

Traditional knowledge and biodiversity conservation in Gujarat

Deepa Gavali and Diwakar Sharma*

Gujarat Ecological Society, 5 Golden Apartment, Subhanpura, Vadodara 390 023
E-mail: gesbrdad1@sancharnet.in

Received 13 February 2003

Gujarat has rich traditional knowledge associated with biodiversity. This indigenous knowledge has been acquired over ages and treasured by the local communities and the tribals, particularly those living in and around the forests and agro-ecosystems. Very little of this knowledge has been documented which coupled with alienation of younger generation from traditional lifestyles, further poses threat to its erosion. This paper briefly presents the extent of the traditional knowledge available in Gujarat, its contribution in biodiversity conservation and the threats of its erosion under changing life-style.

Keywords: Traditional knowledge, Biodiversity conservation, Gujarat.

The cultural diversity in the Indian society reflects close relationship between the existence of human life and nature including all other living creatures and non-living features. Conservation of environment, natural resources and biological diversity has been deeply rooted in the Indian traditions and culture.

More than 50 million people of different ethnic origins, belonging to different social communities and following different religious beliefs, inhabit Gujarat. According to the 2001 population census, the tribal population forms about 15% of the total population of the State. The forest areas all along the eastern boundary of the State are predominantly inhabited by tribal population¹, spread over 8 districts, viz.

Dangs, Valsad, Surat, Bharuch, Vadodara, Panchmahals, Sabarkantha and Banaskantha (Table 1).

These tribals harbour rich and diverse knowledge about the surrounding biodiversity and its importance. The knowledge now available with the ethnic groups is the result of their close association with nature over ages, passed down through generations. The reason that they have conserved this knowledge is largely due to their realisation that the edible, medicinal and other plants in the wild are vital life sustaining sources. But with the influence of markets, and changing life-style this knowledge seems to be degrading fast, as elsewhere². It is necessary that steps are taken to ensure that the traditional knowledge is adequately documented so that the future generations are benefited.

*Correspondent author

Table 1 — Percentage of tribal population in districts of Gujarat

S No.	District	% of tribal population
1	Dangs	93.96
2	Valsad	54.35
3	Panchmahals	47.19
4	Bharuch	45.53
5	Surat	36.05
6	Vadodara	26.60
7	Sabarkantha	18.41
8	Kachchh	6.95
9	Banaskantha	6.91
10	Gandhinagar	1.37
11	Kheda	1.19
12	Ahmedabad	0.89
13	Surendranagar	0.78
14	Jamnagar	0.46
15	Junagadh	0.46
16	Mehsana	0.37
17	Rajkot	0.19
18	Amreli	0.16
19	Bhavnagar	0.15

Traditional knowledge in health and medicines

A survey of tribal communities of Gujarat has revealed that, out of *ca.* 2000 plant taxa occurring in Gujarat, 760 are medicinal and 450 are of economical importance (Table 2), and most of these plant species are used by tribals³. The regional occurrence of medicinally important species in Gujarat is:

353 species from Kachchh and Banaskantha (Desert zone)

540 species from Saurashtra, North Gujarat excluding Banaskantha and Central Gujarat up to river Narmada (Semi arid zone)

Table 2—Plants of economic and ethnobotanical importance in Gujarat

Utility	No. of species used
Cereals and pseudo cereals	21
Pulses	7
Vegetables	80
Fruits and seeds	71
Fodder plants	43
Spices and condiments	15
Beverages	6
Oil yielding plants	15
Tooth brushes	11
Bidi wrappers	2
Timber trees	44
Fish poison and arrow head poison	15
Taboos	17
Musical instruments	8
Narcotics	6
Fibre yielding plants	17
Hedge plants	24
Miscellaneous	48
Medicinal plants	760

488 species from Bharuch, Valsad, Surat and Dangs (Malabar zone).

Of these, 271 species are found in all parts of Gujarat while others have regional and restricted distribution. In Kachchh, the number of medicinal plants is less compared to other regions, but many of the species are endemic to this region. A few plant species with multifarious uses found in Gujarat are given in Table 3.

There are a few instances such as *Commiphora wightii*, *Ephedra foliata* and *Chlorophytum borivilianum*, where local knowledge about utilisation of certain species has been validated by science. These species are now cultivated and harvested to a limited scale on

Table 3 — Some plant species of folk medicine and ethnobotany

Botanical name	Utility
<i>Arisaema tortuosum</i>	Roots are used to kill worms in cattle.
<i>Butea superba</i>	Multiple usage: Leaves applied on boils, flowers yield yellow brown dye. Plant extract as remedy against poisonous insect bites, snakebites and scorpion sting.
<i>Cassythia filiformis</i>	Tonic. Plant powder mixed with sesame oil as hair tonic; when mixed with butter and ginger it is used to clean ulcers.
<i>Chlorophytum borivilianum</i>	Tubers possess antifertility property. Leaves used as vegetable.
<i>Citrullus colocynthis</i>	Fruits are used to treat boils and stomach-ache. Watery juice of fruits is used to rectify lactation problem in cattle.
<i>Colebrookea oppositifolia</i>	Leaves are crushed and applied on wounds.
<i>Dendrobium microbulbon</i>	Bulbs edible.
<i>Derris scandens</i>	Roots used to cure tumours, barks against snakebite and as fish poison.
<i>Malaxis mankinonii</i>	Leaves edible.
<i>Milletia racemosa</i>	Roots used as fish poison.
<i>Nervilia aragoana</i>	Tubers are used for good lactation in women.
<i>Piliostigma malabarica</i>	Fodder.
<i>Salicornia brachiata</i>	Leaves used as spinach.

commercial basis. These examples are not exhaustive and many more may be added. What is important is that due to this tribal knowledge, the economical and medicinal values of plants and animals are known better.

Traditional knowledge in food and fibre

The knowledge of tribals on wild edible plants, particularly in south Gujarat (more than 50 species of plants) can open doors to a new wide range of food items, thus increasing the extent of edible products and reducing our dependence on selected food items. Tribals in this region use more than 43 species as fodder plants. Some experts in this region carry out honey collection from tall trees or from stiff cliffs using traditional methods. The

organized apiculture has not been developed so far in the area⁴.

Fibers are extracted from varied sources by the tribals. The people of the coastal region extract fibers from palms like *Borassus flabellifer*, *Phoenix dactylifera* and *Cocos nucifera*. In forest areas, fiber-yielding trees like *Combretum ovalifolium*, *Butea parviflora* and *Derris scandens* are used for ropes. Roots of *Butea monosperma* are also woven into ropes. Other trees and shrubs with fiber producing bark are *Helecteris isora*, *Corchorus sp.*, *Crotalaria juncea*, *Hibiscus cannabinus*, *Malachra capitata*, *Urena lobata* and *Butea monosperma*. In Dangs, ropes made from fibers extracted from the leaves of *Ketki* are durable and used for tying cattle, as these ropes do not

hurt their skin⁵. Kotwalia community is specialised in making decorative bamboo artifacts.

Traditional knowledge and conservation

Many species are protected by people because of their traditional beliefs. Traditional ideologies conceptualised in "Jeev Daya" (compassion for life) ideal for all animals is respected by the Vala Kathi, Vala Rajputs, Patels and Jains of Saurashtra and North Gujarat region. There are cases where people have protected Blackbuck despite damage to their crops, and provided them water and fodder in periods of scarcity. They have also formed the "Jeev Daya Samiti" for protection of wild animals, mainly the Blackbuck⁶.

Further, the traditional knowledge has helped in conservation of natural resources like water. Gujarat with semi arid climate of Saurashtra, North Gujarat and arid climate of Kachchh, rain and other sources of water have always been prized possessions. Since ages, people have survived in such harsh conditions through innovative ideas and mechanism of water harvesting. The agriculture was mainly rainfed and through years they have evolved technologies to harvest rainwater by recharging of ground water and construction of storage tanks and stepwells to meet and improve their economy and basic needs⁷.

Similarly, wetlands have been protected as *vavs*, *talavs* and *kunds*, by walling them and constructing temples nearby, as they were the only places to obtain drinking water in addition to rivers

and wells. This indirectly resulted in maintenance and recharging of the hydrological regimes and aquifers.

Local people have knowledge about the flora and fauna, their utility, interactions between the flora and fauna, the seasonal variations in the ecosystem and other such details of the functioning of the ecosystems. They understand the ecological processes through experience and observation. Thus consultation with them can earn their co-operation which could save precious resources and documentation of their knowledge based on systematic research can benefit biodiversity conservation.

Changing life-style and traditional knowledge

Development of market economy and migration of people from the villages to the cities has led to the loss of information on traditional system. Furthermore, biodiversity based technologies of tribal and peasant societies are viewed as backward and primitive and are displaced by modern technologies to such an extent that even if not intended they have destroyed biodiversity and people's livelihoods. Presently, it is only the tribals in the forested regions and villages who might have the traditional knowledge about uses of biodiversity and importance of conservation. People in urban areas generally fail to see the importance of naturally occurring species and ecosystems in their lives. This is an indication of the extent to which the erosion of our traditional knowledge has taken place⁸.

Many tribals in Gujarat migrate to nearby urban areas such as from Dangs to Surat; Chhota Udepur and Panchmahals to Vadodara and Ahmedabad. Once these people migrate to new places for livelihood/employment, their traditional knowledge automatically gets eroded, as its application is limited in the new environment. The changing ideologies have influenced the perception of people towards conservation. Driven by market economy and lack of proper incentives the concepts such as 'Jeev Daya' may break down with time. Earlier farmers considered sighting of Sarus Crane in their fields as auspicious, but now they are being shooed away and eggs destroyed or sometimes poisoned due to damage caused to their crops. There has been past record of good Sarus Crane population in the agricultural fields in Kheda, Mehsana, Central and South Gujarat, which is now decreasing at an alarming rate⁹.

The alienation also had its impact on the wetland ecosystem as well. In the last 20-30 years, the State has lost large number of ponds, *kunds*, etc. by reclaiming them for various purposes like construction, agriculture, dumping ground for solid waste, etc. This has given rise to several problems like reduction in ground water table, salinity increase and loss of biodiversity thriving on it.

The age old practices of farmers were based on sustainable use of natural resource, but due to large demand of food by rapid population growth, high yielding crop technologies, consumerism, monoculture practices and demand for

standardised products forced the farmers to give up the traditional practice of mixed and rotational cropping.

Use of traditional knowledge in agriculture was in practice before the green revolution. The green revolution had some spin-offs that were not foreseen earlier. With extension of modern agriculture, farmers began to doubt the wisdom of their own knowledge base, which was evolved over centuries¹⁰. As a result of this, knowledge is not effectively passed on from one generation to the other thus leading to its erosion. In the case of agro-ecosystem, there is ideological alienation also. For better economic gains, the younger generation is reluctant to imbibe the knowledge from their forefathers. Earlier, the farmers had the knowledge of how to differentiate between beneficial and harmful insects, but this is degrading now. The loss of this knowledge is one of the causes for depletion of beneficial insect diversity as the farmers now use insecticides which kill all the insects, many of which are non-targeted species. This is the case in Kheda, Vadodara, Valsad, Ahmedabad, Mehsana and Surat districts¹¹.

Mechanisation in agriculture is a typical case of changing perceptions from one generation to another. Earlier the ploughing operation with bullocks was carried out only in the morning and evening hours, when the birds were active and many of them fed on exposed grubs in the field. But now with the introduction of tractors, ploughing can be done at any hour of the day or night. Because of this, not only the birds are deprived of food source but the population of grubs also

increases which acts as pests for the crops.

Research on traditional knowledge in Gujarat

There are very few cases or sporadic attempts made to document traditional knowledge in Gujarat¹²⁻¹⁵ and are restricted to ethnobotany. Bapalal G. Vaidya¹⁶⁻¹⁸ has worked extensively and documented the ethnobotanical information about plants of Gujarat. Gujarat Pustakalya Sahayak has published few books on ethnobotany to popularise traditional knowledge. In these studies only the names of plants and their uses are given, but information on how to use them is lacking¹⁹. Gujarat Institute of Desert Ecology (GUIDE), Bhuj, has started research and documentation on traditional knowledge on plants and animals of the desert area²⁰.

Intellectual Property Rights (IPR) and Patent issues

The significance of the Intellectual Property Rights regime is increasing progressively at the international level. The marketing of products derived from the biowealth of a nation also comes under the patenting procedure. The rights over any biowealth by a country can be proved only by proper documentation²¹. Non-documentation of indigenous knowledge is already having its repercussions as few cases of our traditional knowledge being patented abroad have taken place. Any benefits from products derived from the usage of our genetic/species diversity would be lost to us because of lack of proof in the

form of specific documentation. Due to lack of proper documentation on procedural aspects and usage of these economic and medicinally important species, we have not been able to patent them. As already mentioned Gujarat has considerable wealth of indigenous knowledge which should be duly recognised and documented under IPR rules. In developing country like ours, local people have a wealth of information on the usage and status of biodiversity in their areas. Till recently, this was ignored and its importance not realized. The main reason for this is the level of literacy about the existing provisions of IPRs among the people.

The International Commission on Plant Genetic Resources emphasises upon the recognition and rewarding informal innovation of tribal and rural folk in the field of genetic resources conservation. M S Swaminathan Research Foundation (MSSRF), Chennai, has taken initiatives in this direction and is creating IPR database on four modules, viz. tribal information, ethnobotanical features, sacred groves and rare angiosperms. This work was started in Tamil Nadu and is now extended to neighbouring states²².

Suggestions for Community Biodiversity Register²³ and Community Gene Fund²⁴ substantiate the necessity to recognise the contribution of traditional knowledge and sharing it. Apart from this, the success story behind the patenting of *Trichopus zeylanicus*²⁵ in Kerala was possible only because the locals of the area shared their traditional knowledge with the scientists of Tropical

Botanical Garden and Research Institute (TBGRI).

The Biodiversity Conservation Network is another platform for the stakeholders to share their experiences. These enterprises are beginning to contribute to the local economy and are working as incentive for the local people to conserve their resources. They are also helping to influence national and local level policies that support better natural resource management. The examples are the projects being implemented in Garhwal (Uttaranchal), West Sikkim and Biligiri Rangaswamy Temple Sanctuary (Karnataka)²⁶. SRISTI, an NGO based in Ahmedabad, has extensively documented and published information on traditional knowledge and innovations of people since 1990, through its periodical, 'Honey Bee'.

Acknowledgements

The present work was part of the State Environment Action Programme, funded by the World Bank and assigned by Gujarat Ecology Commission. Gujarat Ecological Society provided all the support required for the work.

References

- 1 Anonymous, *Census of Gujarat, Provisional Population*, (Directorate of Census, Gandhinagar), 1991.
- 2 Shankar D, My encounter and reflections on Indian medical heritage, *Indian J Traditional Knowledge*, Inaugural Issue, 2002, 51.
- 3 Umadevi A J, Parabia M H & Reddy M N, Medicinal plants of Gujarat: A Survey, *Proceedings of All India Symposium on the 'Biology and Utility of Wild Plants'*. Prof. G. L. Shah commemoration, (Dept. of Biosciences, South Gujarat University, Surat), 1989.
- 4 Parabia M H, *Plant biodiversity survey in Surat, Valsad, Navsari and Dangs District of South Gujarat*, Project report submitted to Gujarat Ecological Society by Department of Biosciences, South Gujarat University, 2002, 290.
- 5 Umadevi A J, *Identification and Status Survey of Medicinal Plants of Gujarat*, Ph.D. Thesis. South Gujarat University, Surat, Gujarat, 1988.
- 6 Singh H S & Rana V J, *Management plan for Blackbuck National Park Velavedar*, (Gujarat Forest Department, Gandhinagar), 1995, 140.
- 7 Agarwal A & Narain S, *State of India's Environment. A citizens' Report: Dying Wisdom* (Centre for Science and Environment, New Delhi), 1997, 401.
- 8 Pant M M, Forestry for tribal development, in: *Forestry for Economic Development*. (Medhavi Publisher, New Delhi), 1984, 182.
- 9 GEER Foundation. *A Study on Indian Sarus Crane (Grus antigone antigone) in Gujarat State*, Project Report, (Gujarat Ecological and Education Research Foundation, Gandhinagar), 2000, 74.
- 10 Hedge P, Conserving agricultural biodiversity and people's knowledge, in: *Biodiversity Conservation*, Edited by Vandana Shiva, (Indian National Trust for Art and Cultural Heritage, New Delhi), 1994, 73.
- 11 Yadav D N, *Conservation of Endangered Species of Entomophages in Gujarat*, Final Technical Report submitted to Gujarat Ecological Society by Biological Control Laboratory, Gujarat Agricultural University, Anand, 2002, 41.
- 12 Bedi S J, *Floristic Study of Ratanmahal and Surrounding Hills*, Ph.D. Thesis, M.S. University of Baroda, Vadodara, 1968.
- 13 Gopal G V, *Ethnobotanical Studies in the Forest Areas of Some Parts of Gujarat*, Ph.D. Thesis, S.P. University, Vallabh Vidyanagar, 1983.
- 14 Reddy A S, *Flora of Dharampur Forest*, Ph.D. Thesis, S.P. University, Vallabh Vidyanagar, 1987.
- 15 Joshi K J, *Floristic, Phytosociological and Ethnobotanical Studies of Cambay Taluka*, Ph.D Thesis, Bhavnagar University, 1994.

- 16 Vaidya Bapalal G, *Nighantu Adarsa (Poorvardha)* (Gujarati), (The Chowkhamba Vidyabhavan, Varanasi), 1968.
- 17 Vaidya, Bapalal G, *Some Controversial Drugs in Indian Medicine*, (Chaukhamba Orientalia, Varanasi), 1982.
- 18 Vaidya, Bapalal G, *Nighantu Adarsa (Uttarardha)* (Gujarati), (Chowkhamba Bharati Academy, Varanasi), 1985.
- 19 Anonymous, *Biological Diversity of Gujarat, Current knowledge*, (Gujarat Ecology Commission publication, Vadodara), 1996, 330.
- 20 Nisha Mistry, Silori C S, Gupta L & Dixit A M, Indigenous knowledge on animal healthcare practices in district Kachchh, Gujarat, *Indian J Traditional Knowledge*, 2(3) (2003) 240.
- 21 Udgaonkar S, The recording of traditional knowledge: will it prevent 'bio-piracy'? *Current Science*, 82(4) (2002) 413.
- 22 Swaminathan M S, Implementing the Global Biodiversity Convention: IPR for Public Good, in: *Conservation and Economic Evaluation of Biodiversity*, Vol 2, Edited by Pushpangadan P, Ravi K & V Santhosh, (Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi), 1997, 399.
- 23 Gadgil M, Tribal and Rural Farmer-Conservers, *Proceedings of a Technical Consultation on an Implementation Framework for Farmers' Rights*, (M.S. Swaminathan Research Foundation, Chennai), 1996, 160.
- 24 Kumar S, Tribal and Rural Farmer-Conservers, *Proceedings of a Technical Consultation on an Implementation Framework for Farmers' Rights*, (M. S. Swaminathan Research Foundation, Chennai), 1996, 163.
- 25 Pushpangadan P, Tribal and Rural Farmer-Conservers, *Proceedings of a Technical Consultation on an Implementation Framework for Farmers' Right*, (M. S. Swaminathan Research Foundation, Chennai), 1996, 165.
- 26 Anonymous, *National Action Plan on Biodiversity*, (Ministry of Environment and Forest, New Delhi), 1997, 81.