

## **Women, Environment and Technology**

### **Ashok Khosla**

All over the third world, women are trapped in a downward spiral of subsistence and survival. They survive and subsist within the limits of an environment that is increasingly hostile and rapidly degrading. Their homes and habitats are becoming less and less liveable. The natural resources from which they draw sustenance for their families are disappearing before their very eyes, sacrificed to the altar of today's most basic needs. Even the keen understanding that comes from aeons of living with nature sometimes cannot prevent them from further undermining, with each new day, the resources of the land on which they know their children will have to depend.

#### **The plight of women**

Despite fifty years of commitment by our governments to so called development, more than half of the people of South Asia today work harder and get less for their effort than ever before. More than 300 million of these are women who spend their entire waking hours in one drudge task after another. It is hard for the average city person to comprehend the misery that surrounds the lives of these fellow citizens of ours. A study by the Indian Social Institute has estimated that women in the Chattisgarh region of central India walk more than 4 kilometres a day to gather various products they need from the forest, up from 1.6 kilometres only 20 years ago. In the state of Orissa in eastern India, the same study found that they walk an average of 7 km, which is up from 1.7 kilometres 20 years earlier. Life for our poor, and particularly for the woman is definitely not improving. Her prayer is no longer for a lighter burden, but for a stronger back.

A time allocation study by ICIMOD published last year found that right here in Nepal, women "do more than 75% of the work" in hill villages. According to an earlier study by Jiggins, women account for 98% of the agricultural production of this country. Not far from here to the West, research by Vir Singh estimates that in the Himalayan region of India, a pair of bullocks work for 1,064 hours, a man for 1,212 hours and a woman for 3,485 hours per year to tend a farm of one hectare. The woman actually puts in more time than the man and farm animals combined. And this, on top of all her other family duties.

Recent field observations by Development Alternatives in the Bundelkhand region of central India show that an average woman in that region spends upto three, and in some cases four, hours a day fetching water. Even when there is a pump right in the village, collecting water takes more than one and a half hours, most of it standing in line, waiting. Research by IUCN in the Thar region of Pakistan showed that many women daily walk more than 10 kilometres to bring back one bucket of water. The amount of water brought home is hardly sufficient for any use other than drinking and cooking. It is hardly surprising that the age-old custom in our countries of regular washing and bathing is rapidly dying out.

Availability of firewood, which in many places is now a euphemism for twigs, shrubs and even life-giving roots which are burnt for cooking and keeping warm, is perhaps the clearest indicator of the health of the natural environment. Even where there were lush forests only a few decades ago, lack of firewood for cooking is gradually taking over from

lack of food as the greatest threat to human nutrition. People may still have access to some food, but soon they will have no fuel to cook it with. It is not uncommon, throughout the subcontinent, to see little girls not yet in their teens carrying headloads weighing a crippling 10, 12 and even 15 kilos. In many areas, they walk for four or five hours each day, covering upto 20 kilometers and facing all kinds of dangers on the way, ranging from deadly snakes and poisonous scorpions to rogue elephants and rapacious forest guards. Sometimes, it is hard to know which the greater threat is.

What little time that is left over after fetching water, gathering fuel and fodder, food preparation and cooking, taking care of husband and children goes into hard labour in the fields and odd jobs like feeding and washing the animals. Each day brings twice as much work as could humanly be expected from one frail, undernourished body, leading researchers to coin the term “the double day”. Life for the village woman is truly busy, but it is also closed, dull and short. Her sister in the city slum doesn’t fare much better either. Most of her chores are the same. Instead of collecting wood and cowdung, she may be fortunate enough to have only to scrounge around in the alleys or for a variety of underpaid odd-jobs to earn enough to buy a little kerosene. Custom and the exigencies of family life preordain a life with little leisure or fulfillment for most of the women on our subcontinent.

How long can this go on?

### **The gender issue**

What would things be like if the traditional roles of men and women at work and in the home were to be reversed? One does not have to be a fanatical feminist to realise that the relationship of women to the environment is yet another manifestation of the wider gender problem that afflicts all our societies, a legacy from earlier generations that no thinking person can any longer accept. Whether it is in the institutions of governance, in the choice and design of technologies, in the way we conduct science and research, or in the management of our natural resources, the systems have largely been designed by men and the rules have to be tamely followed by women.

This is not to say that all women are good and all men bad. Among the universe of women there are all types, just as there are among men. But the social systems we have inherited make for an asymmetry between the sexes that certainly lies at the root of many of the problems we face today. Unless we understand this, any attempt to reverse the current destruction of the environment just will not work.

The purpose of this paper is to explore some of the ways by which the deteriorating relationships between women and their environment might be reversed and brought back to the positive mutual reinforcement that was always inherent in them. But it would perhaps be useful first to identify more precisely what *are* the problems that women face and how the environment is a cause of these.

### **The environment**

The environment is a complex entity, differently perceived by different people. In the city, the environmental issues people worry most about are water contamination, wastes, air pollution, congestion, noise. They also face problems of poor availability of water, energy, transportation, recreational and other services. Often, personal security and health deteriorate as the city grows larger. On all these counts, the causes of environmental degradation lie in poor urban planning, uncontrolled industrial activity, badly designed transport systems, and the costs are paid by the average citizen, and more particularly by the women and the children.

In the village, the environment-related problems pertain much more to the degradation of productive resources: the land, the soils, water and forests. Our rivers and streams have dried up and jungles have turned into deserts. The genetic varieties that provide the basis of our food crops and medicines are rapidly vanishing. Who is to blame? Largely, it is the insatiable demand of our industries and export markets which have led to much of the destruction. Growing populations have also contributed. And again, who pays the costs? Women, of course. And still, in the eyes of some, they -- quite unjustly -- share much of the blame.

Then there is the global village, a worldwide habitat that has discovered the new threats of climate change, sea level rise, stratospheric ozone depletion, biodiversity loss and a host of yet to be discovered planetary ills. Almost all of these cancers are the results of the mindless and selfish economic demands made on the earth's resources by the rich, in both the rich and poor countries. And, once again, who will pay the costs? The women, of course. The marginalised, impoverished women who will be uprooted from their homes and livelihoods when the sea invades their lands in coastal areas. The women who farm the lands from where the rains will disappear. And the women who will not be able to get the seeds they need to grow food for their families. Or the fuel to cook it.

The many ways in which women get marginalised and deprived by environmental change are well known, and they need not be detailed here. Is not the sex ratio in our countries an adequate reflection, by itself, of the hardships they face - indeed of the pervasive threats to their lives? Ours is the only region of the world where the number of women is less than that of men. Demographers talk of the "missing millions", the tens of millions of women who would be alive today, were the social and physical environment to be the same for both women and men.

And then there is the simple matter of existence. For a large percentage of women in our countries, life can only be described as a terminal disease. This may be true in one sense for all living beings, but it is a particularly appropriate description for the woman living in poverty. Spending hours in the smoke-filled kitchen destroys her lungs. Constant bending and carrying huge headloads of fuel and water distorts her spinal column. Malnutrition ruins her bones. Direct, blazing sunlight withers away her skin, sometimes causing cancer. Intestinal diseases nurtured by contaminated water eat away her insides. Anaemia from iron-deficient food debilitates her energy. Unwanted pregnancies and still births finally finish off her health.

And the workload she cannot escape from accelerates all these life-threatening conditions, bringing her inexorably to an early and untimely death.

There is nothing wrong with having to work. Work is to the spirit as food is to the body. Everyone should have the privilege of being able to work. The more creative the work, the more satisfaction it gives. Work, after all, is what distinguishes human beings from most other species. But repetitive, exploitative, unrewarding work, which is the lot of most poor women is not the same thing. The work she has to do, filled with drudgery and hardship, mostly does not even earn her any income. Nor, usually, much respect. And as the environmental conditions become harsher, her work becomes harder -- and ever less rewarding.

Rural and urban women are not unaware of the concept of environmental degradation but their choices are limited and their responsibilities too large. Poor women use finite resources - fuelwood, water, topsoil - out of necessity, not because they seek an easy short term option at the expense of their children's future. They try to make the most of what they have today because that is all they have. Most women would like to do everything they can to sustain the natural environment. But what can they do if there is no assurance that the activities they undertake or avoid for this purpose will not harm their immediate livelihood and the survival of their family?

### **Society**

It would be foolish and self-defeating to deny the importance in South Asia of the growing pressure of increasing numbers, both of people and of animals. In many of our rural areas, the density of people far exceeds the carrying capacity of the land. In Bangladesh, each hectare of land has to support more than ten humans. In Nepal, two and in India three. In the US, only one-fifth. No wonder we are so poor. Worse still, some parts of South Asia, like the rugged massif of Bundelkhand, have one head of livestock for every human being. The simple act of survival by all these people and their animals has now stretched the resilience of the environment to its limits.

It is not only the physical environment that conditions a woman's life. In some of our countries, the impacts of the social, cultural and intellectual environments are even worse, compounding many times over the devastating effects just described. And, of course, the different types of environment are not isolated: they interact to make things much worse. The late Joan Davidson, an English writer on gender issues said not long ago that the factors affecting women in terms of debt, structural adjustment, trade, aid, war and social structure are all closely related. "It is difficult", she wrote, "to define quite where environment begins and ends for women in developing countries. Almost all development activities in some way affect their surroundings - especially in rural areas. Changes in forestry, agriculture, water and waste management all have local environmental implications which affect women as they are the ones who have to play a role at the interface between people and the environment."

The issue of land rights and access to land is a critical one. Women generally do not own the land they work on. It is only in rare cases that decisions about environmental improvement of such land is within their control. Degradation continues and consequently women slave ever harder to achieve the same levels of output. Though these are primary issues for women, they have been more-or-less ignored by administrators and policy

makers alike, not to mention the scientists, engineers and other experts who have assumed for themselves a monopoly on the true meaning of progress. Unfortunately, in this respect many self-styled environmentalists are not much better.

A typical woman in our villages and slums lives in a one-room "house", with no water, sanitation, light or other convenience which most of us take for granted. All the children and several relatives usually share the room. After incessant toil all day, it is a crowded yet often empty darkness all night. Under these conditions what hope can she have to have anything approaching privacy, let alone dignity for the fulfilment of her few personal needs? Surely this must be one of the more painful parts of her existence. It's the little things in life that hurt the most. You can sit on top of a mountain but you can't sit on top of a pin.

But it is not only physical and living resources that people need for a healthy and fulfilling life. They also have emotional, intellectual and spiritual needs. More intangible resources like time, knowledge and family and community ritual are essential facets of life which, over the years have gradually vanished from the lives of poor women. To bring these back, and to permit the woman again to play her part in building a productive family and cohesive community will need more than a rejuvenation of the natural resource base. It will need a wider recognition in the community, especially among their male counterparts, of her essential role as the carrier of society's culture and wisdom. Given how deeply ingrained our patterns of thinking and behaviour are, this will not be easy.

### **The solutions**

It is never easy to find for so many complicated problems a simple solution that can solve all of them at once. However, if we accept that the fundamental, root causes of many of our (seemingly separate) ills lie in the unjust and inequitable social and political order we live under, perhaps we can make some progress. We must also remember that each one of us can make a difference, and that any viable strategy must allow for initiatives on a broad front involving different actors and a variety of actions.

The first involves all of us. It is the need for each person to adopt ways of living that conserve nature and its resources far better than those of today. Unless we resist the trend, nurtured by advertising and the media, to follow the example of western societies, to acquire more, use more and waste more, there can be no form of development that is sustainable. Consumption patterns among the rich and production systems in our so-called modern industries will unquestionably have to change. The only question that remains is whether this will be achieved voluntarily or by coercion: in an orderly, self-regulated way or by strong laws from above and perhaps rebellion from below by those who are now excluded from the material benefits of the economy. The only hope for the future is that we can all be intelligent enough to see the writing on the wall and act quickly.

Equally important is the need for reducing population growth. But how? South Asian countries have invested huge budgets in family planning programmes, and have not been without some success. But we still have a long way to go before human numbers and natural resources are brought back into balance. In the language of economists, we have to find ways to reduce demand for large families and increase supply of acceptable contraceptive methods. The only way to achieve both goals at the same time is to improve

the lives of people, and particularly to ensure that women have full control over their reproductive decisions. And this means rapid development. Across the world, there is an almost perfect correlation between poverty and birth rates. The deeper the poverty, the higher the birth rates. Development certainly appears to be the most effective -- and most acceptable -- contraceptive. And since development is meaningless without regeneration of the environment, trees may well be the best condoms. We need many more of them.

Since women are at the front-line of resource management, it becomes imperative that our decision makers carefully involve them in the planning, execution and evaluation of all development programmes. Their knowledge of resources, as well as their own aspirations should form the basis of all projects designed to improve the conditions of the poor, particularly since the normal decision making process is at present controlled by male administrators and engineers who have little contact with the realities of those they profess to help. It is the women who largely manage the community's resources: land, water, energy sources, and of course the bounties of nature: the food crops, the domestic animals and the forests. Most of the common property resources of the community are in their care. Without their active participation no future can be secure for any community.

Perhaps the greatest tragedy of the twentieth century is how little science and technology have contributed to the lot of the poor. Modern science seems to be able to solve any problem, from probing the atom to reaching the moon. It has conquered diseases that scourged whole populations for centuries, liberated people from the confines of their villages and opened up new vistas of knowledge and action. Yet, neither the scientist nor the engineer has seen fit to solve the simple problems that poor women face every day. Hiding behind the facade of so called "objectivity", science and technology have gone their own way, chasing riches and fame, and in complete ignorance of their responsibility to those who cannot pay for their esoteric, intellectual pursuits. By divorcing itself from the realities of the vast majority of our people, today's science can only end up by marginalising itself. Fortunately, there is a growing feeling among at least a few scientists, most of whom have risked becoming outcasts within their own professional community that things cannot continue like this.

Technology is both the cause of many of our inequities and a potential solution to them. Much of the problems of poverty and environmental degradation are the result of a mindless, runaway technology. But without technology, it is difficult to see how the productivity of people and of resources can be improved sufficiently to bring people and nature back into some kind of balance and harmony. It is all a matter of choosing and designing the right kind of technology. In today's monetised economy, cash is a basic need. Perhaps the most basic need of all.

Raising incomes and creating sustainable livelihoods needs new kinds of technology which make people, not machines, the masters. Moreover, as Development Alternatives has shown, it is possible to design technologies in such a manner that women do not get further marginalised in their communities. To achieve this, the most important criterion that comes through is that the innovation and delivery of sustainable technologies must be arranged so as to maximise their benefits for women. And, of course, this is an excellent short cut to financial independence for women -- and with it the ability control the

decisions that most affect their lives. Next to trees, sustainable livelihoods for women are quite possibly the most effective contraceptive.

### **Sustainable technology**

The poor have many basic needs – food, water, energy, shelter, clothing, transport, health care, education and productive employment. It is largely the responsibility of women to provide these to their families. For this, they need income – income over which they have some degree of control. Almost all these needs have a close relationship with environmental values, and all have largely been left unmet by past development strategies. The cycle of poverty is made more vicious by the lack of access by the poor to financial capital, to raw materials and, most important, to technology appropriate to their needs and skills.

With the evolution of societal perceptions, aspirations and conditions, and with recent developments in science, design, new materials and production processes, technological innovation is becoming increasingly important for solving the problems of poverty and marginalisation of women. New products and technologies, many with significant, positive social and environmental spin-offs, are now possible for mass distribution as a result of the application of sophisticated scientific and technological knowledge.

*Technology that serves the goals of development, and particularly the objective of empowering women is defined as “sustainable technology”.*

Sustainable technology springs from indigenous creativity, in response to local needs and possibilities: it is relevant and ready for use by the common people, especially women, and aims directly to improve the quality of their lives. It also derives maximum leverage from the local cultural environment by drawing upon the existing managerial and technical skills and providing the basis for extending them. And it uses the physical potential of an area, and maintains harmony between people and nature.

In addition to a full-scale delivery system, including the functions of promotion, distribution, sales, training, and maintenance and after sales services, and market analysis, mass diffusion of sustainable technology requires:

- Economic viability, in production, marketing and use, as the prime criterion of “sustainability” or “appropriateness” for a technology.
- Strong linkages, almost non-existent in a developing country, between the processes of innovation, production and marketing.
- Active participation of the people affected by the design of technologies, to take full account of local needs, resources and constraints, and to obtain maximum advantage from traditional knowledge.
- Maximising its positive social and environmental spinoffs, by appropriate design and without loss of product marketability.

- A critical mass of effort, providing economies of scale in innovation, manufacturing and marketing, to bring market or environmental conditions to a new takeoff, beyond an existing threshold.
- Adaptive management to fit organisational practice to local conditions and requirements.

The principles of technology diffusion – their choice, innovation, production and marketing – are the same for all technologies, whether they are of interest to the rich or the poor, to men or to women. They apply, in varying mixes, to all rural technologies. The more important among these factors are:

- \* capital/operational costs
- \* efficiency of the technology
- \* evidence of improvement over traditional methods
- \* ease of operation and ergonomic design
- \* availability of spare parts and ancillaries
- \* ease of repair and maintenance
- \* problems of production
- \* adaptation to local conditions
- \* existence of marketing organisations
- \* availability of information
- \* promotion, training and extension services
- \* management skills and social organisation
- \* social, class, political and cultural attitudes

Above all, the “appropriateness” or “woman-friendliness” of a technology must be measured by how well it satisfies the needs of the end client and with what success it takes advantage of the opportunities and constraints of the production and marketing processes.

Given the magnitude of the problem of disseminating a technology widely, and the limits to the public resources likely to be devoted to it, any successful delivery mechanism must be self-financing and self-supporting at each stage of the product cycle.

It must pay someone to make the products, it must pay someone to sell them, it must pay someone to maintain them; and of course it must be worth someone’s while to buy and use them.

If the premises listed above are accepted, several conclusions follow more or less logically:

- the innovation process must link design of the technologies much more closely to the needs of manufacturing and marketing than it has generally done in the past (see Figure 1). No matter how well it is claimed to fulfil socio-economic criteria, it cannot be considered complete or acceptable until it has been productionised and field-tested
  - \* “productionising” requires full design specifications and blueprints; material specification taking account of local resources,

skills and substitution possibilities; and tooling needed for systematic production-all tested for the conditions under which the production is expected to take place

\* “field-testing” requires detailed studies of the technology in use, accelerated life-cycle tests, and iterative re-adaptation and redesign until the technology has a demonstrated market acceptability

- widespread dissemination of sustainable rural technologies requires new types of institutional structures carrying out new kinds of functions
- the production and marketing activities (and indeed the innovation process also) must be decentralised to be responsive to the local needs and conditions
- the product range and territorial coverage must be large enough to provide significant economies of scale in each of the three functions, innovation, manufacturing and marketing
- clusters and packages of technologies need to be developed to take advantage of standardised modules and components for facilitating production, marketing, spare-part availability and maintenance
- the levels of “technicity” need to be understood, so as to provide continuity with existing methods while introducing new technological perceptions and possibilities in the village
- the methods of modern business management, appropriately adapted to the rural milieu, have much to offer in achieving the goals of mass dissemination

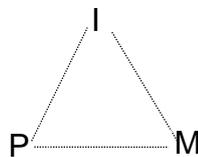


Figure 1: Strong links between Innovation, Production and Marketing

The relevance of the links depicted in Figure 1 is commonly acknowledged, but rarely understood: the design of an appropriate technology, no less than that of a new electronics product or automobile model, must be carried out within the framework of an organisation whose broader activities include manufacturing and marketing. Otherwise its market success can only be a matter of pure chance.

In this light, Development Alternatives has developed a product range that includes devices for energy, water, agriculture, shelter, transport, employment-generation and other human

needs. Specific examples of technologies that have direct relevance to the lives of women are:

- cooking stoves
- stabilised soil brick machines
- paper and board making equipment
- producer gas units
- acetylene lamps
- knitting machines
- water pumps
- solar devices
- biogas generator kits
- food storage bins
- multi-purpose hand presses
- Integrated village energy systems

*These initiatives will have to come from the non-government sector and, more widely, the "Independent Sector", hopefully with direct encouragement and support from Government.*

### **Women and Governance**

Ultimately, it is all a matter of politics. The plight of women, whether in the village or in the city, will not change unless the power structures of our societies change. Going beyond the need to redress the gender and technological hegemonies they face, women living in poverty are, after all, a part of the wider population. And their lot can never improve unless the institutions of governance involve them and all others integrally in social and economic decision making. For this, the first requirement is openness and transparency in government transactions, and legitimising the right of every citizen to know what it is doing.

Today, government in all our countries is too far removed from the people, and hardly accountable to them. An election every four or five years is not enough. Participatory councils need to be set up that provide continuing and critical oversight on the actions and performance of elected government. Village and District institutions are necessary for this, but since the marginalised, particularly the women, do not always have the confidence to take active part in public debate, even smaller - neighbourhood - institutions are crucial. Planning of development must start from the grassroots, initiated by the felt needs of the people themselves.

People are entitled to express their views on any activity that significantly affect their lives. For this, we now need to introduce public hearings and referendums that enable the planners and authorities to know the views of the local people. How should one feel when one comes home to find a factory or a multi-storey building half built next door? Who gave you a chance to explain that your light and ventilation will vanish and the additional traffic created will threaten the safety of your children? Women in poor communities have even less say in what happens to them. At the drop of a hat, they get evicted, displaced

and moved into the street to make way for so called development priorities. We have for too long accepted too much in the name of progress.

Only effective institutions of governance can help bring women, particularly poor women into the mainstream of society, enabling them to have equal control with others over the factors that affect their lives. Participative democracy seems to me to be a fundamental prerequisite to stem the huge waste of human energy that afflicts our countries. One has to wonder how many missing Marie Curies, Rani Jhansis and Lata Mageshkars are lost among those hundreds of millions of our sisters whose double days never permit them the opportunity to reach their full potential.

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