

Status of Indigenous Knowledge in India

Scope of IK, its carriers and limited institutionalization of IK:

Indigenous Knowledge in India is an Ocean, vast, deep & diverse. Its transmission is mostly through non-institutional means. The knowledge is passed down through *a person (teacher) to person (student) process* wherein the student (*shishya*) and teacher (*guru*) are associated with each other by willful and free choice.

It has two kinds of carriers. The first kind is millions of laypersons, ordinary householders, farmers, shepherds, artisans, artists, & priests. It includes both men and women. The second kind is scholars and seers. Their numbers runs into several hundred thousand.

In civil society one can see the application of Indigenous Knowledge in the following fields:

Field	Examples of Indigenous Knowledge application
Nutrition	Valuation of local food resources, design of seasonal diet recipes,
Agriculture & Fisheries	Weather forecasting, Seed treatment, soil quality, bio-pesticides & fertilizers, life forms in rivers and oceans and their behavior.
Human Health	Use of flora, fauna, metals and minerals for management of common and chronic ailments and preventive healthcare,
Veterinary Care	Diseases of livestock with locally available herbal resources,
Handicrafts	Leather, textiles, metal work, pottery, fibers, jewelry
Performing Arts	Wide range of region specific folk and classical art forms
Religion & astrology	Wide range of ethnic community-based world views and practices

Institutionalised IK:

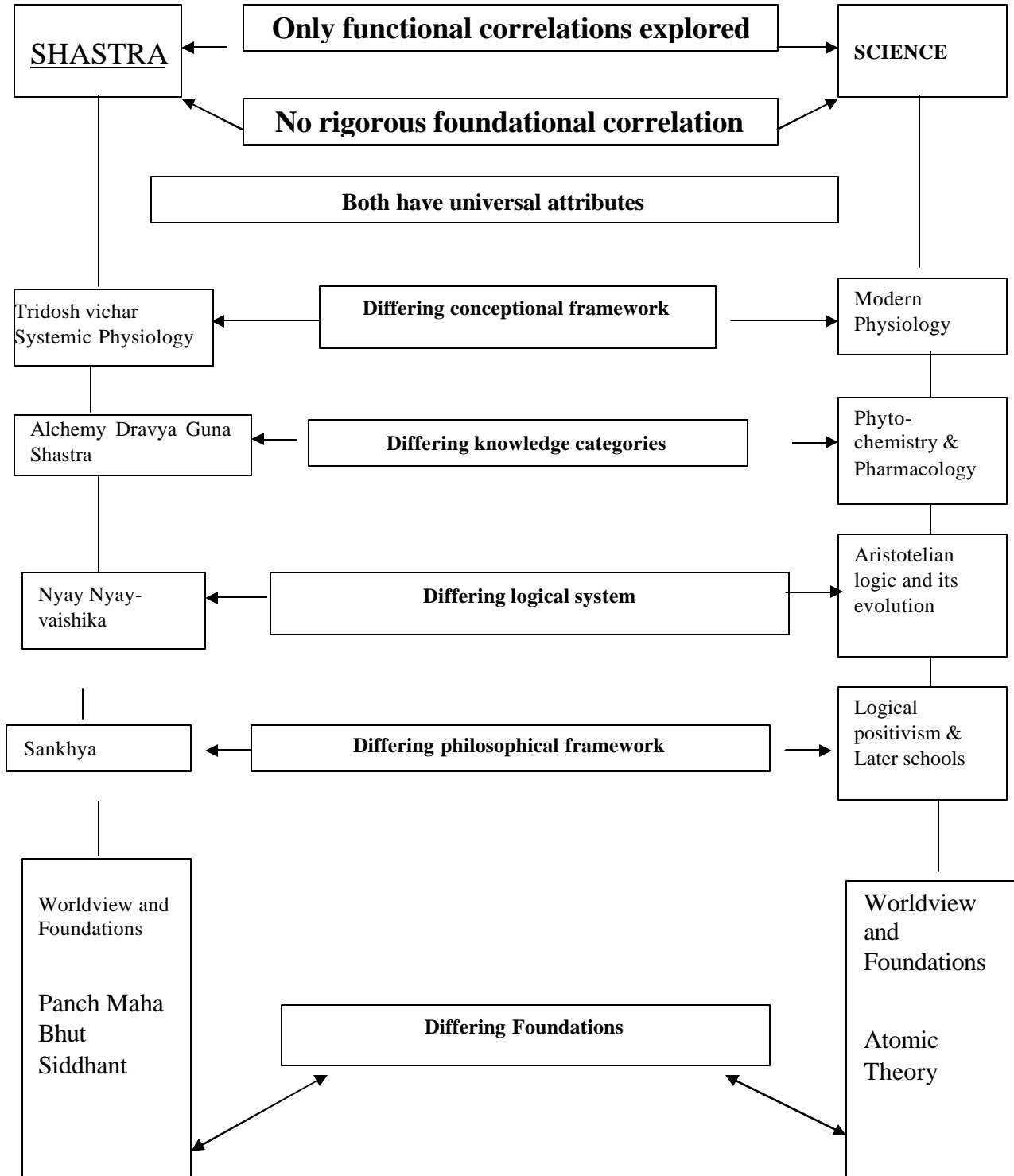
Indigenous Knowledge is generally not taught as a formal subject in educational institutions, except in the field of medicine & linguistics. In these two fields one can pursue formal courses at under graduate and postgraduate levels in several universities. India has over 300 Ayurveda, Unani & Siddha medical colleges and several university departments which teach Sanskrit, vernacular languages and Urdu and Persian.

Science & Indigenous Knowledge:

Science & Indigenous Knowledge are often shown to be at cross purposes although in recent times there has been collaborations in fields like Agriculture, Health & Linguistics. Whereas the collaborations in agriculture and health (human & veterinary) are better known in the field of linguistics, the collaborations are taking place with IT in use of Sanskrit grammar for “simple machine translation”.

The epistemology of Science & Indigenous Knowledge is different. They are based on different Worldviews, Philosophical systems, Logic & Knowledge Categories. The chart below illustrates the differences in the context of the indigenous health science of Ayurveda.

**Distinct Epistemological Foundations
TWO DIFFERENT KNOWLEDGE-SYSTEMS**



The differences in the structure of knowledge systems are inevitable because Indigenous Knowledge & Science have had their genesis in entirely different social, cultural & historical contexts. The question is not to determine which is superior or inferior but to realize the fact that they are different and that IK also has as much contemporary relevance as western knowledge systems.

Potential of Intercultural dialogue:

The goal of synthesis of Indigenous Knowledge into science or vice-versa is unrealistic & unfeasible but it is necessary to try and build bridges for intercultural communication. There are enormous benefits that can arise out of intercultural dialogue, provided sensitive rules for this dialogue are evolved based on mutual respect. Currently view disciplines that go under the rubric of “ethno-sciences” generally suffer from western ethno-centerism and therefore skewed in their perspective and content.

The globalisation process will be enriched if it effectively promotes cultural diversity. Monoculture in any domain of society be it agriculture, medicine, technology or arts is dangerous as it limits the options for civilisational evolution.

IK Initiatives in India:

An illustration of the contemporary relevance of indigenous health knowledge is reflecting FRLHT’s work in this field is reflected in Appendix 1.

In India some of the leading organizations active in the field of IK are:

a)	CIKS, Chennai Email: info@ciks.org	Active in applications of Vrikshayurveda to organic agriculture, (see appendix 2)
b)	NIF, SRISTI & GIAN, Ahmedabad admif@sify.com	Active in documenting rewarding and value addition to Grass-root innovations many of which particularly in the fields of agriculture and healthcare are based on IK, (see appendix 3)
c)	TKDL, vkg@niscair.res.in	A Government of India initiative to establish ‘prior-art’ of Indian medical knowledge systems by documenting classical herbal formulations and their therapeutic uses in a computerized form that can be searched by patent offices world-wide in order to evaluate (and reject) patent claims based on prior-art belonging to the Indian systems of medicine. (see appendix 4)
d)	MSSRF, Chennai Bhavani@mssrf.res.in	Documenting IK in agriculture, in order to establish farmer’s rights’ under the ‘plant varieties act’
e)	Kerala Government	It is the first state government which is active in documentation and value addition of IK in fields like Agriculture, medicine and bio-technology
f)	Govt. of India, - CSIR, - AYUSH Dept., - MoEF, - Ministry of Commerce	The TKDL described above & the latest amendments to patent act which disallow patents on products derived from traditional medical knowledge, and the legislation called Indian Bio Diversity Act 2002, are the policy and legal initiatives of Government of India to protect IK from bio-piracy and to ensure access and benefit sharing in line with provision of CBD
g)	Centre for Ecological Sciences, IISc, Bangalore	In collaboration with several other organizations like FRLHT/MSSRF/TBGRI/NIF etc, it has developed modules for recording traditional knowledge of local bi0-resources in a document, called the “People’s Bio-diversity Register” (PBR) (see appendix 5)

Appendix 1

Outline of FRLHT initiatives in Indigenous Knowledge

1 HEALTH SECURITY OF RURAL AND URBAN COMMUNITIES THROUGH PARTICIPATORY DOCUMENTATION, RESEARCH, ASSESSMENT & TRAINING RELATED TO HOUSEHOLD & COMMUNITY HEALTH PRACTICES

1.1 Perspective of the programme:

Household and community health practices are diverse and they vary across the different regions of the country. They form a very important aspect of the Indian medical heritage. Women are significant carriers of this heritage. Revitalization of these health traditions and practices can ensure health security to millions of rural and urban households.

In order to revitalise these practices, it is essential first to document and next to assess them, so that sound practices can be actively promoted and distorted ones weeded out.

1.2 Aim:

The aim of this programme on documentation and training in community and household practice include:

- achieve self-reliance in primary health care;
- formulate suitable strategies for development of LHT and to influence legitimacy at local level;
- encourage continued use of the best local health traditions;
- strengthen the local health knowledge and practice;
- support local resources;
- assess resource at community level in the context of local health traditions (LHT);
- upscale the Documentation and Assessment of Local Health Traditions (DALHT) methodology.

1.3 Description of work done:

There is a rich knowledge and resource-base with rural and tribal communities with respect to health and healing. However, there is a declining trend due to erosion of culture, knowledge and resource base. This erosion is because of the lack of active movement at community level, lack of state patronage, negative influence of Western medical practice and declining social structure. Documentation and Assessment of Local Health Traditions (DALHT) methodology is developed for supporting local resource building which in turn help self-reliance in primary health care.

FRLHT has facilitated the building of local resource centres and has conducted exchange programmes through networking and workshops. This would improve traditional knowledge and practice. The organisation has also helped to establish kitchen herbal gardens, and income generation programmes through training, *sammelan*, and self-help groups to encourage the continued use of best health traditions. Strengthening of local knowledge is achieved by Rapid Assessment of Local Health Traditions (RALHT) and other relevant local health tradition activities.

1.4 Major achievement

- A participatory methodology for documentation and rapid assessment of local health traditions was developed.
- This method has been field tested and is being promoted through training programmes.
- A training module on documentation and assessment of local health traditions has been developed and is being shared during training programmes.
- A software *local health tradition-home remedies and food and regimen* version 1.0 has been developed as a tool to documentation.
- So far, about 22 training programmes conducted in the four States of southern India and the three States in the northern region.

2 SCIENTIFIC METHODS AND TOOLS FOR INTERPRETING TRADITIONAL KNOWLEDGE

Despite the current resurgence of interest and global demand for herbal medicines, traditional medicines are still viewed with a certain amount of scepticism. This is not only because the Western bio- medicine and traditional medicines are based on epistemologically different foundations but also since the public is not sure of the quality (safety and efficacy, for example) of the traditional preparations available in the market.

Time has come to look deeper into the context of Indian Medical Heritage, to create a respectful cross-cultural dialogue, to understand the knowledge systems, to develop meaningful methods using contemporary tools and to try and interpret traditional knowledge. It may not only be difficult to have direct interpretations of the Indian medical knowledge in terms of modern language but may at times not be possible. However, it has to be attempted since this would not only demonstrate the contemporary relevance of traditional medicines but also build wider public confidence in Indian Medical Heritage.

RLHT, through its Laboratory, Traditional Systems of Medicine and Research Groups, aims (i) to conduct meaningful research to interpret the importance of traditional recommendations with respect to raw drugs (D2.1) and formulations (D2.2) in order to arrive at relevant quality standards using modern tools such as, Chemistry, Biology, Genetics and Botany and (ii) to provide testing facility and technical support to small scale units dealing with medicinal plants and value addition.

The Laboratory set up at FRLHT has the required infrastructure, facilities and expertise to certify the quality of raw drugs & finished herbal medicines as per ayurvedic pharmacopoeial standards.

2.1 Application of Chemistry, Microbiology, Genetics, & Botany for Quality Standardisation & Evaluation of raw drugs based on Dravya Guna Sastra

Documentation of traditional quality standards pertaining to raw drugs:

The aim here is to document traditional quality standards pertaining to raw drugs with reference to identity and collection. Documentation of traditional recommendations regarding identity, collection and storage of raw drugs is to be done from classical texts as well as from living traditions. This

strategy is especially relevant to traditional medical systems such as Ayurveda, since not all instructions are available in texts; many practices are passed on only as oral traditions. These need to be documented so that at a later stage their relevance may be evaluated.

Collection of specifications such as details regarding plant identity, maturity, region of collection and storage are being documented from traditional practitioners. The Laboratory and Traditional System of Medicine Groups with assistance from Conservation Research Group of FRLHT are interviewing traditional practitioners with this aim.

Simultaneously, information is also being compiled from selected classical ayurvedic texts pertaining to any plant-related recommendations.

A computerised database called Traditional Quality Standards Database is being created to enter and retrieve the compiled information. This would have a visual basic front end and access-based back end, with complex inter-linkages to allow multi-faceted query.

Summary of achievements:

- A standard format has been created for compilation of information from texts and four research fellows (ayurvedic physicians) have undertaken the compilation work.
- Information regarding collection and storage of medicinal plants has been compiled from one classical text of Ayurveda.
- Details of the fields, aspects, features and their inter-linkages have been worked out in detail. An access-based back-end has been created with the necessary inter-linkages. Testing of the database and data entry is in progress.

2.2 Standardisation & quality testing of raw drugs

The aim here is to standardise the quality of raw drugs and to test them as per pharmacopoeial standards and as per traditional parameters by modern testing methods developed in the areas of Chemistry, Microbiology, Genetics, Pharmacopoeial standards (including Ayurvedic Pharmacopoeia of India). Testing for raw drugs currently use modern tools such as Microscopy, Physicochemical and Chemical tests including Thin Layer Chromatography (TLC). In the modern herbal sector there are other tools used which includes High Performance Thin Layer Chromatography (HPTLC) and High Performance Liquid Chromatography (HPLC). Biological tests including Brine Shrimp Bioassay are also used by some in the sector to standardise the bioactivity of raw drugs. However, there is no correlation of these standards to traditional quality parameters. In the current scheme of things, the techniques can at best indicate the identity, purity and stability of herbal drugs and their formulations.

Summary of achievements

- The project funded by DST has been successfully completed and a report submitted. The objectives of the project included (i) setting up of testing facility for certification of medicinal plants, (ii) maintaining a raw drug museum of samples tested, (iii) imparting training to women in exo-morphological identification, and (iv) setting up a pharmacognosy database.

84 raw drug samples have been tagged with their chemical fingerprint and stored for reference as dried samples.

Over 15 raw drug samples have been stored as pickled samples along with their supportive authenticating part.

Baseline physicochemical and chromatographic data have been obtained for 40 raw drugs for which no pharmacopoeial standards are available.

Comparative physicochemical and chromatographic profiles of 5 raw drugs and their variants have been studied.

- One raw drug has been tested using Brine Shrimp Bioassay by determination of ED₅₀ (Effective Dose) values. This was done to determine the difference in bioactivity of the drug collected from different regions.
- A prototype of a diagnostic kit has been developed to aid in the correct identification and quality of plants. This kit is simple, cost-effective and can be used by the small scale manufacturing units.

2.3 Development of database on metals and minerals used in Indian Medicines

Description

Mineral and metal medicine is widely used by traditional practitioners all over India, which contributes to total health care. These are potentially toxic materials which need accurate identification and distinction from their prototypes. The project was conceived based on the experience of diversity in use of these; sometimes of poor quality and at other times subjective and with regional ambiguity about identity and purity. To solve the problem, the first step is to put together all the information on this subject which can lead to further specific goals. Therefore it was decided to develop a user-friendly and easily retrievable database on mineral and metal medicine by compilation of relevant references from authentic traditional scripts that are difficult to procure at one place for most users. Supplementing traditional recorded data by modern information on the same materials helps to define or understand objective criteria of identification and standardization of the minerals thereby reducing controversy resulting in the use of authentic raw material in order to produce quality medicine.

Summary of achievements

- A systematic document of theoretical co-relations by putting together traditional and modern data on minerals is made available.
- Identification of any particular medicinally-useful variety of minerals from its prototypes on traditional and objective criteria.
- Collection of multiple processing methods of all the minerals dealt with in *Rasashastra* at one place.
- An understanding of application or practical approach regarding availability, status [rarity] and authenticity [adulterants or substitutes] of minerals and various processing materials is developed.

2.4 Databases on traditional medical knowledge focused on materia - medica and diagnostics

Development of a database and a CD on plants of Caraka Samhita

The source data of plants of Caraka Samhita was converted and exported to windows-based database tools to support database activities. This bilingual database incorporates 12,873 plant references from Caraka Samhita which are grouped into 620 species. This was carried out based on a guideline prepared for grouping plant names asonyms, synonyms and variant names. In the database, each plant reference is provided with its English translation and all the technical terms are supported with a

dictionary of its English meaning. Classification of medicinal plants, 1,700 formulation information, plant picture, various botanical correlations and its identity status, habit and trade information of selected species, commentator's opinion of plant identity, etc. are the important features of this database.

The interface also has various search facilities as the information is classified under three main headings ie plant nomenclature, identification and application. A multimedia CD was designed with necessary visual effects highlighting the importance of Caraka Samhita. A brochure on this CD is also available to support dissemination activities.

Database on plants of ayurveda for BAMS course

All classical information pertaining to detailed and non-detailed list of plants mentioned in the BAMS (Bachelor of Ayurvedic Medicine and Surgery) syllabus were compiled from 20 classical texts. There are 370 plants in the syllabus which are incorporated in the database. Botanical names, regional names, classical references like Sanskrit slokas, interpretation of the slokas into English, and usage of these plants as single drugs are incorporated into this database.

Modern botanical information such as morphology, distribution, propagation methods and pharmacognosy information inclusive of its plant biochemistry and pharmacology are provided. This database is aimed to provide all required information for graduates and postgraduate students of Ayurveda.

Database of plants of Susruta Samhita

The database of plant of Susruta Samhita has 9,650 references. This data has been converted from the previous data environment to the present one to support access to various database tools. A checklist of the plant names was prepared and a report is made available in Sanskrit and English scripts. Hard copy of the previous version of the data is prepared to confirm integrity of the data conversion.

Database on Ayurveda formularies

First part of the database of the Ayurveda formularies was incorporated in the CIPA (Clinically important plants of Ayurveda) Ver.1 of the CD, which was released earlier last year. The second version of the CIPA is incorporated with 4,000 more formulation information from 7 classical texts covering about 150 more plants.

Database on plants of Siddha medicine

This bilingual database of plants of Siddha medicine on conversion and editing of data in Tamil and English has been completed. This has an extensive collection of information pertaining to therapeutic information of plants mentioned in 5 texts of 2,350 records, simple remedies mentioned in 6 texts of 1,800 records, formulation data of 3,013 records and 36,000 records of dictionary file which has Tamil names of plants. A separate nighantu file in Tamil script and a glossary of the technical terms are incorporated in this database.

Database on plants of Homoeo medicine

This database could complete compilation of plants and products information of 80 plants mentioned in Homoeo medicine from 15-20 sources as text document.

Database on Plants of Unani medicine

A hard copy of the Arabic and Urdu names appearing in the classical texts of Unani medicine was prepared from the FRLHT's nomenclature database. Verification on botanical names and spellings of Arabic names and Unani names were carried out.

2.5 Assessment of bone-setting tradition in south India

Background

In rural India, traditional bonesetters manage setting broken bones. No supporting evidence is available so far, apart from the past preliminary studies conducted by FRLHT and other NGOs of similar interests. These studies have shown that approximately 60,000 bonesetters are serving the rural population of developing India¹. In this modern mechanized world, where an average of thousand deaths occur everyday on the road and about seven million are injured in road accidents, 90% of the morbidity is due to fractures and dislocations². Therefore, it is important that documentation and revitalization of this knowledge is essential. In certain cases in cities, approximately 15- 40 cases are attended to every day by a single bonesetter. In the past, studies were initiated in the social aspects of the bone-setting traditions.

Aim

To make an inventory of bonesetters and *Marma* practitioners with their practice details and outreach in selected states of south India (Kerala, Tamil Nadu, Pondicherry, and Karnataka)

To make a comprehensive clinical documentation of selected cases managed by bonesetters.

Description of work done

Of all the traditional healing practices bone-setting plays a very vital role in meeting the needs of orthopaedic problems, especially in the rural area where the facilities for formal primary and secondary health care are still not adequate. Now, as a field research programme, we are looking into the extent of service provided by the traditional bonesetters. This essentially involves sociological and medical aspects of fracture healing.

2.6 Studies on Malaria

Background

Malaria is a serious, acute and chronic relapsing infection in humans characterized by periodic attacks of chills and fever, anemia, splenomegaly (enlargement of the spleen), and often-fatal complications.

As there is no direct reference to the term "malaria" in the ayurvedic or other Indian traditional medical literature, it is essential to have a rigorous disease correlation of malaria with traditional medical nosological entities.

Aim

To assess effectiveness of a set of anti-malarials from folk traditions through clinical case study through documentation based on a pluralistic inter-disciplinary research design.

To initiate pilot projects for promotion of selected traditional folk remedies/practices through community health organizations that has achieved positive results.

To document Ayurvedic management of “malaria” based on an intelligent correlation of clinical symptoms of malaria as collected from recent medical literature, as well as from limited field studies with an appropriate ayurvedic disease entity.

Description of work done

We are studying and documenting malarial positive cases in an ayurvedic case sheet. Along with this we are also compiling the remedies for different types of *Jvara* (fever) from the selected Ayurvedic textbooks. For this purpose we are preparing a database on *Jvara*. Apart from this, the local healers who are treating malaria are being interviewed for details of their treatments. These are then documented and analysed. The treatments are recorded along with blood smear tests before and after their period of treatment. Then these remedies are subjected for clinical study. For the preventive aspects of malaria, we are studying the efficacy of certain drugs used in *Kashaya camps*, which are organized by the local health guides.

2.7 Ethno-botanical nomenclature programme

Perspectives

Ethno-nomenclature or local name is a very visible aspect of the local knowledge of plants and of local health traditions. It tells us how communities think/ use/distinguish plants from the meanings of the names. Meaning of the plant name gives an idea regarding the basis on which the plants or group of plants are being grouped and identified. It also gives clues on how taxonomic affinities at generic levels are distinguished.

The ethno-botanical nomenclature programme took its inception in August 2003 aiming at understanding and appreciating the way in which folk people have labeled plants. This study falls under one of the three main thrust areas of FRLHT namely *demonstrating* contemporary relevance of theory and practice of *Indian Systems of Medicine*. This programme is a cross-cultural research, which enables building bridges of understanding between folk, nomenclature and modern taxonomy. The analysis of the field data will be at three levels viz etymological, epistemological and taxonomical.

The outcome of the ethno botanical research will provide deeper understanding about the knowledge and resource base of (LHTs), which will support revitalization of LHTs. This will help strengthen and deepen the Bio-cultural Nomenclature Database of Medicinal Plants. The results and outcome of the study will be shared in the form of a book and other publications.

For two years initially, the study will be carried out in Karnataka, which will gradually expand to an all-India level as a co-ordinated program. Entire work is based on ethno-botanical and anthropological approaches.

2.8 Studies on ethno-veterinary practices

Local communities have high priority for the health problems of their livestock. Identification of health problems in livestock and subsequent documentation of remedial measures from the *paramparika vaidyas* have been taken up as a major activity. The documentation is done through workshops under Rapid Assessment of Local Health Traditions (RALHT). This is a participatory method of documenting and assessing the data. Besides, a short desk research is done to know about the efficacy and safety of the local health practices. It is called a rapid assessment as it is done with a backup of strong literary supportive evidences from Indian Systems of Medicine (ISM) and Western bio-medical science. No clinical trials are done, as these involve long-term processes. Promotion of assessed data on remedial measures is done by means of kitchen herbal gardens through training the village resource persons. Presently the work is being done with National Dairy Development Board (NDDB) through six district milk unions of Karnataka

Summary of achievements

Based on the RALHT workshops conducted in four centers a total of 191 formulae were documented. Among the 191 formulae, 149 formulae have literary supportive evidence from Indian Systems of Medicine and modern pharmacology. The BAIF Institute for Rural Development (BAIF) center had 116 unique resources (116 plants, 3 animal products and 4 minerals). The Convenient Centre for Development (CCD) center had 40 unique resources (37 plants, 2 animal products and 1 mineral). Society for Rural Development (SRD) center had 59 unique resources (55 plants, 2 animal products and 2 minerals). Wayanad Social Service Society (WSSS) center had 53 unique resources (49 plants, 2 animal products and 2 minerals).

Appendix 2

Centre for Indian Knowledge Systems

Opening people's eyes (Introduction to CIKS)

The Centre for Indian Knowledge Systems is an organisation devoted to exploring and developing the contemporary relevance and applications of traditional Indian knowledge systems - with the focus areas being agriculture and health care. Our key aim is to strengthen and revitalize indigenous sciences and practices by creating a new awareness among the general public about their relevance in today's world. We believe that the best way to keep these knowledge systems alive is to open people's eyes to the scientific basis behind traditional practices and their effectiveness in the modern day context. This approach also serves to remove the many misconceptions that exist about traditional Indian science today. I

Working for results

Our activities centre around three areas of focus - traditional agriculture, healthcare and metallurgy - each one a complex and vast knowledge system with innumerable applications in the modern context. In each focus area, we are involved in the following kinds of activity.

Research: Research into existing indigenous systems and practices, adaptation and application of these techniques in the modern day context.

Training and Extension Work: Training and orientation programmes for individuals and organisations interested in implementing indigenous systems to their existing work environments, consultancy and implementation assistance.

Production of Educational and Training Material: Designing and production of manuals, monographs, texts, books, slide shows and videos.

Activities of CIKS

Some major programmes

- Action Research and Training Programmes on various aspects of Organic Farming
- Research on cultivation of Organic Rice, Cotton, Oil seeds, Vegetables etc.
- Setting up of Rural Gene Banks for the conservation of Traditional Seed Varieties
- Development of the use of Biological Control Agents for the control of pests in different agro ecosystems
- Research on the applications of Vrkhayurveda (Traditional Indian Plant Science)
- Setting up of an Organic Farming Resource Centre which would act as a clearing house for information on organic practices
- Arogyam - a scheme to take organic food grown by farmers to consumers at reasonable prices
- Research and Publications on Medicinal Plants
- Training Programmes on the use of Traditional Medicine for various groups
- Preparation of Audio Visuals on various aspects of Traditional Healthcare Systems

- Publication of Newsletters, Manuals, Posters and Monographs on Traditional Health Care and Traditional Agriculture
- Research and Documentation on Traditional Metallurgy and Metal Working

Why traditional science?

Relevance of traditional knowledge

Even today in very many crucial and basic sectors, the vast majority of the Indian population is sustained by the knowledge, skills and material resources of the traditional sector. However, these systems have received very little by way of attention and even less by way of financial support or institutional help from the government. Even when traditional sciences or technologies are studied, it is often in the nature of the study of history or literature or "Indology" and almost never from the point of view of their contemporary relevance and potential. Moreover, appreciation of tradition is usually limited only to the aesthetic and decorative dimensions of the products of our tradition and not their functional aspects or as living traditions that have relevance for today.

We believe that in order to evolve into a strong and a self-reliant nation we need to identify and build upon our inherent strengths and potential in varied areas. Our approach is based on the understanding that these are not merely serving a decorative role and are not to remain as appendages to modernity or merely as reminders of a past glory. On the contrary, they should become the basis on which today's needs and requirements can be met.

Making tradition work

Professional services

Although most of our work is research and training oriented, we do offer a few professional services. Here is a brief list with a short description of each service:

Consultancy services: If you require any kind of consultancy or project implementation service in the fields of traditional Indian agriculture or healthcare, we can put our vast knowledge base to work for you. For example, if you're interested in setting up an organic farm, we will help you get it up and running in the smoothest possible way.

Training programmes and seminars: We also conduct, on request, training and orientation programmes and seminars on traditional health and agriculture for select groups of people.

Educational courses: If your educational institution wishes to offer a course in traditional agriculture or healthcare for your students, we offer a complete solution. We will design the course, produce the course material and conduct the course in your institution.

Appendix 3

National Innovation Foundation (NIF)

The Department of Science and Technology help establish the National Innovation Foundation (NIF) of India, on March 1 2000, with the main goal of providing institutional support in scouting, spawning, sustaining and scaling up grassroots green innovations and helping their transition to self supporting activities.

The foundation has a [Governing Body](#) chaired by [Dr. R. A. Mashelkar](#), Secretary, DSIR and Director General [CSIR](#). Professor Anil K. Gupta, President SRISTI and Professor Indian Institute of Management Ahmedabad, is the Executive Vice Chairperson of NIF.

For the last ten years the [Honeybee Network](#) and Society for Research and Initiatives for Sustainable Technologies and Institutions ([SRISTI](#)) have been scouting [innovations](#) by farmers, artisans, women, etc. at the grassroots level.

Gujarat Grassroots Innovations Augmentation Network ([GIAN](#)) scales up innovations, from the Honey Bee database of innovations, through value additions in innovations to sustain creativity and ethics of experimentation. GIAN was conceived at the International Conference on Creativity and Innovation at Grassroots (ICCIG), jointly organized by IIM Ahmedabad and SRISTI.

The Honey Bee database of 10,000 innovations, collected and documented by SRISTI, would be part of the National Register of Innovations to be managed and supported by NIF.

Mission

To help India become an inventive and creative society and a global leader in sustainable technologies without social and economic handicaps affecting evolution and diffusion of green grassroots innovations.

Goals

- To help India become an inventive and creative society and a global leader in sustainable technologies.
- To ensure evolution and diffusion of green grassroots innovations in a time bound and mission oriented manner.
- To support scouting, spawning, sustaining and scaling up of grassroots green innovations and link innovation, enterprises and investments.
- To strengthen R&D linkages between excellence in formal and informal knowledge systems and create a Knowledge Network.
- To promote wider social awareness and possible commercial and non-commercial applications of innovations and incorporate the same in education curriculum, development programs and policies.

Objectives

- To help India become an inventive and creative society and a global leader in sustainable technologies by scouting, spawning and sustaining grassroots innovations.
- To ensure evolution and diffusion of green grassroots innovations in a selective, time bound and mission oriented basis so as to meet the socio-economic and environmental needs of our society.
- To provide institutional support in scouting, spawning, sustaining and scaling up grassroots green innovations and helping their transition to self supporting activities, seeking self reliance through competitive advantage of innovation based enterprises and/or application of people generated sustainable technologies at grassroots level.
- To evolve strategies and conduct, co-ordinate and support research, design and development efforts in the country on grassroots innovations so as to attain and maintain technological competence and enhance self reliance.
- To build linkages between excellence in formal scientific systems and informal knowledge systems and create a Knowledge Network to link various stakeholders through applications of information technologies and also otherwise.
- To promote wider social awareness and possible commercial and non commercial applications of know-how generated as a result of above and encourage their incorporation in educational curriculum, developmental policies and programs.

Appendix 4

Traditional Knowledge Digital Library (TKDL)

Introduction

Since time immemorial, India has possessed a rich traditional knowledge of ways and means practiced to treat diseases afflicting people. This knowledge has generally been passed down by word of mouth from generation to generation. Some of them have been described in ancient classical and other literature, often inaccessible to the common man. Documentation of this existing knowledge, available in public domain, on various traditional systems of medicine has become imperative to safeguard the sovereignty of this traditional knowledge and to protect them from being misused in patenting on non-original discoveries, and this has been a matter of national concern. India fought successfully the revocation of turmeric and basmati patents granted by United States Patent and Trademark Office (USPTO) and neem patent granted by European Patent Office (EPO). As a sequel to this, in 1999, the Department of ISM&H constituted an inter-disciplinary Task Force, for preparing a report on establishing a TKDL.

TKDL is a collaborative project between NISCAIR (erstwhile NISCOM) and Department of Indian Systems of Medicine and Homoeopathy (D/o ISM&H), Ministry of Health and Family Welfare which been implemented at NISCAIR. An inter-disciplinary team of 25 Ayurveda experts, 1 patent examiner, 5 IT experts, 3 NISCAIR scientists and 4 technical officers have worked in a dedicated manner for one and a half year for creating TKDL in the present form.

TKDL will give legitimacy to the existing traditional knowledge and enable protection of such information from getting patented by the fly-by-night inventors acquiring patents on our traditional knowledge systems.

The project TKDL proposes to document the knowledge available in public domain by sifting and collating the information on traditional knowledge from the existing literature covering Ayurveda, in digitized format in five international languages which are English, German, French, Japanese and Spanish. Traditional Knowledge Resource Classification (TKRC), an innovative structured classification system for the purpose of systematic arrangement, dissemination and retrieval has been evolved for about 5000 subgroups against one group in international patent classification, i.e. AK61K35/78 related to medicinal plants.

History of TKDL

Following table briefly describes the major milestones in the life cycle of TKDL (Ayurveda) project. Details are at [Annex. 1](#)

S.No	Activity	Period	Responsibility
1.	Recognition of need of creation of Traditional Knowledge (TK) data bases and need of support to developing countries by Standing Committee on Information Technology (SCIT) of World	June, 1999	Third Plenary Session of SCIT, WIPO under the Chairmanship of Dr. R. A. Mashelkar, DG CSIR, India

	Intellectual Property Organization (WIPO)		
2.	Direction to Department of Indian Systems of Medicine & Homoeopathy (ISM&H) for initiating measures to protect Indian Traditional Knowledge in particular, Ayurveda		Planning Commission constitutes Task Force under the Chairmanship of Prof. D. N. Tiwari, Member Planning Commission on S&T
3.	Approach paper on setting up of TKDL	October, 1999	Paper was prepared by Mr. V. K. Gupta, the then Senior Technical Director, National Informatics Center at the direction of the then Secretary Department of ISM&H
4.	Submission of approach paper to SCIT, WIPO	December, 1999	Dr. R. A. Mashelkar
5.	Setting up of the interdisciplinary (interministerial Task Force on TKDL, consisting of experts from Department Of ISM&H, Central Council of Research in Ayurveda & Siddha (CCRAS), Banaras Hindu University (BHU), National Informatics Center (NIC), Controller General of Patents Design & Trade Marks (CGPDTM), etc. under the Chairmanship of the then Senior Technical Director, Mr. V. K. Gupta		Department of Indian Systems of Medicine & Homoeopathy (ISM&H)
6.	Submission of TKDL Task Force Report to Department of Indian Systems of Medicine & Homoeopathy (ISM&H)	May, 2000	TKDL Task Force
7.	Presenting TKDL Concept & Vision at International forum	May, 2000	Dr. R. A. Mashelkar
8.	Cabinet Committee of Economic Affairs (CCEA's) approval on TKDL Project	January, 2001	Department of Indian Systems of Medicine & Homoeopathy (ISM&H)
9.	TKDL software specifications and design	July, 2001	Mr. V. K. Gupta, the then Senior Technical Director, National Informatics Centre
10.	Memorandum of Understanding (MoU) between Department of Indian Systems of Medicine & Homoeopathy (ISM&H) and National Institute of Science Communication (NISCOM)		Department of Indian Systems of Medicine & Homoeopathy (ISM&H) and National Institute of Science Communication (NISCOM)
11.	Establishing TKDL team of Project Assistants (IT), Ayurveda, Patent Examiners, etc.	October, 2001 to March, 2002	NISCOM, CCRAS, D/o ISM&H and CGPDTM.
12.	Presentation on Traditional Knowledge Resource Classification (TKRC) at International Patent Classification (IPC) Union for getting established WIPO-TK Task Force consisting of USPTO, EPO, JPO, China and India	February, 2002	Mr. V. K. Gupta, Director NISCOM
13.	WIPO-TK Task Force recommended for adding a subclass under A 61	February, 2002	Meeting on behalf of India was attended by Director NISCOM as the member of International Task Force and the presentation was made on the issue of linkage between TKRC and IPC
14.	Committee of Experts recommended (i) inclusion of 200 subgroups on TK against earlier single group on medicinal plants, (ii) linking of TKRC	February, 2003	Meeting on behalf of India was attended by Director NISCAIR (erstwhile NISCOM) as the member

	to IPC and (iii) Continuation of work on biodiversity, TK and TCE		of International Task Force and the presentation was made on the issue of linkage between TKRC and IPC
15.	Internationally recognized specifications and standards for setting up of TK data bases and registries based on TKDL specifications		
	(a) Drafting of specifications at WIPO Regional Symposium at Kochi, based on TKDL	November, 2002	Regional TK experts from China, Philippines, India (Prof. Anil Gupta, Prof. Madhav Gadgil, Dr. Darshan Shankar, Mr. V. K. Gupta, etc.)
	(b) Presentation of WIPO document No. WIPO /GRTKF / IC/ 4/ 14 at the 4th Session of Intergovernmental Committee (IGC) of WIPO on Intellectual Property and Genetic Resources, Traditional Knowledge and expression of folklore	December, 2002	Mr. V. K. Gupta, Director National Institute of Science Communication And Information Resources (NISCAIR)
	(c) Adoption of recommendations contained in document No. WIPO/ GRTKF/ IC/ 4/ 14 by International IP community at the 5th Session of IGC	July, 2003	Intergovernmental Committee (IGC) of WIPO
16.	Completing data abstraction work on 36,000 Ayurvedic formulations for creating TKDL in five languages, i.e. English, German, Spanish, French and Japanese	March, 2003	TKDL team of Project Assistants (IT), Ayurveda, Patent Examiners, and Scientists functioning since October 2001 at NISCAIR (erstwhile National Institute of Science Communication, NISCOM).

TKDL AYURVEDA: Impact at national and International level on evolving International Classification

TKDL has made several national and international impacts. Traditional Knowledge has been included as item no. 9 'Indigenous Resources and Traditional Knowledge' in the Science and Technology Policy, 2003 which was announced in January, 2003. The TKDL approach is likely to be expanded to the areas of Traditional Cultural Expressions (TCE) and Components of Biodiversity. A coordinated exercise for the entire country in the areas of bio-diversity and TCE related to classification aspects on evolving international classifications is likely to be initiated at the earliest. Secretaries of different concerned Departments/Ministries such as Department of Biotechnology, Department of Culture, Department of Industrial Policy and Promotion, Ministry of Education, Ministry of Information and Broadcasting, Ministry of Environment and Forests and Ministry of Science and Technology are being contacted for nominating experts for the creation of the task force.

TKDL Ayurveda has made an impact at an international level after realizing its utility in preventing misappropriation of the rich traditional knowledge and also making it as a valuable tool for encouraging advanced research. The above statement can be appreciated by the contents of the second paragraphs of the letter from Mr. Francis Gurry, Assistant Director General, Legal Counsel, WIPO is reproduced below:

"I refer to previous collaborations and correspondence between the World Intellectual Property Organization (WIPO) and the National Institute of Science Communication (NISCOM) as regards the

linking of the Indian Traditional Knowledge Digital Library (TKDL) of Ayurveda with the WIPO Online Portal. I am pleased to report that the linking of a sample of Indian TKDL Database to the WIPO Online Portal at the third session of the Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (the "Committee") was a full success and brought strong recognition for the leading work of India in the field of traditional knowledge. The presentation of the Indian TKDL Database generated a wide interest among WIPO Member States and TK holders in applying the Indian TKDL model in their respective countries and communities.

In particular, the presence of the TKDL sample on the WIPO Portal has led to several requests by Member States and other regional organizations, such as the Delegation of South Africa and the African Regional Intellectual Property Organization (ARIPO), to seek advice and assistance from India when applying the TKDL approach within their countries and regions. Further, the presence of the Indian TKDL sample on the WIPO Portal has enabled WIPO to continue to demonstrate the potential of the Indian TKDL model to other member states and communities in a wide range of countries throughout the world."

Indian contribution on creating / developing technical standards on TK databases / registries was recognised by Dr. Kamil Idris, Director General World Intellectual Property Organization in his letter dated 4.8.2003 to Dr. R.A Mashelkar, Director General, Council of Scientific and Industrial Research relevant extracts are reproduced below:

"One recent tangible outcome of India's strong involvement was the adoption by World Intellectual Property Organization Inter Governmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore of draft technical standards concerning Traditional Knowledge documentation, an initiative that received considerable momentum and indispensable technical input from the pioneering work of India and your team in particular"

Traditional Knowledge Resource Classification (TKRC), an innovative structured classification on the lines similar to IPC was presented by India in the 30th IPC Union. TKRC is a structured classification for the classification of the traditional knowledge resources pertaining to Ayurveda. However, there is just a single subgroup existing with the IPC for the classification, which is A61K 35/78 for traditional knowledge from medicinal plants. Since a single subgroup is not sufficient for classification of entire traditional knowledge from medicinal plants the IPC Union constituted a Task Force to substantially revise the classification, including creation of a new subclass covering traditional knowledge subject matter and further study the possibility of linking and/or integrating TKRC developed by India with IPC. Task Force consisted of United States Patent Office, European Patent Office, China, Japan and India. Subsequently, the Task Force in its 32nd IPC has prepared its draft recommendations according to which there are possibilities of getting 200 sub-groups included in IPC (under a new main group N36) instead of single sub-group on medicinal plants. Also the Task Force has recommended linking of TKRC developed by India with IPC. This is likely to have significant impact on the system of search and examination while granting patents in the area of traditional knowledge whereby the possibilities of grant of wrong TK patents shall get significantly reduced.

Also TKDL has created innovative solutions / methodologies by adopting an interdisciplinary approach where by it has been able to accomplish the entire task with a team of 40 experts at a cost of 0.3 million US \$ in a period of one and half year, which in a traditional translation route would have cost 50 million US \$, team of 1000 translators and time period of 10-12 years. TKDL is also likely to

give adequate defensive protection to about 36,000 formulations (whereas revoking of on wrong patent at a international level in one country alone may cost 0.2 to 0.3 million US \$). Also TKDL has immense potential for being utilised as a tool for advance research thus has large possibility ties in creating new IP.

Annex. 1

Standing Committee on Information Technology (SCIT), World Intellectual Property Organisation (WIPO) at the 3rd Plenary Session held at Geneva in June 1999 and attended by 170 members states of WIPO was held under the Chairmanship of Dr. R. A. Mashelkar (Director General CSIR). SCIT strategic plan for 21st century, Para 8.2 reads "Creation of Knowledge Databases including Traditional Knowledge: The SCIT recognizes the concern by WIPO Member States regarding the granting of intellectual property rights due to a lack of traditional knowledge being documented in the public domain. The SCIT will take the initiative by including activities in its work program to support WIPO Member States, in particular developing countries in their creation of databases in the area of traditional knowledge available in public domain so that *prior art* gets established"

The Approach Paper on establishing Traditional Knowledge Digital Library (TKDL) was prepared by Mr. V. K. Gupta, the then Senior Technical Director, National Informatics Centre (NIC), Ministry of Information Technology at the request of the then Secretary, Mrs. Shailaja Chandra, Department of ISM&H in October, 1999 and submitted to Department of Indian Systems of Medicine & Homoeopathy (ISM&H), Ministry of Health & Family Welfare.

The Approach Paper was sent by Dr.R.A.Mashelkar to SCIT on behalf of India in Dec.'99 to Standing Committee on Information Technology, WIPO-4th Plenary Session at Geneva. In the discussions at Geneva by 170 member states of WIPO, SCIT agreed to the India's approach.

Mr. Robert Saifer, Director, International Liaison Staff, US Patent and Trademark Office suggested in August 1999 "We should, however, address the need of creating more easily accessible non-patent literature databases that deal with traditional knowledge. Perhaps an office amongst the developing countries should suggest this as a project for the SCIT Working Group on Standards and Documentation, working in close cooperation with the International Patent Classification (IPC) Committee of Experts. With the help of the developing countries, traditional knowledge can be documented, captured electronically, and placed in the appropriate classification within the IPC so that it can be more easily searched and retrieved. This would help prevent the patenting of turmeric, as well as *karela, jamun*, brinjal and other traditionally used remedies."

TKDL Task Force was established in January, 2000 after the interdepartmental meeting attended by Secretaries of Department of Industrial Policy & Promotions (DIPP), Department of Indian Systems of Medicine & Homoeopathy (D/o ISM&H) and Department of Scientific & Industrial Research (DSIR). Task Force was constituted under the chairmanship of Mr.V.K.Gupta, the then Senior Technical Director, NIC with the following membership: Council of Scientific and Industrial Research, NIC, Patent Office, Ayurveda Experts, Central Council of Research in Ayurveda and Siddha, and D/o ISM&H.

Mr. V.K.Gupta, the then Senior Technical Director, NIC, submitted TKDL Report along with Traditional Knowledge Resource Classification (TKRC) to the Govt. of India May, 2000.

In the WIPO Panel Discussion in May 2000 a document was prepared by Dr. R.A Mashelkar, DG, CSIR in which he suggested that the domain name www.tkd.com may be taken up by WIPO as the global repository of traditional knowledge. Each country, in turn, may pre-fix the name of their country to the global traditional knowledge library documentation, for example, www.india.tkd.com. Once the National Traditional Knowledge Digital Libraries get created, they may get included in the official list of international search authorities (ISA) relating to non-patent literature. Presently, there are 135 non-patent technical journals, periodical literature in the non-patent lists of ISA. Once the traditional knowledge digital library by various member states gets created and integrated with www.tkd.com. It will be useful for the IP offices to take a review of the patents granted in traditional knowledge systems for non-original inventions. Revocation of such patents by IP Offices will go a long way in addressing the emotive concerns of the developing world on the issue of IPR based on indigenous knowledge.

Government (CCEA) approval to the TKDL project was given in January, 2001 and this was piloted by Mrs.Shailaja Chandra, the then Secretary. D/o ISM&H. The then Hon'ble Finance Minister mentioned this project in his budget speech on 28th February, 2001. He said: "We are establishing a Traditional Knowledge Digital Library to bring the knowledge in the public domain in international languages to prevent the grant of patents".

At the 30th Meeting of the International Patent Classification (IPC) Union at Geneva in February, 2001 a presentation on TKRC & TKDL was made by Mr. V.K. Gupta the then Director, National Institute of Science Communication (NISCOM). Consequent to that a specialized Task Force was constituted by WIPO to address the need for enhancement and also to look into the possibilities of integration/linking with TKRC developed by India to IPC.

TKDL software requirement, specification and software design was developed by Mr. V.K. Gupta, Director NISCOM and Chairman TKDL Task Force in July 2001.

Memorandum of Understanding (MoU) between National Institute of Science Communication (NISCOM) and Department of ISM&H for implementing TKDL was signed by Mr. V. K. Gupta, Director, NISCOM and Mr. L. Prasad, JS, D/O ISM&H on June 6th, 2001. NISCOM shall be the implementing agency whereas ISM&H shall be the Project sponsors.

Assembly of Formulation Transcription Team by recruiting for the project duration started in October, 2001 with a part team of 12 Ayurveda Experts and 4 scientists were in place and work on transcription of Sanskrit Slokas into TKRC was initiated. The complete team consisting of 29 Ayurveda Experts, 5 IT Specialists, 2 Patent Examiners, 4 scientists and 3 Technical Officers were in place January, 2002. Ayurvedic experts are either Doctor of Medicine (Ayurveda)/Master of Surgery (Ayurveda) or Bachelor of Ayurvedic Medicine.

Mr. V.K. Gupta made a detailed presentation on TKDL and TKRC at IPC Union in Dec.2001/January, 2002. The material accumulated and studied by the Task Force and various proposals made by the Task Force members would lead to the conclusion that the most efficient way of developing classification tools for traditional knowledge would be their integration into the IPC on the basis of its revision, in particular in the area of traditional medicine. The material for such revision could be

provided by TKRC and other classification systems for traditional knowledge available in various countries, for example, in China and the United States of America.

The Committee of Experts in the 31st meeting of IPC Union held at Geneva noted that the IPC, representing the worldwide system for classifying patent information, could also be successively applied for classifying non-patent documentation, such as traditional knowledge documentation. However, only a few entries in the IPC were available for classifying this subject matter, and substantial revision of the Classification could be required in this regard, including creation of a new subclass covering traditional knowledge subject matter. The Committee instructed the Task Force, accordingly, to continue its work and to start preparation of an IPC revision proposal with regard to classification of traditional knowledge documentation. The Committee indicated that, in view of the urgency of the matter, it would be highly desirable that the revision results were available already in the next edition of the IPC and requested the Task Force to prepare the draft revision and to submit it for consideration to the Revision Working Group by the end of 2002. In sequel to above India has attempted to consolidate all possible information on traditional knowledge under one Subclass under A61 followed by Main Groups and Subgroups. For providing a universal and long term solution to address the concerns of TK holders, India has followed Whittaker's (1978) classification system, since now it is universally accepted that bacteria, algae, fungi and plants belong to different Kingdoms of life. For the detailed classification of flowering plants, the phylogenetic system proposed by Cronquist (1999) has been considered. India has worked out the classification in detail in view of the fact that it provides an opportunity for integration of plants used across the world in traditional knowledge.

The Task Force has recognised the need of having more detailed level of classifications relating to medicinal plants and has prepared its draft recommendations according to which there are possibilities of getting 250 sub-groups included in IPC instead of single sub-group on medicinal plants. Also the Task Force has recommended linking of TKRC developed by India with IPC. This is likely to have significant impact on the system of search and examination while granting patents in the area of traditional knowledge whereby the possibilities of grant of wrong TK patents shall get significantly reduced.

The Committee of Experts also requested the Task Force to consider, at a later stage, how the future revised IPC could be linked to traditional knowledge resources classifications which may be developed in various countries, and how to best organize access to traditional knowledge documentation which was in public domain.

With respect to the knowledge based conversion capability of software in to multiple languages, Mr. Robert Saifer, Director, International Liaison Staff, US Patent and Trademark Office comments during the presentation at Geneva are reproduced below "Indian Software innovation on TKDL is a path breaking initiative, which may lead to several software patents under Business Process Innovation".

The initiation of the TKDL project was launched by Dr. C. P. Thakur, the then Hon'ble Minister of Health & Family Welfare on March 26th, 2002 in NISCAIR (erstwhile NISCOM).

For accessing of the TKDL database the Government has set up an Inter-Ministerial Access Policy Issue Committee. The first meeting of the Committee was held on 20th December, 2002. The major decisions that were taken include providing TKDL to Patent Offices throughout the world under non-

disclosure agreement. However, initially a CD containing 4,000 formulations will be sent to Patent Offices. Regarding access to TKDL information by persons other than Patent Offices, it was suggested that a two-day workshop may be organized and different stakeholders may be invited to attend the workshop to formulate guidelines on accessing TKDL information. It was also suggested that since TKDL is an original work, it could be protected under Copyright Law. TKDL, may therefore, be registered for copyright protection jointly by NISCAIR and D/o ISM&H with credits to DIPP.

At the WIPO Asia-Pacific Seminar on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore held at Kochi, Kerala from 11th to 13th November, 2002, Director, NISCAIR gave a presentation on maiden effort of documentation of traditional knowledge by India i.e., the TKDL. Director NISCAIR also presented the recommendations of the workshop on technical specifications and standards of TK databases and registries, technological standards, security standards, etc. to the delegates.

At the Fourth Session of Inter Governmental Committee Meeting on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore held at Geneva during 9th to 17th December, 2002, Director, NISCAIR referred to the Asian Group position regarding using TK databases for defensive purposes and the technical proposal submitted by the Asian Group on setting up TK databases and registries as the conclusion of the Kochi Regional Seminar held during November, 2002. However, a need for evolving consensus on making available like initiatives under non-disclosure agreement to patent offices was identified. Indian delegation supported the establishment of international framework on TK rights for public domain TK and undisclosed TK through the sui-generis mechanism.

Appendix 5

People's Biodiversity Register

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The Biological Diversity Act visualizes a system of decentralized management of biodiversity at the level of Panchayati Raj institutions, namely, Gram, Taluk and Zilla Panchayats, as well as Municipalities and City Corporations. The *Biodiversity Management Committees* (BMC) functioning at the level of these local bodies would complement the activities of the Karnataka Biodiversity Board and the National Biodiversity Authority. These BMCs will prepare local level databases in the form of *People's Biodiversity Registers* (PBR) to support their own activities, as well as to feed into the State and National level Biodiversity Information Systems. The PBRs are expected to include information on availability, historical trends, uses and management of local natural resources with special reference to biodiversity resources, an inventory of local knowledgeable individuals and of knowledge associated with biodiversity, in particular, traditional knowledge and grass-roots innovations of local community members. The PBR documentation will also consider domesticated diversity including agricultural and horticultural crops, livestock and other domesticated animals, and cultured fish and shellfish.

The PBRs will serve to promote (a) good management of biodiversity resources, including conservation (along with designation of heritage sites and locally threatened species), prudent regulation of access (together with levying of collection charges) and sustainable use, control of undesirable elements such as pests and vectors of diseases in an environment friendly fashion, local level value addition accompanied by equitable sharing of benefits, and (b) long term conservation of and protection of intellectual property rights over biodiversity related knowledge, generation of wealth based on such knowledge and equitable sharing of resultant benefits. PBRs would play an important role in resolving disputes over: [1] rights of local communities over natural resources vis-a-vis neighbors, nomadic communities, government agencies, or [2] rights of nomadic communities over natural resources vis-a-vis resident local communities, government agencies, [3] claims over rewards, [4] benefit sharing claims. Several of these functions overlap with a number of other on-going activities related to planning for management of natural resources at the decentralized level. Such activities include micro-planning for management of village forests and watershed planning. Proper links should be established to these processes in organizing the preparation of PBRs.

The PBRs will constitute continually up-dated databases, not just one-time printed documents. They will primarily be in Kannada, and where appropriate include an English language version to facilitate links at the national level. They will be generated through a broad-based process led by the local community, and supported by appropriate technical and administrative inputs. The local educational institutions, in particular High Schools and Colleges along with Eco-clubs, National Green Corps and other relevant programmes may play a significant supportive role in this context serving to generate

and compile a part of the relevant information, especially information pertinent to the status and dynamics of biodiversity resources, by preparing *School Biodiversity Registers*. These inputs may be complemented by compilation of information relating to management and intellectual property rights issues by Community Based Organizations such as Yuvak Mandalis, Mahila Mandalis, Self-help Groups, Village Forest Committees and Co-operative Societies.

PBRs will include two components: {a} public database and {b} confidential database. The confidential database will include elements such as knowledge of uses of medicinal plants that people may wish to make available only under certain special circumstances. For this purpose, people will be invited to submit their special knowledge, if they wish to do so voluntarily on a confidential basis, in sealed envelopes, accompanied by a synopsis indicating the contents of such confidential knowledge, and a statement of conditions under which more details may be made available. Other information and knowledge in public domain and the synopsis of confidential knowledge will be included in the PBR after scrutiny by and approval of the Gram Sabha. One copy of the confidential knowledge maintained in a sealed envelope will be deposited in a safe with an appropriate Government repository such as an Office of the Sub-Registrar. Details of the confidential knowledge would be made a part of the People's Knowledge Data Base maintained on a confidential basis at National Innovation Foundation (NIF) Ahmedabad after signing of a Memorandum of Agreement between the knowledge holder/s and NIF. NIF is an institution established by the Government of India for the express purpose of recognizing, respecting and rewarding innovations and outstanding traditional knowledge at the grassroots.

PBRs will thus comprise periodically updated databases, which may even include elements such as folk songs and paintings or a seed bank. The computerized, publicly accessible components of PBR's may be based in computers at all Panchayats and Municipalities with servers located at district level. The public components of these local databases would be linked to the district, Karnataka state and national level **Biodiversity Information Systems** ensuring free lateral as well as upwards and downwards flows of information in all directions. Various kinds of reports, as desired, may be generated on the basis of each local database, incorporating as appropriate information derived from the overall Biodiversity Information System.

The PBRs will have certain common components, along with other special components, which may include elements such as local folk arts, tailored to suit local conditions. The schedules listed below are part of the common components and will constitute the basic building blocks of a properly designed relational database. The two major agencies for compilation of PBR data, students or CBOs have been indicated in brackets against the various elements. In all cases the data compilers would actively work with and be guided by community members, especially individuals knowledgeable about local biodiversity resources.

Module 1: Background

- Schedule 1: Background information [Students/ CBO]
 - Maps: Maps drawn on ground or simple sketch maps
 - Prevalent land classification system. This may include different classes of (i) forest land such as reserve forest, minor forest, soppinabetta, hadi lands, lands under JFM management, (ii)

revenue lands such as gomal, gundathope, quarries etc. (iii) private lands on which cultivation, house building, industrial sheds, shops etc may be permitted

- Water-bodies (iv) Rivers, streams, lakes sea coast and any regulations regarding their ownership and use (v) Number of open and bore wells. Depth of water.
- Customary management practices such as protection to sacred groves, regulation of grazing on pastures.
- Human population
- Livestock
- Irrigated and unirrigated cultivated lands, major crops
- Significant forests produce. Quantities recorded at the Range and Divisional Forest Offices. Forest Labour Co-operative Societies and their transactions
- Significant freshwater fish productions. Auctions of ponds
- Significant estuarine and marine fish productions. Number and type of fishing craft. Fish landings at nearby fishing ports
- Mining and quarrying activities
- Sources and extent of air and water pollution
- Prevalence of water borne diseases such as gastroenteritis, or of vector-borne diseases such as malaria from Primary Health Centers
- Educational institutions
- Co-operative Societies
- Community based organizations: Youth and Ladies Clubs,
- Active NGOs

Module 2: Peoplescape

Objectives of this module include

- Assign people, resident and outsiders, who relate to the local biodiversity in a variety of different ways to major user groups (defined in relation to eco-resources) and work with members (women, men and children) from each of these user groups
- Record how people, and human institutions, both from within the study locality, and from outside, relate to the biodiversity resources of the locality and with the associated knowledge
- Identify main user groups; local and external
- Create a roster of knowledgeable individuals
- Constitute a study team with adequate participation of the various local and external user groups and of knowledgeable individuals
- Schedule 2: List of activities impacting local natural resources [Students/ CBO]
- Schedule 3: Composition and influence of Resident User Groups [Students/ CBO]
- Schedule 4: Composition and influence of External User Groups [Students/ CBO]
- Schedule 5: Composition and influence of Nomadic User Groups [Students/ CBO]
- Schedule 6: List of Knowledgeable Individuals [Students/ CBO]

Module 3: Focal issues

Objectives of this module include

- Documenting ecological/economic processes considered as being significant by local community members
- Prioritization of these ecological/ economic processes to identify the ones that should serve as the focus of the PBR exercise.
- Identification of the important components of the priority ecological/economic processes
- Schedule 7: Assessment of ecological concerns and identification of focal issues [CBO/ students]

Module 4: Earthscape

Objectives of this module include

- Documenting the setting of ecological habitats
- Habitats defined on the scale of hectares, discernible in satellite images (though these need not be necessarily used)
- Individual, relatively homogeneous patches termed as *Landscape Elements* or *Waterscape elements*
- Schedule 8: Earthscape (= Landscape/ waterscape/ farmscape/ habitation) element types and subtypes [Students/ CBO]
- Sketch map of Earthscape element types and subtypes [Students/ CBO]
- Schedule 9: Characterization and trends over time in selected Earthscape element types and subtypes [Students/ CBO]

Module 5: Lifescape

Objectives of this module include

- Recording of status, distribution, dynamics and values to people of biodiversity resources defined in terms of species (mango, wild boar), varieties (Basmati rice, Bannur sheep), higher taxonomic categories (bamboo, spider), or functional groups of species (fuel- wood, non-edible oil seeds)
- Schedule 10: Occurrence of species/ varieties/ breeds and their values to people [Students/ CBO]
- Schedule 11: Occurrence, abundance and import/export of focal species/ varieties/ breeds for entire study area [Students/ CBO]
- Schedule 12: Occurrence and abundance of focal species/ varieties/ breeds in selected earthscape elements [Students]

Module 6: Knowledge

Objectives of this module include recording of traditional knowledge as well as grass-roots innovations associated with Biodiversity in contexts of:

- Assertion of intellectual property rights:
Drugs, vegetable dyes, biocosmetics; genetic resources of domesticated plants and animals
- Promoting conservation & sustainable use
Ecology and management related knowledge and practices

- Schedule 13: Salient features of varieties of cultivated plants and breeds of domesticated animals [Students/ CBO]
- Schedule 14: Salient features of locally developed special varieties of cultivated plants and breeds of domesticated animals [Students/ CBO]
- Schedule 15: Practices of management of ecological habitats and natural populations of plant and animal species [Students/ CBO]
- Schedule 16: Innovative practices of management of ecological habitats and natural populations of plant and animal species [Students/ CBO]
- Schedule 17: Practices' of management of man-made habitats and populations of cultivated plants and of domesticated animals [Students/ CBO]
- Schedule 18: Innovative practices of management of man-made habitats and populations of cultivated plants and of domesticated animals [Students/ CBO]
- Schedule 19: Public domain knowledge of human and domesticated animal health related practices [Students/ C60]
- Schedule 20: Synopsis of confidential knowledge [C60]
- Confidential database created in collaboration with the National Innovation Foundation

Module 7: Resource management

Objectives of this module include

- Recording systems of management *of* biodiversity elements and their habitats, on-going changes, forces driving changes, gainers and losers from changes
- Identifying significant management issues
- Recording people's perceptions of desired changes, and desired management systems,
- Recording people's perceptions of management responses that are considered practicable under the present circumstances
- Schedule 21: Management issues of high priority [C60]
- Schedule 22: Earhscape elements, species/ varieties/ breeds, user groups and their activities, including conflicts of interests, pertinent to prioritized management issues [C60]
- Schedule 23: Historical experiences pertinent to prio~itized management issues [C60]
- Schedule 24: Current management practices pertinent to prioritized management issues [C60]
- Schedule 25: Ongoing Government schemes, programmes and regulations and their implications for prioritized management issues [C60]
- Schedule 26: Lessons learnt to date from experiences pertinent to prioritized management issues [C60]
- Schedule '27: Preferred patterns of management pertinent to prioritized management issues [C60]

Module 8: Management plan

Objectives of this module include

- Working out a management plan
- Monitoring experiences from implementation of management plans
- Learning from lessons of past experiences

This module should involve all community members