Joint Sector	800	234	517	1551
Private Sector	2601	2163	1750	6514
Total Industrial Sector	**3401**	**2397**	**2267**	**8065**
Total *	**9701**	**10157**	**17815**	**37673**
1.4.1996				
Institutional Sector				
Major Scientific Agencies	4994	3592	5687	14273
Central Government Ministries/Departments	705	873	1885	3463
State Governments	2513	2086	6313	10912
Total Institutional Sector	**8212**	**6551**	**13885**	**28648**
Industrial Sector				
Public Sector Including Joint Sector	774	291	363	1428
Private Sector	2092	2279	1734	6105
Total Industrial Sector	**2866**	**2570**	**2097**	**7533**
Total *	**11078**	**9121**	**15982**	**36181**

Abbr. : R&D : Research and Development.
Note : * : Total of Institutional Sector & Industrial Sector.
1.4.1998 : Data for private sector refers to 1144 in-house R&D units including 176 SIRO units.
1.4.1996 : Data for private sector refers to 1149 in-house R&D units including 159 SIRO units.
Data does not include Small Scale Industries (SSI) and Higher Education.
Source : Research and Development Statistics 2000-01 & Past Issue, Ministry

Table III

Women Employment

Figures at all India level

Industry-wise Women Employment in the Organised Sector (As on 31.3.1998 and 31.3.1999)									
Industry	Employment (In ' 000)						Percentage Change		
	(As on 31.3.1998)			(As on 31.3.1999)					
	Public Sector	Private Sector	Total	Public Sector	Private Sector	Total	Public Sector	Private Sector	Total
Agriculture, Hunting Forestry & Fishing	47.5	442.5	490	45.8	425.7	471.5	-3.6	-3.8	-3.8
Mining & Quarrying	58.3	12.7	71	58.2	10.4	68.6	-0.3	-17.8	-3.4
Manufacturing	105.5	930.6	1036.1	101.1	933.3	1034.4	-4.2	0.3	-0.2
Electricity, Gas & Water	41.7	1.4	43.2	42.8	1	43.8	2.4	-30.6	1.3
Construction	60.7	6.3	66.9	63.2	5.3	68.5	4.2	-16.2	2.3
Wholesale& Retail Trade & Restaurants and Hotels	16.3	27.4	43.7	16.6	27.4	44	1.9	-0.1	0.7
Transport, Storage & Communications	168.4	6.1	174.5	171.3	6.7	178	1.7	8.9	2
Financing, Insurance Real Estate & Business Services	177.9	48.8	226.8	178.7	55.6	234.3	0.4	13.9	3.3
Community, Social & Personal Services	2086.4	535.1	2621.5	2133.1	553.1	2686.2	2.2	3.4	2.5
Total	2762.7	2010.9	4773.6	2810.7	2018.4	4829.2	1.7	0.4	1.2

Source : Employment Review, January-March 1999, Directorate General of Employment and Training, Ministry of Labour Government of India.

Table IV

Some Indigenous Medications Prescribed by Sitaben Gaikwad

Note: The most preferred line of treatment for a particular ailment is tabulated. Sitaben has several alternative herbs, which she prescribes if the diagnosis and prognosis warrant. A few example of the diseases that she treats is given below. The exact proportion of each ingredient was not possible because over a period of time, Sitaben has developed her own measure of approximation. Furthermore, identification of all plants used was not possible because of the limited time frame of the study. For identification of each plant, flowers of each plant is required. All the plant names are in Dangi (the local tribal dialect)

Complaint	Herb/s employed (native name and botanical identification)		Directions
Vomiting and diarrhea	Aawal (Cassia auriculata[1,2,3])		Boil bark in water to prepare decoction
	Bark of Ragatrohido (*Tecomella undulata*), root of Nagar veil (*Piper betel*[3]), bark of Ambla (*Phyllanthus emblica*[1,2,3]), bark of Bili (*Aegle marmelos*), root of Vatham chhod, bark of Kamal zad, Tuber of Kachhuro		Take 50 g each of Ragatrohido, ambla, bili, kamal zad barks, nagar veil and vatham chhod roots and kachhuro tuber. Boil in 2 L water till volume is half. One teaspoonful of decoction taken twice a day to relieve symptoms.
Jaundice	Tetu, Nilsoti	Oroxylon indicum1 2 3.	Bark and leaves are boiled and the filtrate is used.
Pain while urinating	Bhutiya alan	Oroxylon indicum 1	Grinded bark is mixed with sugar
Do	Ragat rohido, Kharato and Jambudo	Tecomella undulata 2&3, Syzygium cumini[2]	50 g, 25 g and 25 g respectively is ground and boiled with 500 ml water till it remains 100 ml. Drink this once in a day for 3-4 days
Fever in children	Nilsoti leaves (*Dalbergia volubilis*[1&3])		Boil leaves in water to prepare decoction and filter out sediments. Massage child's body with a few drops of the liquor
	Shiri (Albizia lebbeck[1,2,3]), Fok (Securinega leucopyrus[4])		Crush shiri leaves and mix powdered roots of Fok tree.
Acidity			
Asthma	Karav roots (Achyranthes aspera[1,2,3])		Crush roots and dilute juice in water and drink it.
	Shirish bark (Albizia lebbeck[1,2,3)]		Powder bark
Bleeding Wound	Burandi (Barleria prionitis[3])		Powder bark. Sprinkle over wound to stop bleeding. Also expedites healing of wound.
	Mokha (Schrebera swietenioides[3])		

Table V

LIST OF PLANTS USED IN RECIPE CONTEST DURING SHODHYATRA 2.

Route : Amirgadh village to Tundia village in Palanpura taluka (Balaram-Ambaji sanctuary) of Banaskantha district.

Date : 31-12-1998 to 6-1-1999

No.	Name	Village	*Recipe*	*Name of ingredients*		
				Local	**Common**	**Scientific**
1	Laliben Rajabhai Gamar	Gavra	(i)Curry of Bokhana vegetable	**Bokhana**	*Bokhana*	*Commelina benghalensis*
2	Ramiben Hirabhai Gamar	Gavra	(i) Vegetable of Karamada (berries)	**Karamada**	Karamada	*Carissa carandas*
3	Jamnaben Shantibhai Gamar	Gavra	(i)Vegetable of Fang with mango, butter-milk, sour tamarind etc.	**Fang**	Fang	*Rivea hypocrateriformis*
4	Soniben Sabalabhai Gamar	Gavra	(i)Vegetable of Goonda (berries) leaves	**Gunda**	Gunda	*Cordia mixa*
5	Dhuliben Gulbhai Gamar	Gavra	(i)Vegetable of Rajka (Alfalfa)	**Rajka**	Rajka	*Medicago sativa*
6	Premiben Bhomabhai Gamar	Gavra	(i)Vegetable of Velodi	**Velodi**	Velodi	Convolvulus arvensis
			(ii)Vegetable of Goras Ambli	**Goras Ambli**	Goras Ambli	*Pithecellobium dulce*
			(iii)Vegetable of Lakhaluni	**Lakhaluni**	Lakhaluni	*Portulaca oleracea*
7	Pooniben Gamabhai Gamar	Gavra	(i)Wild mango Chutney	**Keri**	Keri	*Mangifera indica*
8	Sablalabhai Chamarbhai Gamar	Gavra	(i) Matar (Pancake of Dhav gum + honey)	**Dhav no gunder**	Dhav gum	*Anogeissus latifolia*
9	Babiben Devabhai Gamar	Gavra	(i)Bhakhri (pancake) of Mahuda flowers	**Mahuda**	Mahuda	*Madhuca indica*

LIST OF PLANTS USED IN RECIPE OBTAINED DURING SHODHYATRA 6.

Route : Mohandari village (Maharashtra state) To Dhulda village (Gujarat state)

Date : 23-12-2000 to 1-1-2001

10	Shantiben Bandubhai Padvi	Payarpada	(i) Mokha Bhaji	Mokha	Mokha	*Schrebera swietenioides*
			(ii) Bhaji of soft roots of Vas	*Vans*	Vans	*Bambusa arundinacium*
			(iii) Bhaji of leaves of Amala	Amala	Ambla	*Emblica officianalis*
11	Yashodaben Shrirambhai Chaudhari	Vakaria	(i) Bhaji of flowers of Kanchan	Kanchan	Kanchanar	*Bauhimia racemosa*
12	Sayaben Ramabhai Thakre	Vakaria	(i) Bhaji of flowers of Champa	Champa	Champo	*Michelia champaca*

Table VI

Shodhyatra-1 -Gir to Gadhada				
Village Name	**Date**	**Kms.**	**District**	**State**
Ramlechi (Gir)	14-5-98		Junagadh	Gujarat
Chitravad	14-5-98		Junagadh	Gujarat
Hiranvel	15-5-98		Junagadh	Gujarat
Haripur (Jamri)	16-5-98		Junagadh	Gujarat
Lakkdpura Nesh	16-5-98		Junagadh	Gujarat
Sasan (Gir)	16-5-98		Junagadh	Gujarat
Navi Alvani Nesh	16-5-98		Junagadh	Gujarat
Prempara	17-5-98		Junagadh	Gujarat
Kalavad	17-5-98		Junagadh	Gujarat
Sudavad	18-5-98		Junagadh	Gujarat
Bagsara	18-5-98		Amreli	Gujarat
Mota Mandvada	19-5-98		Amreli	Gujarat
Babapr	19-5-98		Amreli	Gujarat
Rangpur	20-5-98		Amreli	Gujarat
Vadera	20-5-98		Amreli	Gujarat
Mora Sankaliya	20-5-98		Amreli	Gujarat
Pipallag	21-5-98		Amreli	Gujarat
Nana Sankliya	21-5-98		Amreli	Gujarat
Khijadiya (Jun)	21-5-98		Amreli	Gujarat
Shekh Pipaliya	21-5-98		Amreli	Gujarat
Limbdiya	22-5-98		Bhavnagar	Gujarat
Ghoghasamdi	22-5-98		Bhavnagar	Gujarat
Raniyala	22-5-98		Bhavnagar	Gujarat
Gadhada	23-5-98	**162**	Bhavnagar	Gujarat
Shodhyatra-2 Amirgadh to Tundiya				
Amirgadh	31-12-99		Banaskantha	Gujarat
Dungarpur	31-12-99		Banaskantha	Gujarat
Khapa	31-12-99		Banaskantha	Gujarat
Upla Bandh	01/01/2000		Banaskantha	Gujarat
Upla Bandh	01/01/2000		Banaskantha	Gujarat
Karamadi	01/01/2000		Banaskantha	Gujarat
Dabhchitra	01/02/2000		Banaskantha	Gujarat
Isariya	01/02/2000		Banaskantha	Gujarat
Sembalpani	01/02/2000		Sabarkantha	Gujarat
Ambaji	01/02/2000		Sabarkantha	Gujarat
Chikhla	01/03/2000		Sabarkantha	Gujarat
Koteshwar	01/03/2000		Sabarkantha	Gujarat
Ranpur Bunglow	01/03/2000		Sabarkantha	Gujarat
Gana Pipli	01/03/2000		Banaskantha	Gujarat
Machkoda	01/04/2000		Banaskantha	Gujarat
Bagadia Vas	01/04/2000		Banaskantha	Gujarat
Khatal, Torania	01/04/2000		Banaskantha	Gujarat
Torania to Sanali	01/04/2000		Banaskantha	Gujarat
Sandhosini	01/05/2000		Banaskantha	Gujarat
Mankadi	01/05/2000		Banaskantha	Gujarat
Dalpura	01/05/2000		Banaskantha	Gujarat

Gajipar	01/05/2000		Banaskantha	Gujarat
Gorad	01/05/2000		Banaskantha	Gujarat
Chorasan	01/05/2000		Sabarkantha	Gujarat
Toondia	01/06/2000	**102**	Sabarkantha	Gujarat
Shodhyatra-3 Mangal Bharti to Nighantu				
Mangalbharati	15-5-99		Vadodara	Gujarat
Hadod	15-5-99		Vadodara	Gujarat
Nandpur	16-5-99		Vadodara	Gujarat
Sipakoi	16-5-99		Vadodara	Gujarat
Katholi	16-5-99		Vadodara	Gujarat
Vora	16-5-99		Vadodara	Gujarat
Mangu	17-5-99		Vadodara	Gujarat
Kesharpura	17-5-99		Narmada	Gujarat
Alampur	18-5-99		Narmada	Gujarat
Garudeshwar	18-5-99		Narmada	Gujarat
Nana Thavdiya	19-5-99		Narmada	Gujarat
Dhirkhadi	19-5-99		Narmada	Gujarat
Dedvani Faliu	19-5-99		Narmada	Gujarat
Chopdi	20-5-99		Narmada	Gujarat
Gichad	21-5-99		Narmada	Gujarat
Juna Mojda	21-5-99		Bharuch	Gujarat
Nani Shindloti	22-5-99		Bharuch	Gujarat
Nighant	23-5-99	**150**	Bharuch	Gujarat
Shodhyatra – 4 Neelpar to Nani Khakhar				
Neelpar	26-12-99		Kutch	Gujarat
Pagivandh	26-12-99		Kutch	Gujarat
Dadadhro	26-12-99		Kutch	Gujarat
Jadsa	26-12-99		Kutch	Gujarat
Kanthkot	27-12-99		Kutch	Gujarat
Vamka	27-12-99		Kutch	Gujarat
Lakavat	27-12-99		Kutch	Gujarat
Meghapar	27-12-99		Kutch	Gujarat
Bandhadi	27-12-99		Kutch	Gujarat
Kabrau	28-12-99		Kutch	Gujarat
Aamradi	28-12-99		Kutch	Gujarat
Morgar	28-12-99		Kutch	Gujarat
Budharmota	28-12-99		Kutch	Gujarat
Dhamdka	28-12-99		Kutch	Gujarat
Kotda	28-12-99		Kutch	Gujarat
Chandrani	29-12-99		Kutch	Gujarat
Rapar (Kho)	29-12-99		Kutch	Gujarat
Khokhara	29-12-99		Kutch	Gujarat
Modsar	29-12-99		Kutch	Gujarat
Shugariya	29-12-99		Kutch	Gujarat
Sapeda	29-12-99		Kutch	Gujarat
Nigal	29-12-99		Kutch	Gujarat
Chandiya	30-12-99		Kutch	Gujarat
Balot	30-12-99		Kutch	Gujarat
Vadhura	30-12-99		Kutch	Gujarat

Bagda	31-12-99		Kutch	Gujarat
Kudrodi	31-12-99		Kutch	Gujarat
Ratadiya	31-12-99		Kutch	Gujarat
Lakhapur	31-12-99		Kutch	Gujarat
Viraniya	31-12-99		Kutch	Gujarat
Toda	31-12-99		Kutch	Gujarat
Bhorara	31-12-99		Kutch	Gujarat
Samaghogha	01/01/2000		Kutch	Gujarat
Bhujpur	01/01/2000		Kutch	Gujarat
Deshalpur	01/01/2000		Kutch	Gujarat
Moti Khakhar	01/01/2000	**144**	Kutch	Gujarat
Shodhyatra-5 Kasana to Koba				
Kasana	20-6-00		Sabarkantha	Gujarat
Vadthali	20-6-00		Sabarkantha	Gujarat
Khokhariya	20-6-00		Sabarkantha	Gujarat
Jivanpur-1	20-6-00		Sabarkantha	Gujarat
Adapur	20-6-00		Sabarkantha	Gujarat
Nani Mordi	21-6-00		Sabarkantha	Gujarat
Moto Mordi	21-6-00		Sabarkantha	Gujarat
Undva	21-6-00		Panchmahal	Gujarat
Vasai	21-6-00		Panchmahal	Gujarat
Royaniya	21-6-00		Panchmahal	Gujarat
Kaliyakuva	21-6-00		Panchmahal	Gujarat
Lambho	21-6-00		Panchmahal	Gujarat
Chhani	22-6-00		Panchmahal	Gujarat
Madapur	22-6-00		Panchmahal	Gujarat
Vavkuva	22-6-00		Panchmahal	Gujarat
Punjela	22-6-00		Panchmahal	Gujarat
Pandola	23-6-00		Panchmahal	Gujarat
Zalasag	23-6-00		Panchmahal	Gujarat
Bachakariya	23-6-00		Panchmahal	Gujarat
Dintvas	23-6-00		Panchmahal	Gujarat
Karvai	23-6-00		Panchmahal	Gujarat
Juni Godhar	24-6-00		Panchmahal	Gujarat
Navi Godhar	24-6-00		Panchmahal	Gujarat
Ghasvad	24-6-00		Panchmahal	Gujarat
Muvadabid	24-6-00		Panchmahal	Gujarat
Munpur	24-6-00		Panchmahal	Gujarat
Kadana	24-6-00		Panchmahal	Gujarat
Kureta	25-6-00		Panchmahal	Gujarat
Chitva	25-6-00		Panchmahal	Gujarat
Timla	25-6-00		Panchmahal	Gujarat
Nani Kyar	25-6-00		Panchmahal	Gujarat
Moti Kyar	25-6-00		Panchmahal	Gujarat
Bhana Sima	25-6-00		Panchmahal	Gujarat
Bhana Simal	25-6-00		Panchmahal	Gujarat
Sarmi (Khedapa)	25-6-00		Panchmahal	Gujarat
Mali Faliu	26-6-00		Panchmahal	Gujarat
Mena Padar	26-6-00		Banswada	Rajasthan
Anandpuri	26-6-00		Banswada	Rajasthan

Tametiya	26-6-00		Banswada	Rajasthan
Chhaja	26-6-00		Banswada	Rajasthan
Kangliya	27-6-00		Banswada	Rajasthan
Barjediya	27-6-00		Banswada	Rajasthan
Kanela	27-6-00		Banswada	Rajasthan
Naharpur	27-6-00		Banswada	Rajasthan
Sundara	27-6-00		Banswada	Rajasthan
Kanjliya	27-6-00		Banswada	Rajasthan
Koba	28-6-00	**142**	Banswada	Rajasthan
Shodhyatra-6 Mohandari to Dhulda				
Mohandari	23-12-2000		Nasik	Maharashtra
Jamset	23-12-2000		Nasik	Maharashtra
Chinchora	24-12-2000		Nasik	Maharashtra
Chankapur	24-12-2000		Nasik	Maharashtra
Barkipada	24-12-2000		Nasik	Maharashtra
Kanasi	25-12-2000		Nasik	Maharashtra
Khadakvan	25-12-2000		Nasik	Maharashtra
Dungarchathi	25-12-2000		Nasik	Maharashtra
Kermal	25-12-2000		Nasik	Maharashtra
Hathgadh	25-12-2000		Nasik	Maharashtra
Bakurde	25-12-2000		Nasik	Maharashtra
Kharbhal	25-12-2000		Nasik	Maharashtra
Dalvat	25-12-2000		Nasik	Maharashtra
Jamla	26-12-2000		Nasik	Maharashtra
Jirvada	26-12-2000		Nasik	Maharashtra
Virset	26-12-2000		Nasik	Maharashtra
Chapapada	26-12-2000		Dang	Gujarat
Payarpada	27-12-2000		Dang	Gujarat
Chinchavada	27-12-2000		Dang	Gujarat
Vakariya	28-12-2000		Dang	Gujarat
Suryavanshi	28-12-2000		Dang	Gujarat
Kosambiya	28-12-2000		Dang	Gujarat
Bilmal	28-12-2000		Dang	Gujarat
Linga	29-12-2000		Dang	Gujarat
Kumbhariya	29-12-2000		Dang	Gujarat
Mahalpada	30-12-2000		Dang	Gujarat
Jamlapada	30-12-2000		Dang	Gujarat
Koshimkhadro	31-12-2000		Dang	Gujarat
Savaradaksad (Mahal)	31-12-2000		Dang	Gujarat
Dhulda	01/01/2001	**134**	Dang	Gujarat
Shodhyatra 7 Dabhuda to Sarsala				
Dabhuda	16-6-2001		Kutch	Gujarat
Bhujodi	16-6-2001		Kutch	Gujarat
Pichhana	17-6-2001		Kutch	Gujarat
Nalia Timba	17-6-2001		Kutch	Gujarat
Mevasa	18-6-2001		Kutch	Gujarat
Thoriyali	18-6-2001		Kutch	Gujarat
Kumbhariya	19-6-2001		Kutch	Gujarat
Khanpar	19-6-2001		Kutch	Gujarat

Gajuvadnh	20-6-2001		Kutch	Gujarat
Jethasari	20-6-2001		Kutch	Gujarat
Gogavandh	20-6-2001		Kutch	Gujarat
Badargadh	21-6-2001		Kutch	Gujarat
Badargadh	22-6-2001		Kutch	Gujarat
Sarsala	23-6-2001	**65**	Kutch	Gujarat
Shodhyatra –8 Bhikampura to Neelkanth				
Bhikampura	24-12-2001		Alwar	Rajasthan
Kishori	24-12-2001		Alwar	Rajasthan
Kyara	24-12-2001		Alwar	Rajasthan
Suratgadh	24-12-2001		Alwar	Rajasthan
Bharvata	25-12-2001		Alwar	Rajasthan
Aagar	25-12-2001		Alwar	Rajasthan
Chousala	25-12-2001		Alwar	Rajasthan
Chhapli Padak	25-12-2001		Alwar	Rajasthan
Naraith	26-12- 2001		Alwar	Rajasthan
Pratapgadh	26-12- 2001		Alwar	Rajasthan
Palasana	26-12- 2001		Alwar	Rajasthan
Hamirpur	27-12- 2001		Alwar	Rajasthan
Samra	27-12- 2001		Alwar	Rajasthan
Piplai	28-12- 2001		Alwar	Rajasthan
Moradi	28-12- 2001		Alwar	Rajasthan
Naidoli	28-12- 2001		Alwar	Rajasthan
Soti ka guvada	29-12- 2001		Alwar	Rajasthan
Gugali ka guvada	29-12- 2001		Alwar	Rajasthan
Ramji ka guvada	29-12- 2001		Alwar	Rajasthan
Shili Vavdi	30-12- 2001		Alwar	Rajasthan
Jaitpur	30-12- 2001		Alwar	Rajasthan
Gopalpura	30-12- 2001		Alwar	Rajasthan
Rajourgadh	31-12- 2001		Alwar	Rajasthan
Mandalvas	31-12- 2001		Alwar	Rajasthan
Nilkanth (Gadh)	01/01/2002	**107**	Alwar	Rajasthan
Shodhyatra –9 Samadara to Bhadarva				
Samadara	06/02/2002		Kheda	Gujarat
Modaj	06/02/2002		Kheda	Gujarat
Shantrunda	06/03/2002		Kheda	Gujarat
Pithai	06/03/2002		Kheda	Gujarat
Vadthal	06/04/2002		Kheda	Gujarat
Mahisa	06/04/2002		Kheda	Gujarat
Alina	06/05/2002		Kheda	Gujarat
Heranj	06/05/2002		Kheda	Gujarat
Pansor	06/06/2002		Anand	Gujarat
Ashipura	06/06/2002		Anand	Gujarat
Sarsa	06/07/2002		Anand	Gujarat
Khanpur	06/07/2002		Anand	Gujarat
Bhadrva	06/08/2002	**135**	Vadodara	Gujarat
Shodhyatra – 10 Thoduvedgam Ashram to Sevapur (Tamilnadu)				
Thiruvedgam Ashram	21-12-2002		Madurai	Tamilnadu

Thenu	22-12-2002		Madurai	Tamilnadu
Melkka Bridge	22-12-2002		Madurai	Tamilnadu
Thachampatthu	22-12-2002		Madurai	Tamilnadu
Solavandaha	22-12-2002		Madurai	Tamilnadu
Methurithan	23-12-2002		Madurai	Tamilnadu
Andipatti Bunglow	23-12-2002		Madurai	Tamilnadu
Kadchakatti	23-12-2002		Madurai	Tamilnadu
Allpur	23-12-2002		Madurai	Tamilnadu
T. Matupatthi	23-12-2002		Madurai	Tamilnadu
Kundipatti	23-12-2002		Madurai	Tamilnadu
Kolinchipatti	23-12-2002		Madurai	Tamilnadu
Gengamuthur	23-12-2002		Madurai	Tamilnadu
Satheyyar Dama	23-12-2002		Madurai	Tamilnadu
Palamedu	24-12-2002		Madurai	Tamilnadu
Arampatti	24-12-2002		Madurai	Tamilnadu
Manichakka Patti	24-12-2002		Madurai	Tamilnadu
Pallpatti	24-12-2002		Madurai	Tamilnadu
Ponthukampatti	24-12-2002		Madurai	Tamilnadu
Lingavadi	25-12-2002		Madurai	Tamilnadu
Rediapatti	25-12-2002		Madurai	Tamilnadu
Vaththi patthi	25-12-2002		Madurai	Tamilnadu
Santhigramm	25-12-2002		Madurai	Tamilnadu
Natham	25-12-2002		Madurai	Tamilnadu
Nr. Natham Village	26-12-2002		Madurai	Tamilnadu
Kutthipatti	26-12-2002		Madurai	Tamilnadu
Ayyanarpuram	26-12-2002		Madurai	Tamilnadu
Mankuttur	27-12-2002		Madurai	Tamilnadu
Kondgipatti	27-12-2002		Madurai	Tamilnadu
Alampatti	27-12-2002		Madurai	Tamilnadu
Kurunthampatti	27-12-2002		Madurai	Tamilnadu
Puthur	28-12-2002		Madurai	Tamilnadu
Kolyymapati	28-12-2002		Madurai	Tamilnadu
Verkulapatti	28-12-2002		Madurai	Tamilnadu
Ayyalur	28-12-2002		Madurai	Tamilnadu
Palakurichi	29-12-2002		Madurai	Tamilnadu
Sithuvarpatti	29-12-2002		Madurai	Tamilnadu
Semperipatti	29-12-2002		Dindigal	Tamilnadu
Venktachalpuram	29-12-2002		Dindigal	Tamilnadu
Virrampuram	29-12-2002		Dindigal	Tamilnadu
Samnapatti	29-12-2002		Dindigal	Tamilnadu
Mammniyar	29-12-2002		Dindigal	Tamilnadu
Komperipatti	29-12-2002		Dindigal	Tamilnadu
Valvichetipatti	30-12-2002		Dindigal	Tamilnadu
Mamrathupaati, Puthupatti	30-12-2002		Dindigal	Tamilnadu
Sevapur	30-12-2002	**156**	Dindigal	Tamilnadu
Total Kms.		**1297**		

End Notes

[1] R A. Mashelkar, 'New '*Panch Sheel'* for the new Millennium', Presidential address, Indian Science Congress at Pune, January 3, 2002, New Delhi: CSIR, mimeo. The quotation is from a speech delivered by Krishna Kant, New Delhi, Feb. 21, 1999

[2] The educational statistics show that about fifty percent girls drop out in upper primary.
[3] According to UNESCO 1999 statistical yearbook, about 66 per cent women are illiterate, only 38 per cent girls enroll at secondary school level (these figures have been revised to about fifty percent as per the Selected Educational Statistics, 200-2001. 36% tertiary students are girls, and about 30 per cent students in Natural sciences including computer science, town planning, communication and transportation are girls. Only 23 % of India's Internet users are women.
[4] As is apparent from table two, hardly 37363 women worked in research and development institutions as well as industrial units in private as well as public sector in 1998. The enormity of the problem does not need to be further stressed.
[5] There were 58. 29 lakh women employed in organized sector in 1999 out of whom about half were in social and community services and about one fourth in manufacturing sector (see Table three).

6. See Lakshmi Lingam, *Sex Detection Tests and Female Foeticide: Discrimination Before Birth,* Thiruvananthapuram: Centre for Development Studies, 1999 .Lingam observes,

> The scanty research evidence points to the extensive use of the test for sex detection purposes, followed by sex selective abortion of female foetuses. Ramanamma and Bambawali's study (1980) of the records of three hospitals in the city of Pune indicates that between June 1976 and June 1977, 700 women sought sex detection in hospital 'B'. Of the 450 women who were informed that they would have a daughter, 430 (95.5 per cent) went in for an abortion. On the other hand, all the 250 women (100 per cent) who were informed that they bore a male foetus carried on with the pregnancy, even though they were warned of a chance of genetic disorder in certain cases. Kulkarni's study of 50 gynecologists in the city of Bombay reveals that 27 (i.e., 64.3 per cent) carry out amniocentesis tests solely for sex determination. On an average, 42 gynecologists perform 271 SD tests per month. The remaining doctors (35.7 per cent) reported that only in less than 10 per cent of the cases is the test performed to detect genetic defects.
>
> With the mushrooming of clinics conducting this test, it was estimated, in 1986, that there were 248 clinics and laboratories, and approximately 16,000 tests being performed in the Bombay metropolitan region each year. It is estimated that selective abortions must have claimed 78,000 female foetuses between 1983 and 1986.

[7] Lalita Subramanyan*, Women Scientists in the Third World: The Indian Experience,* New Delhi: Thousand Oaks, London: Sage Publications, Delhi, 1998

[8]Dr Manju Sharma recalled the contribution of many outstanding women scientists while delivering the keynote address at the National Consultation on Science and Technology for Women - A Millennium Dialogue, Dec 20, such as Prof. Ashima Chatterjee, Prof. Archana Sharma, Prof. Kasturi Dutta, Dr. Janaki Ammal, Prof. Sipra Guha Mukherjee, Dr. Sneh Bhargav, Prof. Indira Nath and many others.

See *The Hindustan Times*, December 21, 1999
[9] Abha Sur in her article in *The Hindu,* Oct 14, 2001 observes:

> Anna Mani came from a large family (she is the seventh of eight children, three girls and five boys) in the former state of Travancore, (now part of Kerala) in the southern part of India. Her father was a prosperous civil engineer who owned cardamom estates. Although Mani's family belonged to an ancient Syrian Christian church, her father was an agnostic. By the time she was eight, Mani had read almost all the books in Malayalam at her public library. On her eighth birthday, when she was gifted with diamond earrings, as was the custom in her family, she opted instead for a set of the Encyclopaedia Britannica
>
> In the matter of education, Mani followed her brothers, who were groomed for high-level careers in government service. While there was no opposition to her desire for higher education in physics from her family, there was little encouragement. In 1940, a year after finishing college, Anna Mani obtained a scholarship to do research in physics at the Indian Institute of Science, Bangalore. She was accepted in Raman's laboratory as a graduate student. Mani worked on the spectroscopy of diamonds and rubies. She recorded and analysed fluorescence, absorption and Raman spectra of 32 diamonds. She studied temperature dependence and polarisation effects in these spectra. The experiments were long and painstaking: the crystals were held at liquid air temperatures, and the weak luminescence of some of the diamonds required 15 to 20 hours of exposure time to record the spectrum on photographic plates. Between 1942 and 1945, she published five single-authored papers on the luminescence of diamonds and ruby. In August 1945 she submitted her Ph.D. dissertation to the Madras University and was awarded a government scholarship for an internship in England, where she specialised in meteorological instrumentation.
>
> Mani returned to Independent India in 1948. She joined the Indian Meteorological Department at Pune, where she was in charge of construction of radiation instrumentation. She published a number of papers on subjects ranging from atmospheric ozone to the need for international instrument comparisons and national standardisation of meteorological instrumentation. She retired as the deputy director general of the Indian Meteorological Department in 1976 and subsequently returned to the Raman Research Institute as a visiting professor for three years. She

published two books, The Handbook for Solar Radiation Data for India (1980) and Solar Radiation over India (1981), and worked on a project for harnessing wind energy in India in 1993. Despite her interest in, and involvement with, issues of environment, Anna Mani ``got out of the business,'' as environmentalists (``carpetbaggers'' as she called them) seemed to be ``always in orbit.'' She preferred to stay in one place.

[10] Abha Sur, ibid.

[11] Arati Prabhakar, Director, National Institute of Standards and Technology, USA, was born in New Delhi, India. She received her B.S. in Electrical Engineering from Texas Tech University (1979), and her M.S. in Electrical Engineering (1980) and Ph.D. in Applied Physics (1984) from the California Institute of Technology. She is a member of Eta Kappa Nu, Tau Beta Pi, and a senior member of the Institute of Electrical and Electronics Engineers. She received a fellowship from the Bell Laboratories Graduate Research Program for Women. Dr. Prabhakar was appointed tenth NIST Director by President Clinton, took office May 28, 1993.

Bhama Srinivasan was born in 1935 in Madras, India. She received her BA and MSc degrees from the University of Madras and went to England for further graduate study. She received her PhD in 1960 under the direction of J. A. Green at the University of Manchester. She taught in England at the University of Keele, held a postdoctoral fellowship at the University of British Columbia, and also taught at the Ramanujan Institute of Mathematics, University of Madras. She came to the United States in 1970 and taught at Clark University until 1979, and since then has been a professor at the University of Illinois at Chicago. She became a U.S. citizen in 1977.Srinivasan served as President of the Association for Women in Mathematics during 1981-1983. She was a member at the Institute for Advanced Study in 1977 and at the Mathematical Sciences Research Institute in 1990, and has held visiting professorships at the Ecole Normale Superieure in Paris, the University of Essen in the Federal Republic of Germany, Sydney University in Australia, and the Science University of Tokyo in Japan. In January 1979, she presented an AMS Invited Address at the Joint Mathematics Meetings in Biloxi, Mississippi. She served as an editor of the *Proceedings of the AMS* (1983-1987), *Communications in Algebra* (1978-1984), and *Mathematical Surveys and Monographs* (1991-1993), and is a member of the Editorial Boards Committee of the AMS (1991-1994).

Radha Basu joined HP in 1978 as an R&D engineer in HP Laboratories, working in the field of ultrasound imaging, and was promoted to New Enterprise startup manager for imaging in 1981. In 1983, Basu moved to Boeblingen, Germany as European Sales & Marketing Manager of diagnostic medical products. In 1985, she moved to the Intercontinental Group and was responsible for starting up HP's Sales and R&D operations in India, including the India Software Operation, where she served as Managing Director. Basu is on the board of directors of SEEC, Inc., a company that specializes in software products and business solutions for e-legacy to e-business migration. She is a board member of and strategic advisor to Connectinc.com, an Internet e-commerce company for NetMarketmakers. She received the 1995 Woman of Achievement Award for leadership and vision in the corporate field from San Jose Mercury News and Women's Fund. In 1997 she received the Excelsior Leadership Award from Net- IP. She is a co-founder of 'Maitri', a counseling and assistance organization for South Asian women, is an invited lecturer at MIT Sloan school of management, is a speaker at high schools and mentoring workshops, and is on the Board of Trustees of Business and Professional Women. Basu is married with one daughter and her interests include programs for women and children in rural areas, trekking in the Himalayas and classical dancing. Basu is named one of the Top 25 women on the web. Jan 31, 2000.

[12] It is, of course, true that women scientists do not get their due recognition either in India or outside India. The following facts give us an insight.
Women Scientists elected as Fellows of National Academy of Science:
Indian Academy of Science, Bangalore 28/836 3.35%
Indian National Science Academy, Delhi 18/707 2.55%
Royal Society, London 70/1200 5.83%

[13] Dr M S Geerwani, former Vice Chancellor, Padmawati Mahila Vishwavidyalaya, Tirupati has been a distinguished scholar in the field of nutrition and home science. In a personal interview fifteen years ago, she told Anil Gupta that her mission was to put the products made of millets and sorghum on the plates of the rich. She believed that the only way the demand for the crops grown by poor dry land farmers could be enhanced was by making them palatable to the rich. She also felt that instead of focusing all attention on wheat and rice, bajra and sorghum should also receive priority because these were also more nutritive in nature. She has been an advisory committee member of SRISTI and research advisory committee of national Innovation Foundation. She has received many awards and honours in her career

[14] Dr Indira Nath, Faculty at AIIMS, New Delhi, has devoted her entire life to finding a cure for leprosy. The citation for loreal award read:

> Discover and discover again and again..." This one word seems to sum up both Indira Nath's career and her endless battle against leprosy. "What an extraordinary time we are living in! Knowledge of the human gene progresses every day. How lucky we are!" Passion is, without a doubt, the driving force of this internationally renowned Indian researcher. Her vocation appeared early in her life. "I was ten years old when I decided that I wanted to take up medicine. I never doubted that I'd grow up to become a doctor." Unwavering idealism and dedication allowed this dynamic woman to go far beyond her childhood dreams. Doctor and Professor of Immunology at the All India Institute of Medical Sciences in New Delhi, she is considered an authority on leprosy throughout the world.
>
> Convinced that leprosy could be fought, Indira Nath began her research in the early 70's. At the time, many scientists felt they had discovered a new way of understanding the disease. Along with other Indian researchers, Dr.

> Nath's groundbreaking studies began by contradicting these new theories and drew a great deal skepticism. At the forefront of technological progress, Indira Nath created India's first biotechnology department in 1986. She distinguished herself by making an essential discovery: people infected by the leprosy bacilli do not all develop the same disease. Among those who develop lepromatous leprosy, the most serious form, Indira Nath identified a mechanism associated with the triggering of the disease: a deficiency in the immune response system. This discovery is a significant contribution toward the development of treatments and vaccines.

[15] Third World Organization For Women in Science (TWOWS), Second General Assembly and International Conference on 'Women, Science and Technology for Sustainable Human Development', Cape town, 8-11 February 1999.

[16] See Anil K. Gupta, 'Managing Ecological Diversity, Simultaneity, Complexity and Change: An Ecological Perspective', W.P.No. 825. IIM Ahmedabad. 1989, p. 115, & 'Third survey on Public Administration: Indian Council of Social Science Research, New Delhi', in V.A.Pai Panandiker (ed.), *A Public Survey of Research in Public Administration, 1980-1990* , New Delhi, 1997, pp.431-495.

[17] Maithreyi Krishnaraj, *Women's Studies in India: Some Perspectives,* Bombay: Popular Prakashan, 1986, cited in ibid.

[18] SRISTI was set up as a developmental voluntary organization at Ahmedabad in 1993 to support the Honey Bee network. Deprived of sufficient access to natural resources and economic means of livelihood, many disadvantaged communities have no choice but to innovate in order to survive. Many of such creative communities and individuals have only knowledge resources left with them. The emergence of Honey Bee Network in 1989 thus signified a point of departure in our thinking about the way we should deal with people's creativity, knowledge systems and conservation ethic. The growth of the Honey Bee Network required institutional support and it was felt that an independent institutional structure was much needed to sustain Honey Bee newsletter and it's associated activities. SRISTI (Society for Research and Initiatives for Sustainable Technological and Institutions) and its research programmes were the result of that realisation. The specific objectives of SRISTI are: (a) To create greater space in society for building upon initiatives and innovations at grassroots level with special focus on women's indigenous knowledge (b) To document, analyze and disseminate technological as well as institutional innovations developed by people themselves.(c) To validate and add value to local innovations through experiments (on farm and on-station) and laboratory research for generating nature-friendly sustainable technologies.(d) To conserve local biodiversity through *in-situ* as well as *ex-situ* gene banks managed by local people.(e) To protect intellectual property rights of grassroots innovators and to generate incentive models for recognizing, respecting and rewarding grassroots creativity and associated ethical values and norms.(f) To provide venture support to grassroots innovators to scale up products and services based on grassroots innovations through commercial or non-commercial channels.and (g) To embed the insights learnt from grassroots innovations in formal educational system in order to expand the conceptual and cognitive space available to these innovations.

SRISTI believes that value addition to indigenous knowledge will help local communities co-exist with biodiversity resources by reducing primary extraction and generating long-term benefits. Further this would facilitate income earning opportunities for people and enhance sustainable resource use. SRISTI actively supports the Honey Bee Network which aims to bring together creative people engaged in the development and application of local ecological, technological and institutional knowledge for sustainable development. The network endeavors to scout, recognize, respect and reward innovative individuals/groups who, through their own efforts, have evolved sustainable solutions for natural resource management. The spirit of sustainability is sought to be achieved by blending the secular and the sacred streams of consciousness around basically seven E's (Ethics, Excellence, Equity, Efficiency, Environment, Empathy and Education). SRISTI, 1993, 2001 mimeo.

[19] once when a colleague's wife sent an innovation to the NIF's national contest, Gupta was guilty of asking why did the colleague had sent it in his wife's name. When we met the colleague's wife, he realized that she was, if any thing, even more creative than her husband).

[20] Autumn Stanley, *Mothers and Daughters of Invention*, Rutgers University Press, 1995, pp xx-xxi

[21] Abha Sur observes in her article cited above,

> Raman maintained a strict separation of sexes in his laboratory. The crucial practice of discussion and debate about scientific ideas among peers was denied to women, rendering them peripheral to the scientific enterprise. Casual, informal association with male colleagues was strictly out of bounds. Raman frowned upon any interaction between men and women. Mani recalled how he would mutter ``Scandalous!" every time a male and a female student walked together by his window. With a touch of amusement, Mani noted that Raman must have had an uncanny sense, for even while bending over a microscope, he would be able to catch a glimpse of an ``offending" couple. She remembered one incident vividly. She was talking to Nagamani, one of her male colleagues in the laboratory. In the middle of a sentence, Nagamani looked up to find Raman at a distance, cycling slowly (``like a big bear") toward them. Nagamani turned pale and fled the scene as fast as he could, she recalled, "leaving me to face the music alone.'

[22] Maithreyi Krishnaraj, *Women and Science – Selected Essays,* Mumbai: Himalaya Publishing House, 1991; Subrahmanyan, op. cit.

[23] Maria Mies and Vandana Shiva, *Ecofeminism,* New Jersey: Zed Books, 1993

[24] A. K. Gupta, 'Role of Women in Risk Adjustment in Drought Prone Regions with Special Reference to Credit Problems', IIM Working Paper No. 704, October 1987.

[25] For example, Evelyn Fox Keller, *Reflections on Gender and Science,* New Haven: Yale University Press, 1995; Linda Alcoff, "Justifying Feminist Social Science", *Hypatia* 2 (3), Fall 1987, pp.1207-27; Sandra Harding, "The Method

Question", *Hypatia* 2 (3), pp.19-35; Lisa Heldke, "John Dewey and Evelyn Fox Keller: A Shared Epistemological Tradition". *Hypatia* 2 (3), pp.129-40.

[26] Lalita Subrahmanyan, *Women Scientists in the Third World*, p.32

[27] Presidential address given by Dr R A Mashelkar, Pune, 2000, CSIR, New Delhi, mimeo

[28] See Table III for discipline-wise share of women

[29] Honey Bee network is an informal network of creative artisans, farmers, mechanics etc., and traditional knowledge holders who wish to learn from each other, build upon each other's innovations and combine seven Es i.e. ethics, equity, excellence, efficiency, environment, education and empathy. Honey Bee network has been scouting odd balls all around the country and also outside it to cross pollinate, ensure that IPRs of the people are safeguarded, and that they get affair share of any value addition that takes place in their knowledge.

[30] Herbal Healer of Savarda Kasad, Ahwa: Sitaben Lasiyabhai Gaikwad: A profile:

The only woman to practice traditional medicine among the tribals in Savarda Kasad village, Sitaben Lasiyabhai Gaikwad is not another one of those faith healers who commands the awe of tribal people through skullduggery. She is a virtual repository of a wealth of traditional knowledge in indigenous medical practices. Her husband and son are proud of her achievements and consider it their duty to accompany her to all formal meetings.

Native Cure, Natural Cure

Sumanben, a tribal woman of Ahwa taluka, had sustained a major injury as a sharp axe fell on her foot as she was busy cutting wood in the forest. The forest officials took her to the dispensary for emergency trauma treatment. As ill luck would have it, the sutures she had received proved troublesome. The wound would not heal. It did not respond to any modern medication. Sumanben approached Sitaben Gaikwad when she could no longer bear the pain and loss of livelihood due to the wound. The wound was treated with the bark of Mokha (Schrebera swietenioides) and other plants and got completely healed within about 10 days. She profusely thanked god and Sitaben that she was able to get the treatment in Dangs district itself and did not have to go to Surat or Ahmedabad for treatment, burning a big hole in the pocket.

Two incidents that had happened in her life had reinforced the confidence of the Herbal-Healer Lady Sitaben in the efficacy of traditional indigenous medicine and also her will to continue to learn while practicing. About 15 years ago, her husband had a severe stomach ache. Her father and brothers treated him and got him back to normal in a month's time. Again about 10 years ago, her husband fell off a tree and broke his hip. At that time, she herself prepared the correct remedy by collecting plants from the forest and treated him. He recovered quickly.

Down the Generations

The grandfather of Sitaben Gaikwad was a vaid (native doctor) of long standing in Gana village in Ahwa taluka, Dangs district. Her father continued the practice along with his two sons; they helped him in locating and collection of different types of herbs from the thick woods surrounding the village as well as in grinding and preparation of traditional formulations.

Sita was the youngest of five children and the darling of the household. Her two older sisters had already been married away and had set up their own homes when Sita was still a young child. She received only a couple of years' formal education and used to help her brothers and her father in the preparation of medicinal formulations. Her chores included trekking to the forest occasionally to locate useful herbs. Thus, she got an opportunity to learn about traditional medicines from her brothers in early childhood. On occasions when both her brothers were not home, she would dispense medicines.

Young Sita possessed very good observation skills and could easily comprehend the signs and symptoms of various diseases and the effect of different herbs on them. She also had a thorough grounding in the use of different members of the plant kingdom in treating human ailments. She was married off according to tribal tradition to Laisyabhai Gaikwad, a marginal farmer with no formal education, when she turned 16. Lasiyabhai lived in Savarda Kasad village, 15 km from Gana in the thickly forested taluka. Her husband and in-laws encouraged her to continue the noble work of treating the sick of the region.

The Present

Three decades later, Sitaben, now 45 years old, happens to be the only woman to practice traditional medicine in Savarda Kasad village and scores of tribals living in several other settlements in the thickly forested area come to her for treatment. (this case was compiled with the assistance of Mahesh Parmar, SRISTI field researcher and Jyoti Capoor helped in editing it)

[31] Perhaps many first generation women professionals face similar stresses when they have to combine two worlds of work (formal and informal, home and office) and when they have to respond to conflicting standards of performance, 'goodness' and sensitivities.

[32] Adapted from Editorial, Honey Bee, 12(4) October-December, 2001

[33] Shodh Yatra (journey for exploration) started five years ago and so far ten such walks have been organized during summer and winter involving about 1950 kilometers through different regions of Gujarat, Maharashtra, Rajasthan and Tamilnadu. It helps in recalibrating our understanding of our society and its creative impulses. We honor innovators and outstanding traditional knowledge-experts at their door step and share with them what we have learned from elsewhere. In a way, we perform honey bee function of crosspollination as well as learning from local experts and collecting the pollen of knowledge without impoverishing them.

[34] See Table VI for list of regions in which ten shodh yatras have been held, along with season, year, approx kilometers walked in each.

[35] Table V provides some of the recipes collected during one of such Shodh Yatras.

It may be mentioned here that that Smt Ganga Ben of Mansa village in Mehsana district of Gujarat had written a book in 1898 containing about 2080 recipes. She had become a widow at the age of 14 and had pooled the best practices so to say, from around the region and put them together in this book. SRISTI is re-publishing this book shortly. It is said that 1000 copies of this book were sold in three days. The point is that learning from people and pooling their best practices is not a new idea started by Honey Bee Network and there are pioneers who have tried it before. Also women writers like her have been neglected in literature, and science is deprived because of that.

[36] Craig Davis in *Growing Milkweed, a Plant with Prospective Anti-cancer Properties,* Brisbane, Australia : RIRDC, 1993, observes, "Recent research by a small Brisbane-based, Australian-owned company Peplin Biotech Ltd in conjunction with the Queensland Institute of Medical Research has found that extracts from milkweed (Euphorbia peplus) and potentially other Euphorbia species (e.g. E.esula, E.lathyris, E.terracina and E.lagascae) have significant anti-cancer activity in mice and humans. Euphorbia is a large genus of some 2000 species with milky sap, often with poisonous or medicinal uses. It includes beneficial as well as weedy plants, of which some 45 species are found in Australia. Although milkweed and the other promising Euphorbia spp. are new to agriculture, environmental requirements for their cultivation have been established in the course of earlier research by Peplin Biotech and QIMR. The active compounds are unable to be synthesised on a commercial scale and have been patented by Peplin Biotech. An early version of the product has given >90% complete responses on skin cancers in a Phase II clinical trial".

[37] Recently in Panchmahals, during the fieldwork being pursued by Kirit Patel, a PhD student at University of Guelph and the seniormost member of Honey Bee network for last twelve years, a question was asked to women and men separately about the criteria of selecting seeds. Not only was the knowledge of women in maize and several minor millets found to be deeper but also they could distinguish various cobs lying mixed very quickly compared to the men. Personal communication with Kirit Patel, December, 2002

[38] Puri Ben from Gujarat describes various methods of seed storage, for instance adding chilli powder and filtered fine soil. Some women put an earthen burning lamp inside the seed container and then seal the mouth of the vessel. The lamp will burn till there is no oxygen left in the box and then when the oxygen is exhausted, the lamp is extinguished and the seeds so stored remain safe for several years. There are a large number of such practices developed and used by women all over the developing world.

[39] Who in India has not been treated with these remedies which grandmothers use for keeping children safe and healthy, and succeed in doing so in most cases, most of the time? Use of nutmeg paste made with milk for stopping loose motions among children is a well known traditional knowledge of women.

[40] See the case study of Nathi Ben published in Honey bee 13(4) 2002, annexure two.

[41] Apparently, rituals like these might serve among other purposes, a key purpose of letting communities be aware of the diversity available in the region. After all, a community concerned about its long term survival would keep exploring such issues so as to ensure food security and also nutritional diversity and security.

[42] See Nina Etkin (ed.), *Eating on the Wild Side, The Pharmacologic, Ecologic and Social Implications of Using Noncultigens, in Arizona Studies in Human Ecology,* 1994, pp. 305; Irene Guijt, Fiona Hinchcliffe and Mary Melnyk **,** *The Hidden Harvest -- the Value of Wild Resources in Agricultural Systems -- A Summary.*, London: IIED, 1995; Ian Scoones, Mary Melnyk and Jules Pretty (eds.), *The Hidden Harvest -- Wild Foods and Agricultural Systems. A Literature Review and Annotated Bibliography*. London: IIED, 1992.