

## **How to Make India a Knowledge-based Society?**

**Pushpa M. Bhargava**, ANVESHNA, 'Furqan Cottage', 12-13-100, Lane No.1, Street No.3 Tarnaka, Hyderabad – 500 017  
Email : [pmb1928@yaboo.co.in](mailto:pmb1928@yaboo.co.in), [bbhargava.pm@gmail.com](mailto:bbhargava.pm@gmail.com)

### **I. Leveraging our traditional wealth**

India has had an unbroken tradition, built over five millennia, of unusual varieties of arts, crafts and practices that collectively go under the name of “traditional and cultural knowledge”. Some of this knowledge is documented, while the rest of it is not adequately documented; further, where documentation exists, in many cases, it does not allow one to immediately cull out the information that one would need today to optimally utilize the traditional or cultural knowledge in various areas. In spite of valiant efforts by the Government of India after Indian independence some six decades ago, and the equally important efforts of a number of highly talented, knowledgeable and committed individuals, the fact remains that, in its engagement with mediocrity, India has far from optimally utilized its traditional knowledge for social and economic gain. Not only has this knowledge the potential of providing full employment or additional employment to over 200 million people, it can also generate a revenue for the country of over 600,000 crores of Indian Rupees (one million US dollars roughly equals Rs.5 crores) and can provide products and services of great social and economic value, thus enhancing the prestige of the country. Further, the traditional wealth of India has the potential of serving as a vehicle for the creative abilities of Indians in diverse fields, generating new kinds of tourism and providing opportunities for research in new areas, besides, of course, adding to the repertoire of knowledge for the peoples of the world. The fact is that all this is possible, and it is only when that happens that India will be an effective knowledge-based society, for it would have then encompassed both modern and traditional knowledge and married the two where necessary. It is hoped that the National Knowledge Commission will work out a plan to accomplish the above objective.

I will now make some comments on the following areas of our traditional knowledge:

- a. Plant-based drug formulations
- b. Traditional agricultural practices
- c. Traditional water-harvesting practices
- d. Our creative and cultural traditions
- e. Food in regard to the indigenous varieties available
- f. Some new aspects of tourism

However, before I talk about the above, I would like to mention some principles and basic premises that relate to traditional knowledge (from its documentation to its use) that we must accept and adopt. This statement of “principles and basic premises” was worked out at a meeting on traditional knowledge under the auspices of the National Knowledge Commission in Hyderabad on 5<sup>th</sup> December 2005. The participants in this meeting included Prof. Anil Kumar Gupta of the Indian Institute of Management, Ahmedabad; Dr Darshan Shankar of the Foundation for Revitalisation of Local

Health Traditions, Bangalore; Mr. Rajiv Sethi, Vice Chairman, Indian Planning Commission's Task Force on Creative Industries, New Delhi; Dr A. K. Gogai of the Indian Council of Agricultural Research, New Delhi; Prof. M. P. Ranjan of the National Institute of Design, Ahmedabad; Mr. Neetu Loond of Ishwar, an Indian textiles corporation, Paris; Mrs. Chandana Chakrabarti of the National Knowledge Commission and me. The above group felt that the following principles and basic premises must be recognized and followed when commercializing traditional knowledge.

1. In all commercialization of traditional knowledge, there must be equity in respect of the distribution of profits. Thus, the producers or the traditional keepers of the knowledge must be considered as equal partners along with others in the commercial exploitation of traditional knowledge. A code of fair trade practices in this area must be evolved by the designated organization.
2. It must be recognized that traditional knowledge does not need to be collective; it can be with an individual. Similarly, it should not be taken as being static. It must be recognized that innovation takes place constantly even in what we label as traditional knowledge.
3. Where a marriage of traditional knowledge with what is commonly perceived as modern knowledge is likely to yield better results, it should be ensured that the traditional knowledge component is not lost sight of, either in practice or in publicity.
4. Both tangible and intangible variations in any traditional knowledge item, stemming from underlying traditional taxonomy, must be recognized.
5. Where traditional knowledge comes from identifiable groups or individuals and is not in the public domain, prior informed consent must be obtained from the contributors of the traditional knowledge or innovation.
6. A legal framework should be created for establishing proprietary rights for traditional knowledge holders – be they individuals or a community.
7. A system should be set up for urgent scientific investigation of traditional practices, in various places including survival strategies, for which there is strong prima facie evidence.
8. The definition of work for employment purposes must include all activities that relate to the use and application (not just manual but also mental) of traditional knowledge.
9. A system should be created for the support of those who are involved in the formal transmission of traditional knowledge – especially women and older people in communities where young people have been migrating to urban areas in large numbers.
10. A system should be set up that would provide incentives for inter-community transmission/transfer of traditional knowledge to ensure that the knowledge is not lost – remembering that knowledge multiplies when shared and decays when kept secret or confidential.
11. The results of all research and development based on traditional knowledge must be shared with the providers of the initial knowledge package.
12. Whatever infrastructure is created to document, standardize, validate and/or commercialize traditional knowledge, it must be cross-sectoral and cross-ministerial; the system set up must operate in a mission mode with cross-sectoral

and cross-ministerial powers, for traditional or cultural knowledge is almost always cross-sectoral.

I will now deal with the use of traditional knowledge in the areas of plant-based drugs, traditional agricultural practices, traditional practices of water harvesting, our creative and cultural tradition, food and tourism, in this order.

## **II. Plant-based drug formulations**

There seems to be little doubt that if we did not have any cures for any of the ailments with which we have suffered since we appeared on our planet, we would be extinct by now, just as, if we had always had all the cures we have today, the world population of today would have been reached several millennia earlier. The most likely ways of treating ailments in ancient and mediaeval human history would have been plant-based drug formulations, which exist virtually in every culture around the world. In fact, some of the effective drugs we have today are derived from such traditional formulations. Examples would be quinine, reserpine, vinblastin, and artimesin that have come to us from Latin American, Indian and Chinese traditions. An example of a plant-based drug formulation that does not consist of a single chemical entity like the ones mentioned above but that is an ethical (that is, prescription) drug in several parts of the world, including the western world, is Liv-52 for liver disorders, marketed by the Himalaya Drug Company of India. However, just as one can be sure that at least some of the traditional plant-based drug formulations must be effective, one can be equally sure that all of them are unlikely to be as effective as has been claimed, for the simple reason that the practitioners of traditional medicine that use such formulations claim to be able to cure virtually every ailment with plant-based drug formulations, which even the practitioners of modern medicine do not claim to be able to do.

The advantages of plant-based drug formulations in comparison with the conventional drugs used in modern medicine are many. They are far cheaper to validate and produce; they would, therefore, cost the consumer much less. And their lack of toxicity has been established through centuries of usage. Further, their manufacture would be totally non-polluting and environment-friendly.

There are, perhaps, some 40,000 unique traditional plant-based drug formulations available in the country in the documented Ayurveda, Sidhha, Unani and Tibetan systems of medicine and in the undocumented tribal systems of medicine. They need to be (a) appropriately documented, using modern information technology, in such a way that we can retrieve answers to as many questions as possible from the computerized data; (b) prioritized for further work on the basis of stated criteria; (c) standardized to obviate variations in the chemical constituents on account of soil or climatic conditions; (d) validated using, first, *in vitro* techniques and, then, the usual techniques commonly used for the validation of drugs, including clinical trials; and then (e) manufactured and marketed. All this should be done using good laboratory practice, good clinical practice, and good manufacturing practice (GLP, GCP and GMP). I believe that at least 4000 out of the 40,000 plant-based drug formulations mentioned above will be found to work and be marketable, if tested systematically.

A detailed project outlining the above and giving a detailed financial analysis has been prepared. It projects marketing 100 tested and validated formulations over a

period of 10 years, with an investment of a few hundred crores, which should at the end of 10 years lead to a turnover of Rs.10,000 crores per year with a net profit of more than Rs.5000 crores (one billion US dollars), at the prices of the year 2000. India has the capability, including infrastructure, of implementing ten such projects in the next 20 years. This would be significant in view of the fact that less than 35 new chemical entities (NCEs or new drugs) have been added every year in the last 10 years to the repertoire of drugs in the modern system of medicine, with each new drug costing on an average one billion US dollars (Rs.5000 crores) in research and development. The above number has been decreasing over the years with only 20 NCEs being approved in 2001.

Two major initiatives have taken place recently in India in regard to the documentation of traditional drug formulations and the plants used in such formulations. One initiative has been taken by the CSIR (Council of Scientific and Industrial Research, the premier federally funded scientific research agency in the country) in which they have attempted to document the formulations. The second initiative has been taken by Dr Darshan Shankar, who belongs to a well-known and respected NGO, the Foundation for Revitalisation of Local Health Traditions, in Bangalore. Dr Shankar had earlier done a superb job of documenting over 7000 plants (out of, perhaps, 10,000) used in traditional plant-based drug formulations in India. He is now documenting the formulations themselves. Documentation of formulations in a way that we can use them today poses several problems, especially of language equivalence. However, ways and means of overcoming this problem have been worked out. In summary, the first step in marrying traditional knowledge with modern technology has been taken – a marriage that has the potential of augmenting substantially, rapidly and at much less expense our repertoire of drugs. Indeed, more than 50% of the new drugs of tomorrow (by 2025) may well be plant-based drug formulations that have been standardized and validated, and India can make a major contribution in this area.

### **III. Traditional agricultural practices**

The Indian Council of Agricultural Research (ICAR) has recently brought out a series of volumes (ICAR, 2002, 2003, 2004) that document 40,502 traditional agricultural practices, out of which 86 have been validated and 38 cross-validated as of writing this article. In addition, there is a similar documentation of such practices by Dr Anil Gupta of the Indian Institute of Management in Ahmedabad. Many of us believe that the following should be done to ensure that validated traditional agricultural practices find a place in today's agriculture around the world and add substantially to either economic or social gain:

- A consolidated, co-operative system of documentation of such practices should be set up, appropriately computerized and indexed, to which anyone can contribute and that anyone can access.
- The cross-validated practices mentioned above should be commercialized and an appropriate mission set up for this purpose by the Government of India. However, we should keep in mind what I have already said in Section I that before the above commercialization takes place, appropriate consent from those who contributed to the practice (individuals or communities) should be obtained

and a system set up for fair sharing of the profit as a result of such commercialization.

- A set of strategies for validation should be worked out. For example, one should be able to use and encourage expert farmers to be a part of the validation process. They should be appropriately supported with adequate staff.
- An appropriate venture fund that would support the above-mentioned validation should be set up.
- The above process of validation should not be confined only to what has been documented till now. It must be recognized that innovation by farmers, even the illiterate ones as is the case with many farmers in India, continues to take place all the time. Such innovation could be in areas as diverse as new agricultural implements, pesticides, veterinary medicine, animal and plant growth regulators, food processing and so on. A nation-wide system should be set up that will ensure that all such innovations are fed into the system of documentation mentioned above.

An example of an area where traditional agricultural practices are already poised to make significant contribution in India is organic farming using traditional practices within the framework of a modern scientific paradigm.

#### **IV. Traditional water harvesting**

Detailed information on traditional modes of water harvesting is already available in a book authored by the late Anil Agarwal and Sunita Narain who is at present Director of the Centre for Science and Environment (CSE), New Delhi. (Sunita Narain is a winner of the World Water Prize; CSE, under her leadership, was the organization that tested soft drinks, such as Coca Cola and Pepsi Cola and brought out that they were contaminated with unacceptably high levels of pesticides. Earlier, CSE, through a decision of the Supreme Court of India, was responsible for all public transport in Delhi shifting to compressed natural gas (CNG) as the fuel, leading to a dramatic reduction in air pollution in that city.) The book is a superb documentation of traditional practices in this area. If an agency were to be established in which both the Government and NGOs such as CSE could participate, the application of these practices all over the country would probably take care of our water problems in possibly the most inexpensive way, obviating the need for the proposed, extremely expensive and environment-unfriendly project of interlinking of rivers in which, unlike in the popularization of validated traditional practices, there would also be a tremendous scope for corruption, which, unfortunately, is as much a hallmark of today's India as is its scientific and industrial development.

#### **V. Creative and cultural traditions**

To give readers a flavour of the richness of the creative and cultural traditions of India, I give below a partial list of traditional endeavours that have the potential of being commercialized and raising revenue, both for the producers or keepers of such work as well as for those who create the set-up to commercialize them; in addition, the Government can also benefit through its participation in the commercialization or

through appropriate taxation. This list is based on information provided by Mr. Rajiv Sethi, Vice Chairman of the Task Force on Creative Industries set up by the Planning Commission of the Government of India. This list is only indicative and not exhaustive.

1. Handicrafts: bead and bangle making; glass blowing; carving/etching/ engraving; casting; cutwork/trellis; enamelling; filigree/wire work; footwear; furniture assembly and carpentry; glazing; inlay; lacquering/lac turnery; lapidary; moulding and shaping; paper-making; plating; embossing; setting/fixing; throwing; turning; traditional painting and frescoes; assembly skills (e.g. toy-making and bookbinding); pottery (including the disposable *kulhars* for serving drinks such as water); paper-mâché; various indigenous uses of plant material such as the making from leaves of disposable and totally hygienic *pattals* (plates) to serve food, from leaves; and cloth from parts of banana tree.
2. Textiles, clothing materials, and related activities; felt-making; spinning/ drawing of thread; weaving; cording, knotting and tasselling; dyeing, printing; embroidery/appliqué/quilting; lace work/crochet work/knitting; tailoring; costume accessories (turbans, bags, belts); traditional apparel and accessories; wool preparation and processing.
3. Household and rural community-based manufacturing: herbal preparations; utility products (chalk, incense); sericulture; honey-making.
4. Design: graphic design; intermedia design; industrial/product/commercial/ packaging design; artistic direction, scenography, museography; fashion, costume and accessories design.
5. Architecture and building arts: planning and survey; traditional architectural design and features; building services including building material; construction skills (e.g. masonry, welding and soldering); interior design; landscape design; community-based systems of transportation; sanitation; irrigation; conservation and restoration.
6. Fine arts and studio arts: painting; sculpture and installations; cartoons and caricature/calligraphy.
7. Performing and ritual arts: dance; music; theatre and dramatic arts; itinerant/ street/circus arts and entertainment; folk performances; festivals and rituals.
8. Literary arts: oral literature and storytelling.
9. Antique arts and trade.
10. Cultural education and training: libraries and archives (both private and public); museums and galleries (both private and public); cultural centres.
11. Advertising and marketing: *baats* (a place where the producer brings and sells his/her products without an intermediary) and bazaars.
12. Leisure and entertainment: traditional games and sports.
13. Food and culinary arts: vegetables, fruits, food processing; organic food (already discussed)
14. Beauty, health and healing: yoga, meditation, massage, and bone-setting; cosmetics; jewellery; martial arts.

Under each of the above categories, statistical information and identification of individuals, associations and NGOs would be needed for

- a. content/idea creation and development;
- b. manufacturing/production;
- c. distribution and marketing; and
- d. regulatory and quality protection mechanisms.

It is noteworthy that all of the above traditional arts and crafts are practised on a substantial scale in the country today, each activity involving thousands to millions of people. As examples, I mention below some impressive facts and possibilities:

- Both traditional and modern Indian paintings and sculptures have now come of age in the international market. A 9<sup>th</sup> century Chola bronze (a statue not more than 10 inches in height) is likely to fetch ten million dollars in the international market.
- Paintings of well-known Indian artists, such as Husain, routinely fetch one crore rupees each. Indian contemporary painters have never had it so good. In fact, it has now been realized all over the world that an investment in paintings done by some Indian painters who are living today or who lived in the last century may be one of the best investments that one can make today.
- As of today, it is estimated that some twenty million people may be involved in weaving cloth on handlooms or doing something on cloth by hand before marketing. There is a mind-boggling variety of weave, texture and design that identify to the discerning eye the place (including, often, the village) where the cloth was woven or processed. Such variety in textiles, which makes every piece that one wears unique for all practical purposes, is unparalleled in human history. If an Indian woman buys a handloom sari, the chance is that she will *never* meet any other women wearing the same sari. Similarly, most of us can identify paintings done by women (often utilized) of a little village in Bihar called *Madhuban*. These *Madhubani* paintings were discovered by the so-called intelligentsia of the country only a few decades ago. At that time, one could buy a good one for Rs.20 (40 U.S. cents). You cannot buy one of the same quality today for a thousand times that price. It is clearly in the country's interest to make these women go to school and become a part of the real world and yet continue to be engaged in the traditional craft that they love, which today has a tremendous market potential.

## **VI. Food**

India has some extremely unusual vegetables and fruits - and an unparalleled variety of them. Thus, there are some 150 documented vegetables for which all the nutritional information is available, and perhaps another 50 used by tribals that have not been systematically documented so far. The same is true of fruits. Many of the traditional Indian vegetables and fruits have been shown to have amazing pharmacological effects and medicinal properties as documented recently in some of the world's best-known scientific journals. It is, therefore, a matter of great concern that even our five star hotels serve no more than some 10 vegetables and very rarely fruits such as custard apple or guavas!

India has thus the potential of making an important contribution to the world vegetable and fruit market, if it could only appropriately publicize its rich heritage in

this regard. In this connection, we should recall that there was no (what we call) mineral water available in the United States or in Britain till the 1960s. It was French high-power marketing that made bottled water (beginning with Evian and Perrier) so popular in these countries, even though in all of them the water that comes through the tap is perfectly drinkable. In our country itself, we have seen how South Indian snacks have invaded the North Indian market where they were unknown till the late 1940s. There is, therefore, no reason why India should not exploit its tremendous heritage in regard to foods and vegetables and attempt to popularize them all over the world. That would be sharing of knowledge!

## **VII. Tourism**

India, perhaps, has the potential of raising the number of tourists who visit it and, consequently, the revenue through tourism, by one order of magnitude by leveraging its creative, cultural and legacy traditions. I give below four suggestions in this regard that were arrived at during the meeting of experts, mentioned earlier, held under the auspices of the National Knowledge Commission late last year.

- Attempts must be made to empower, through information, local people to serve as guides. They could also be the custodians of India's biodiversity heritage. This would be in consonance with the provisions of the recent tribal rights bill of the Government of India (the Scheduled Tribes (Recognition of Forest Rights) Bill, 2005).
- Tribal art centres should be identified where they exist, and new ones should be opened, where possible, with competent and trained guides from the local population. It must be recognized that local people have information and anecdotes that tourists will enjoy (10–15% of India is tribal).
- Similarly, a system should be set up by which tourists are able to witness real and authentic local performing arts without adulterating them in any way. The system should ensure that the respect and dignity of the performer is fully maintained. The objective should be to share a tradition and not to make an exhibition of oneself.
- This country has some extremely unusual sites and practices, which could become major tourist attractions. For example, there is a place where birds commit suicide. Similarly, the whole process of picking raw betel-nuts from a cluster of trees that are more than 50 feet tall is absolutely stunning. This is done by a person who climbs to the top of one tree and then swings from tree to tree collecting the nuts. Such places could become major tourist attractions following the principles mentioned above. The revenue from the visit of tourists to such places should be shared with the communities involved.

## **VIII. Conclusions**

A simple calculation indicates that traditional knowledge has tremendous potential for generating employment and income. On the basis of the population details of the 2001–2002 census and the inputs provided by the Asian Heritage Foundation, I estimate that

- Traditional knowledge and creative and cultural industries in India can provide employment for at least a hundred million persons even with a very conservative estimate –
- They have the potential to generate income to the order of Rs.400,000 crores even with a conservative estimate of the contributions from certain specific identified areas such as plant-based drugs, rainwater harvesting, marketing traditionally used fruits and vegetables, value addition to agricultural produce through organic farming and identifying new areas for tourism based on traditional knowledge.

The annexure at the end of this article provides the details of these calculations.

In conclusion, recognition of the attributes of knowledge and weaving them into the social fabric, setting up systems for disseminating and communicating knowledge that would make the country's citizens informed citizens (not only through formal education but also through non-formal means on a continuous basis) and judicious use of both new and traditional knowledge would be, in my opinion, important ingredients of a policy that would make India a knowledge-based society. It is only then that the country, which has all through history been committed to peace and has never had colonialist tendencies, will be able to renew its role as a major participant in the process of developing a peaceful and prosperous world – a world with no man-made borders.

## **References**

ICAR, *Inventory of Indigenous Technical Knowledge in Agriculture*, Document 1 (2002), Document 2 (2003), Supplement 1 to Document 2 (2003), Supplement 2 to Document 2 (2004), Document 3 (2004), Document 4 (2004), Document 5 (2004). Indian Council of Agricultural Research, New Delhi

## ANNEXURE

### Traditional Knowledge, Employment and Income Potential

#### Employment potential of TK and creative and cultural industries in India (abbreviated collectively as TK)

---

(Based on 2001–2002 census)

	(Rs. in crores)
<b>1. Non-workers</b>	
Total 62.64 crores	
44% (27.56 crores) can work	
40% of 27.56 crores can work in the TK sector	11.02
<b>2. Agricultural workers: cultivators</b>	
(10.10 crores)*	
20% of them can work in the TK sector	2.04
<b>3. Agricultural workers: labour</b>	
(12.06 crores)*	
One sixth of them can work in the TK sector	2.01
<b>4. Other workers: rural sector</b>	
(10.48 crores)	
50% of them can work in the TK sector	5.24
<b>5. Other workers: urban sector</b>	
(4.72 crores)	
25% of them can work in the TK sector	1.18
	21.49
Very conservative figure: 100 million!	(215 million)

(Prepared on the basis of inputs from Mr. Balasubramanian of the Asian Heritage Foundation)

## II. Traditional Knowledge: Income Generation Potential per year (Pt.1)

	(Rs. in crores)
<ul style="list-style-type: none"> <li>• Plant-based drugs (10 × 10,000 crores) (international market for one drug from <i>Phyllanthus amarus</i> estimated at US \$ 6–18 b, say US \$ 10 b \$ = 45,000 crores)</li> </ul>	100,000
<ul style="list-style-type: none"> <li>• Rainwater harvesting (100 × 100 crores) (value Rs.100 per person on an average, per year, including water for agriculture) (0.3 paise/litre based on 100 litre/person/day)</li> </ul>	10,000
<ul style="list-style-type: none"> <li>• Preventable loss of agricultural produce owing to pests (20% lost; 75% preventable)</li> </ul>	100,000
<ul style="list-style-type: none"> <li>• Marketing of new (traditionally used) vegetables and fruits plus value addition by food processing (target population: 1 billion @ US \$30 each/year)</li> </ul>	150,000
<ul style="list-style-type: none"> <li>• 20% addition to value of 33% of our agricultural produce through organic farming</li> </ul>	35,000
<p>New areas for tourism where traditional knowledge or traditional practices, cultural and creative work is exhibited (10 million tourists spending on an average \$100 extra)</p>	5,000
	400,000
<hr/> <p>Note: Value of marketed agricultural produce (approx. 20% of GDP of 600 b \$ or 27,00,000 crores)</p>	524,000

\* approximate