7. **Case Study Of The Leather Industry In Tamil Nadu**

7.1 **Background**

The bed of the River Palar, flowing through the North Arcot district of Tamil Nadu, presents a picturesque sight. The traditional laundry men dry their customers’ clothes, children play cricket and cows graze lazily—all on the riverbed. A few stray patches of water remain as the only indicators of the fact that a river once used to be in full flow here.

The river is dry with overexploitation, the groundwater is colored, saline and contaminated with the leather industry's effluents and the air is thick with the stench from the tanning process.

This is one of the strongholds of the leather industry in India. It was here, in the North Arcot district of Tamil Nadu*, that the study team decided to look for one more different context where Industrial Ecology concepts could be applied. Like the foundry cluster in Haora, the leather industry in this region was the center of a national debate due to the high levels of pollution it created. In this case as well, the Supreme Court had intervened to try and find a solution to the problem. A section of the local community was up in arms against the leather industry.

Like in Tirupur and Haora, the cluster of tanneries was a nearly homogeneous group of small industries that used similar processes. Just as in Tirupur and Haora, the study team documented a dossier on the region and the industry and attempted to understand the resource flows in the region.

*Since the period of the study, the names of the districts in Tamil Nadu have changed. The new name for the region covered by the erstwhile North Arcot District is Vellore District.*
7.2 History of the Leather Industry in Tamil Nadu

Madras (now Chennai) was one of the important trading centers during the British days in India. Hides and skins were major items of trade. Much of the export consisted of raw hides and skins. Of the 25 tanneries reported in India in the early 20th century, 14 were said to be in Chennai.

In 1973, the Dr. Seetharamiah Committee, set up by the Government of India, recommended that export of raw hides and skins should be banned and the export of semi-processed leather should be restricted. The aim was to encourage exporters to process the hides and skins and export finished products. The government accepted the recommendations, as it was keen that there be substantial value addition to the exports. This would not only improve the foreign exchange inflow, a national priority, but also provide employment to thousands of people. Issues of environment were not an important part of the agenda in India before the early 1980s. The government, partly with the help of legislation and partly with a system of incentives, banned the export of raw hides and skins and discouraged the export of semi-processed leather. This accelerated the growth of tanneries.

As Chennai was the major trading center for hides and skins as well as the little processed products that were exported, it was not surprising that the new leather processing units were founded close to the city. Some of the tanneries, were located on the outskirts of Chennai city. With the aim of shifting the industries out of the cities, and providing equitable employment opportunities to the population in the hinterland, the state government provided a wide range of incentives to the industrialists to set up industries in pre-designated backward regions of the State. One such region was the belt in the North Arcot District of Tamil Nadu, half-way between the cities of Bangalore and Chennai, which was witness to the phenomenal growth of the leather industry.

The river Palar cuts through this region and the water flow in the river was considered adequate to meet the requirements of the industry.
7.3 The Growth of the Industry

The growth of the industry was spectacular. It was also aided by the fact that many of the developed countries did not wish to dirty their hands any more with the tanning process. The tightening of the environmental legislation in the West also made India a much more attractive production center than the developed countries. Much of the growth of the industry in India was in the small-scale sector (Table 7.1). The total investment in plant and equipment of most of the industries is less than that prescribed to qualify as small-scale units (US$ 70,000 at that time). The operations are mostly manual. The government tends to be considerably more tolerant with the small-scale units in matters concerning law enforcement. Laws concerning environment protection are no exception.

Table 7.1: Leather Industries in India: Small Scale and Large Scale

<table>
<thead>
<tr>
<th>State</th>
<th>Small Scale</th>
<th>Large Scale</th>
<th>Total</th>
<th>Percentage Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tamil Nadu</td>
<td>536</td>
<td>41</td>
<td>577</td>
<td>53.3</td>
</tr>
<tr>
<td>West Bengal</td>
<td>227</td>
<td>6</td>
<td>233</td>
<td>21.5</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>140</td>
<td>7</td>
<td>147</td>
<td>13.6</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>18</td>
<td>5</td>
<td>23</td>
<td>2.1</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>27</td>
<td>3</td>
<td>30</td>
<td>2.8</td>
</tr>
<tr>
<td>Karnataka</td>
<td>15</td>
<td>1</td>
<td>16</td>
<td>1.5</td>
</tr>
<tr>
<td>Punjab</td>
<td>8</td>
<td>3</td>
<td>11</td>
<td>1.0</td>
</tr>
<tr>
<td>Other States</td>
<td>37</td>
<td>9</td>
<td>46</td>
<td>4.2</td>
</tr>
<tr>
<td>Total</td>
<td>1,008</td>
<td>75</td>
<td>1,083</td>
<td>100</td>
</tr>
</tbody>
</table>


The annual output of the tanning industry grew to 1,800 million sq. ft (162 million sq. m) of finished leathers by 1995. A considerable portion of this was exported. Table 7.2 gives the export volume of the industry.
Of the 1,083 tanneries in India, more than half, i.e. 577 (Table 7.1) are in Tamil Nadu and of the 577, Chennai City and the North Arcot district account for as many as 397 tanneries. The production in Tamil Nadu is 44% of the total all-India production. Over 66% of the total production in Tamil Nadu is from the Chennai and North Arcot regions. The data regarding the number of tanneries relates to the year 1990. Since most of the tanneries are in the small-scale sector, they are often not registered with any statutory authority. Authentic figures later than those given here were not immediately available.

Table 7.2: Export Volume of the Leather Industry in India in 1995–96

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Value US$ (Mill.)</th>
<th>Percentage Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finished Leather</td>
<td>283 mill. sq. ft</td>
<td>248.20</td>
<td>21</td>
</tr>
<tr>
<td>Leather Footwear</td>
<td>32 mill. pairs</td>
<td>220.60</td>
<td>19</td>
</tr>
<tr>
<td>Footwear Components</td>
<td>51 mill. pairs</td>
<td>162.80</td>
<td>14</td>
</tr>
<tr>
<td>Leather Goods</td>
<td>–</td>
<td>276.60</td>
<td>23</td>
</tr>
<tr>
<td>Leather Garments</td>
<td>9.4 mill. pieces</td>
<td>277.40</td>
<td>23</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>–</td>
<td><strong>1,185.60</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>


7.4 The Problem

Over the years the groundwater in the areas where the tanneries are located, has become intolerably polluted. The industry is highly water-intensive. Each tonne of hide/skin tanned requires over 40,000 liters of water. Hence even a small tannery with a capacity to process 3 to 4 tonnes a day uses up well over 100,000 liters of water a day—the daily household requirement of at least 2,500 people. The pollution control authorities have been following their routine procedures in bringing the pollution from the tanneries under control.

Table 7.3 gives the characteristics of a typical raw effluent from a tannery. Table 7.4 gives the standards prescribed.
Table 7.3: Average Tannery Raw Wastewater Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Oxygen Demand (BOD)</td>
<td>95</td>
</tr>
<tr>
<td>Total Kjeldahl (ammonia plus organic) Nitrogen (TKN)</td>
<td>17</td>
</tr>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>140</td>
</tr>
<tr>
<td>Total Chromium</td>
<td>4.3</td>
</tr>
<tr>
<td>Oils and Grease</td>
<td>19</td>
</tr>
<tr>
<td>Sulfides</td>
<td>8.5</td>
</tr>
<tr>
<td>pH</td>
<td>1.0-13</td>
</tr>
</tbody>
</table>


Table 7.4: Tolerance Limits for Effluents from the Tanning Industry in India

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Into Inland Surface Waters</th>
<th>Into Public Sewers</th>
<th>On Land for Irrigation</th>
<th>Into Marine Coastal Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Absent</td>
<td>—</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Total Dissolved Solids (mg/l)</td>
<td>2,100</td>
<td>2,100</td>
<td>2,000</td>
<td>—</td>
</tr>
<tr>
<td>Suspended Solids (mg/l)</td>
<td>100</td>
<td>600</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>BOD (mg/l)</td>
<td>30</td>
<td>350</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>pH Value</td>
<td>6.0 to 9.0</td>
<td>6.0 to 9.0</td>
<td>6.0 to 9.0</td>
<td>6.0 to 9.0</td>
</tr>
<tr>
<td>Chlorides (mg/l)</td>
<td>1,000</td>
<td>1,000</td>
<td>600</td>
<td>—</td>
</tr>
<tr>
<td>Hexavalent Chromium (mg/l)</td>
<td>0.1</td>
<td>2.0</td>
<td>0.1</td>
<td>1.0</td>
</tr>
<tr>
<td>Total Chromium (mg/l)</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Sulfides (mg/l)</td>
<td>2.0</td>
<td>5.0</td>
<td>—</td>
<td>5.0</td>
</tr>
<tr>
<td>Sodium (%)</td>
<td>—</td>
<td>60</td>
<td>60</td>
<td>—</td>
</tr>
<tr>
<td>Chemical Oxygen Demand (mg/l)</td>
<td>250</td>
<td>—</td>
<td>—</td>
<td>250</td>
</tr>
</tbody>
</table>

The industry has been making the plea that available technology does not permit it to adhere to the legal requirement. Process economics do not allow them to treat their effluents adequately. This is particularly so as the units are very small. The investment in pollution abatement systems as a proportion of the investment in the plant is very high.

Some parts of the local community have taken the issue to court and the matter is the subject of an intense legal battle.

The industry has been using to advantage the fact that the legal processes in India are slow and it could take years before the Government can act. In the meantime, the problem persists.

### 7.4.1 The Issue of Water

The availability of water has become another worry for the industry. Earlier, the River Palar in North Arcot provided enough water for the process. Failing this, the plentiful availability of groundwater had been sufficient to meet their needs. Now, over the years, the surface water sources have dried up. The increasing population competes with the growing industry for this scarce resource. The groundwater table in most places has been going down with overexploitation. The available groundwater is polluted with effluents and highly saline.

The industry most often brings in water by truck from distant places, where the well water is still of acceptable quality. The industry can still afford the cost of transporting water, but ordinary citizens, who are often from the poor sections of society, face the brunt of the scarcity of water.

### 7.5 The Present Approach

The pollution control authorities, as well as a number of research institutions such as the Central Leather Research Institute in Chennai, have been working to develop systems and processes to help the industry to conform to the law. The United Nations Industrial Development Organisation (UNIDO) also has a special program for working on issues concerning the pollution from tanning.

As most of the tanneries are in the small-scale sector and cannot afford expensive treatment systems on their own, Central Effluent Treatment Plants (CETPs) are
being established under the aegis of the local industry association. Although this is helping to some extent, the water after treatment is still not fit for re-use by the industry or by the population. One major problem continues to be the high salinity of the water.

In addition, there is no answer as of now to the huge quantity of solid waste generated from water treatment (the quantity is estimated at 150 kilograms per tonne of hide tanned). Since the solid waste is carelessly disposed of, it finds its way into the groundwater during the seasonal rains. (For details of the leather tanning process, see Annex 7.1.)

### 7.5.1 A New Approach to the Problem

Since so many agencies had been working on solving the pollution problem, the study team found it difficult to define the kind of input that it could provide. The Central Leather Research Institute has a vast pool of expertise, which deals with every aspect of leather production and serves as a point of reference for the industry and the government. The institution has done commendable work in many aspects of pollution prevention and reduction in the leather industry. Some important contributions of the institution include a technology for recovery of chrome from the effluent and systems for minimizing the use of water in the process. Although, many laudable steps have been taken, such as the setting up of many Common Effluent Treatment Plants (CETP), a solution to the problem is still not in sight.

All the studies so far had focused on the issue of pollution from the tanneries and ways to treat it. The attempt was to use science to bring the effluent as close to the acceptable norms as possible. The quest was for the Best Available Technology. However, it was obvious that the Best Available Technology was still not good enough in any practical sense.

From the perspective of Industrial Ecology, it is not enough to just look at the end-of-pipe, but at the beginning also—to consider the resources going into the system. Without any serious study, it was obvious that the major critical resource was water. Of course, this had to be considered along with the various chemicals that go into the process.
The problem is not just the pollution from the tanneries, but whether the local community could afford to provide this valuable resource to the industry. The second aspect is whether the community could afford its freshwater resources poisoned by the effluents. Water is a serious issue affecting the lives of the population of the region and an academic exercise of how close can we get to the prescribed standards is certainly not just adequate.

If the industry were not using the water resources of the region, a major part of the problem would be solved. Hence it is logical that the industry find some other source of water and does not compete with the population for this scarce resource. Thus, any sustainable solution has to ensure that the industry does not use the water resources of the region. It also has to ensure that the industry does not pollute the water needed by the population.

7.6 A Direction to a Solution

Since dry tanning technology is far from being an immediately practical option to replace conventional tanning practices, one of the possible approaches that emerged was that the industry could draw seawater, as the state of Tamil Nadu has a long coastline. The current process parameters do not permit the use of seawater. This could be a possible direction to research for the industry.

If this is not feasible, then the industry would have to desalinate the sea water for its use and internalize the cost of desalination. Desalination of seawater is an expensive and energy intensive process. The cost of energy has to be minimized. One possibility is the use of the waste heat from a power plant. Many new thermal power plants are being planned in the state and it may be possible to use waste heat from one of the plants to desalinate water. The industry could internalize some part of the cost involved in using the waste heat for desalination, along the lines of the industrial symbiosis that has evolved in Kalundborg. The recovered salt could also be used by the leather industry or could be sold in the market.

A part of the treated effluent that is good for re-use could be recycled to the leather tanneries and the part that the industry finds unusable could be discharged into the sea (as is being done now by one of the CETPs in Chennai). If salinity is the only major issue, there should be no problem in discharging the effluent into the
sea. The power plant design could aim to include a facility for incineration of the solid waste (sludge) from water treatment.

However, for this purpose, it may be essential that the tanneries be relocated along the sea, so that costs of transporting the water could be minimized.

Hence, the following could be a possible solution.

- Re-locate all the tanneries along the coast
- Set up a power plant close to the tannery cluster
- Use the waste heat from the power plant to desalinate water
- Set up a central treatment system for the wastewater from the tanneries
- Re-use the wastewater in the power plant
- Incinerate the solid waste in the power plant

Figure 7.1 gives a schematic view of a possible sustainable system.

This is still a fairly idealistic perception. Considerable work needs to be done in ascertaining the technical and economic feasibility of the concept. However, the essence of this case study is that redefinition of a problem from the perspective of Industrial Ecology can result in a new systemic solution to a problem.

It must be mentioned that such relocation (though it may be a plausible and feasible option in India) cannot be achieved in a very short time. It involves the movement of thousands of families, their homes and their work. If such a scheme as suggested were feasible, it would provide a long-term goal to the industry planner. It is possible to develop a long-range plan (say over a decade) and create a suitable road map to achieve the goal.
FIGURE 7.1
Schematic View of a Possible Sustainable System

Sea Water → Power Plant/Desalination Plant → Tanneries → CETP → Solid Waste

Water/Salt → Tanneries

Treated Unusable Water to the Sea

Treated Water

CETP
Annex 7.1

Leather Tanning & Finishing

Tanning is the process by which animal skins are converted into leather. The skin consists of three layers: flesh, derma or corium and epidermis. The epidermal and corium layers constitute the leather making portion, consisting mainly of the protein collagen. Basically, leather is formed by the reaction of collagen fibers with tannin, chromium, alum or other tanning agents.

This note deals with the processing of cattle hides and sheep skins.

Four general processes are used in this industry: beamhouse; tanning; retan, color and fatliquor; and finishing (Figure 7.2).

Cattle Hide Tannery

The beamhouse process provides for the receiving of the hides and for the initial cleaning and preparation for the other operations. Nearly all hides as received will have been trimmed and graded, and salted or brined at the meat packing plant prior to shipment to the tannery. They are normally received and stored at the tannery in packs 1.5 to 2 meters high. The moisture content in the hides, as received, is maintained during storage.

The first step in the process is to unfold and trim each hide, and cut it in half along the backbone, the step being frequently referred to as halving or siding. The trimmings are collected for shipment to glue or other by-product manufacturing plants.

The sides (or whole hide, in some instances) are transferred to vats, drums, or hide processors for washing and soaking to restore moisture. This serves to remove dirt, salt, blood, manure and non-fibrous proteins from the skins.

The skins are next transferred to a fleshing machine, in which they are carried through rolls and across rotating spiral blades to remove any flesh still clinging. Fleshings are normally recovered and sold for rendering or conversion to glue.

The final operation is the removal of hair. This is done by chemical loosening, followed by either machine pulling or chemically dissolving of hair. Machine removal is practiced where hair is to be recovered. Removal is accomplished in vats, drums or hide processors with lime slurry. Sharpeners, such as sodium sulfide and sodium sulfhydrate, are added in varying strengths depending upon whether or not the hair is to be saved. The unhairing process is one of the principal sources of wastes in tannery operations. The effluent is treated and the solid residue is dumped.

The basic tanning is accomplished in the tanhouse process. The first step is the bating, which prepares the stock for tanning. The hides are placed in a solution of ammonia salts and enzymes in order to de-lime the skins, reduce smell, peptize fibers and remove the protein degradation products. Bating is followed by pickling, frequently done in the same containers. A brine and
Acid solution is used to bring the hides to an acid condition for subsequent tanning. This treatment also prevents precipitation of chromium salts in the chrome tanning procedure.

Nearly all hides are either chrome or vegetable tanned. In a few instances alum or other tanning materials are used. For heavy leathers such as sole, mechanical, and saddle leathers, vegetable tanning is used, in a solution containing vegetable tanners or other plant extracts.

Shoe upper leathers are usually tanned in a bath containing chrome sulfate. The tanned leather is then split to produce a grain side piece of essentially constant thickness and a flesh side layer.

The retan, color and fatliquor operations constitute the third major step. Retanning is done principally to impart different characteristics to the finished leather. Chrome, vegetable, or synthetic tanning agents may be used for this purpose. Bleaching with sodium bicarbonate and sulfuric acid commonly follows the tanning in producing sole leather. Coloring is done in the same drums as retanning, using natural dyes or synthetic products. The fatliquoring operation adds oils to the leather in order to replace the natural oils lost in the beamhouse and the tanning procedures.

After the wet processes, the hides are subject to the finishing steps such as drying, staking or tacking, and plating prior to marketing. Staking or tacking involves stretching the hide to make it more pliable and to prevent shrinkage. The plating operation "presses" the hide in order to give it a smooth surface.

**Sheep Skin Tannery**

Sheep skin tanneries generally omit the beamhouse operation but include a degreasing operation. Thus, the three major processes are the tanhouse; retan, color and fatliquor; and the finishing.

The tanhouse process includes receiving, storing, fleshing, degreasing, tanning and refleshing. After fleshing, the skins are placed in drums, washed and soaked. A solvent or detergent is then added to remove the grease, which is recovered as a by-product from those skins where the wool has been removed. Grease recovery is not normally practiced when the wool (shearlings) is still attached to the skin. The solvent is recovered and reused.

Sheep skins may be either chrome or vegetable tanned, with chrome being most frequently used. Where skins are received in a pickled condition there are no liming and bating operations. In some cases tanning is followed by refleshing.

Skins to be dyed are immersed in drums containing a dye (usually synthetic) solution. Some bleaching may be done prior to coloring of shearlings. Fatliquoring follows the dyeing, and is usually carried out in the same containers.

The finishing process following the color and fatliquor operations includes drying, skiving (removal of the skins thin surface layer), staking, carding, clipping, sanding (use of abrasives or wheels to produce a specific texture) and buffing.

FIGURE 7.2

Process Sequences and Nature of Effluents in Tanneries

TRADITIONAL KNOWLEDGE – THE CHANGING SCENARIO IN INDIA

Dr. Elizabeth Varkey, Advocate, High Court of Kerala, India.
isaacs@justice.com Tel.091 484 2318954 Mobile.091 94470 38955

Traditional Knowledge (TK) is essentially culturally oriented or culturally based, and it is integral to the cultural identity of the social group in which it operates and is preserved. “Traditional knowledge” is an open-ended way to refer to tradition-based literary, artistic or scientific works; performances; inventions; scientific discoveries; designs; marks, names and symbols; undisclosed information; and all other tradition-based innovations and creations resulting from intellectual activity. The definition of traditional knowledge used by the World Intellectual Property Office (WIPO) includes indigenous knowledge relating to categories such as agricultural knowledge, medicinal knowledge, biodiversity-related knowledge, and expressions of folklore in the form of music, dance, song, handicraft, designs, stories and artwork.

“Tradition-based” refers to knowledge systems, creations, innovations and cultural expressions which have generally been transmitted from generation to generation; are generally regarded as pertaining to a particular people or its territory; and are constantly evolving in response to a changing environment. It tends to be developed in a way that is closely related to the immediate environment in which traditional communities dwell, and to respond to the changing situation of that community. Process leading to the creation of TK may not be formally documented in the way that much scientific and technological information is recorded. The apparent non-systematic manner of creation of traditional knowledge, does not diminish its cultural value, or its value from the point of view of technical benefit.

In recent years concern has been expressed in relation to the recognition of traditional knowledge as prior art. Patents have been granted for traditional knowledge-related inventions which did not fulfill the requirements of novelty and inventive step when compared with the relevant prior art. This prior art consisted of traditional knowledge that could not be identified by the patent-granting authority during the examination of the patent application. The term “prior art” generally refers to the entire body of knowledge which is available to the public before the filing date of an application for certain industrial property titles, principally patents, utility models and industrial designs. The identification of prior art constitutes a cornerstone for the substantive examination of applications for these titles, since requirements such as novelty and inventive step are established by comparing the claimed subject matter with the relevant prior art.

For example, pharmaceutical patents were granted which had to be revoked, once the patented invention was compared with the teaching of traditional medicine which constituted relevant prior art. A well-known example is US 5,401,504 on Use of Turmeric in Wound Healing, issued March

**Turmeric- The Grandmother’s Recipe:**

Turmeric (Curcuma longa) is a plant of the ginger family yielding saffron-colored rhizomes used as a spice for flavoring Indian cooking. Its unique properties also make it an effective ingredient in medicines, cosmetics and as a color dye. As a medicine, it is traditionally used to heal wounds and rashes.

In March 1995, two expatriate Indians at the University of Mississippi Medical Centre, Jackson, (Suman K Das and Hari Har P. Cohly) were granted a US patent for turmeric to be used to heal wounds.

The Indian Council for Scientific and Industrial Research (CSIR) filed a case with the US Patent Office challenging the patent on the grounds of “prior art”, i.e. existing public knowledge. CSIR said turmeric has been used for thousands of years for healing wounds and rashes and therefore its use as a medicine was not a new invention. CSIR also presented an ancient Sanskrit text and a paper published in 1953 in the Journal of the Indian Medical Association. The US Patent Office upheld the objection and cancelled the patent. The turmeric case failed to meet the novelty criteria.

**The Case of Neem:**

The European Patent Office (EPO) revoked in its entirety Patent number 436257, which had been granted to the United States of America and the multinational corporation W.R. Grace for a fungicide derived from seeds of the Neem tree.

Following extensive testimony by expert witness, the 4-person panel judged that the claimed "invention" was lacking in "inventive step," which is a prerequisite to obtaining patent protection. One interesting twist was that the expert had personally provided samples of a neem fungicide he produced to W.R. Grace. The panel had earlier ruled that the USA/Grace neem fungicide product was lacking in "novelty," another patent criterion, and established that its properties and use were "prior art" years before the "proprietors" applied for a patent.

The broad development underlying this issue is that, as the reach of the intellectual property system in the global information society extends to new stakeholders, such as indigenous and local communities, their knowledge base, including in particular their traditional knowledge, constitutes an increasingly relevant body of prior art, the effective identification of which is of increasing importance for the functioning of the intellectual property system. Traditional knowledge documentation data constitutes an important form of non-patent literature with specific characteristics. Some of those characteristics may necessitate specialized measures for traditional knowledge data to be adequately integrated and recognized as relevant non-patent literature.
The development of new technology and the new use of traditional knowledge based products today is the major threat to the survival of many of these communities. The modern cultural industries as well as the manufacturing industries now commercially exploit the traditional knowledge based products using new technology without the permission and sharing of profits with the communities. It is possible today to bring out new products or find out new use of existing products based on traditional knowledge utilizing the technological developments in the field of biotechnology. This is proved beyond doubt particularly in the field of medicines, agriculture etc. The bio-prospecting help the scientists in the modern pharmaceutical research laboratories to get the know how to develop new products or new use of existing products. Similarly traditional designs of the articles are reproduced by the modern industries for its application in the consumer products. The development of new products or new use of existing products enable the industries to get protection for these products through the formal intellectual property laws.

Traditional knowledge is generally associated with biological resources and is invariably an intangible component of such a biological resource. Traditional knowledge has the potential of being translated into commercial benefits by providing leads/clues for development of useful practices and processes for the benefits of mankind. The valuable leads/clues provided by TK save time, money and investment of modern biotech and other industries into any research and product development. Logically, therefore, a share of such benefits should accrue to the creators and/or holders of such traditional knowledge. Some countries have specific legislation protecting this kind of knowledge while some other countries feel their existing IPR regime protect such knowledge. A regional policy has to be developed for the protection of indigenous knowledge related to biodiversity and which includes agriculture, medicinal, ecological related knowledge; and also for the protection of other traditional knowledge relating to folklore.

**Jeevani – The Miracle Drug**

“Jeevani” is a restorative, immuno-enhancing, anti-stress and anti-fatigue agent, based on the herbal medicinal plant *arogyapaacha*, used by the Kani tribals in their traditional medicine. Within the Kani tribe the customary rights to transfer and practice certain traditional medicinal knowledge are held by tribal healers, known as *Plathis*. The knowledge was divulged by three Kani tribal members to the Indian scientists who isolated 12 active compounds from *arogyapaacha*, developed the drug “Jevaani”, and filed two patent applications on the drug (and another patent based on the same plant but for different use). The technology was then licensed to the Arya Vaidya Pharmacy, Ltd., an Indian pharmaceutical manufacturer pursuing the commercialization of Ayurvedic herbal formulations. A Trust Fund was established to share the benefits arising from the commercialization of the TK-based drug “Jevaani”. The operations of the Fund with the involvement of all relevant stakeholders, as well as the sustainable harvesting of the *arogyapaacha* plant, have posed certain problems which offer lessons on the role of intellectual property rights in benefit-sharing over medicinal plant genetic resources and traditional medicinal knowledge.
The health tradition of the Kani tribes inhabiting the forests of the Western Ghat region of Kerala is quite rich. The herbal lore of this tribal community of a large number of wild plants found in the flora-rich forests of the Western Ghats holds a lot of potential for the future. Conservation of biodiversity and related knowledge systems thus has to be an important objective of any benefit-sharing system apart from the improvement of local livelihood support systems.

While the Kani informants had used the plant fruits for vitality and energy, the scientists had made the preparation by using the leaves of the plant. But the fact that the plant was being used for the same purpose for which local people used it underlined the logic of benefit-sharing. After all if the local communities had not conserved the biodiversity, the probability of scientists making any selection at all will be remote or nil. In cases where local communities provide the lead and the use of the biological resource in the TK is identical to the use of the resource claimed in the patent application, the case stands for:

- sharing intellectual property, i.e. shared inventorship,
- shared licensing agreement, and
- common benefit-sharing.

The current IPR system cannot protect traditional knowledge for three reasons. First, the current system seeks to privatize ownership and is designed to be held by individuals or corporations, whereas traditional knowledge has collective ownership. Second, this protection is time-bound, whereas traditional knowledge is held in perpetuity from generation to generation. Third, it adopts a restricted interpretation of invention which should satisfy the criteria of novelty and be capable of industrial application, whereas traditional innovation is incremental, informal and occurs over time. A sui generis, or alternative law, is therefore necessary to protect traditional knowledge.

**International Initiatives**

The Convention on Biological Diversity is the first international agreement acknowledging the role and contribution of indigenous and local communities in the conservation and sustainable use of biodiversity.

The Convention imposes general obligations relevant to the conservation, sustainable use, sharing of information on, and equitable sharing of benefits derived from biodiversity.

Each party has an obligation (subject to their particular national circumstances) to develop national legislation as far as possible and as appropriate in order to:

- respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and
- promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.

Parties to the CBD are also obliged and encouraged to:

- protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements,
- develop and use indigenous and traditional technologies, in pursuance of the objectives of this Convention.

Under the CBD, States are recognized as the owners of the natural biological resources in their territories including their genetic resources and thus have a sovereign right to exploit their natural resources and determine access. Access to genetic resources must be consistent to the parties obligation to respect, preserve and maintain traditional knowledge, innovation and practices. States have a responsibility under the CBD to facilitate access to, and benefit sharing arising from the use of biological resources and to subject all access to prior informed consent according to mutually agreed terms.

The International undertaking on Plant Genetic Resources for Food and Agriculture was the first comprehensive international agreement dealing with plant genetic resources for food and agriculture. This is a non-binding agreement.

The treaty obliges States to promote or support, as appropriate, farmers and local communities efforts to manage and conserve on-farm their plant genetic resources for food and agriculture. Part III of the treaty recognizes the enormous contribution of local and indigenous communities and farmers of all regions of the world, to the conservation and development of plant genetic resources. Contracting parties are obliged to take measures to protect and promote farmers rights including protection of traditional knowledge relevant to plant genetic resources for food and agriculture as well as the right to share in the benefits and participate in decision making. The treaty sets up a multilateral system of access and benefit sharing.

The TRIPS Agreement also has some provisions having limited application to the protection of traditional knowledge. The obligation to protect geographical indications can be used to protect traditional knowledge if associated with the indication used for production and sale of goods. It is made clear that a given quality, reputation or other characteristics of the goods essentially attributable to its geographical origin are to be considered in identifying the geographical indications for protection. Thus it may be possible for protection through geographical indication the traditional knowledge associated with goods.

Thus it is clear that there is a general agreement within the international community that there is a
need to recognize the traditional knowledge. It is also evident that wherever possible it must be
identified with the community and treat them as the holders of such knowledge if it is confined to
the community. It is the notion of collective enjoyment of property by the members of the
community that is reflected in these norms. The concern is to recognize it, take measures to ensure
that communities are involved in the preservation and development of it and proper benefits return
to them in case of commercial exploitation by others. But the method of achieving it is left to
individual nations. But there are no uniform norms regarding the protection of different types of
traditional knowledge owned by local communities. The reasons being that the international
community never had an occasion to look at the protection of traditional knowledge in its entirety.

The Trade Related Aspects of Intellectual Property Rights Agreement requires as a general rule that
patents be granted in all areas of technology without discrimination.

Article 27.3(b) provides a limited exception to the general rule on scope of patentable subject matter

- WTO members do not have to, but may, provide protection for plant and animal inventions
  and for biological processes for producing plants and animals

- Members must provide patent protection for micro-organisms and non biological and
  microbiological processes

- Members must also provide some form of protection for new plant varieties (patents, a sui
  generis system such as plant breeders rights or a combination of both)

The WTO Council for TRIPS is currently revising Article 27.3 (b) of the TRIPS Agreement, which
deals with the patentability of traditional knowledge. The 2001 Doha Declaration of the Fourth WTO
Ministerial Conference says that work in the TRIPS Council on these reviews should examine the
relationship between the TRIPS agreement and the UN Convention on Biodiversity; the protection of
traditional knowledge and folklore; and other relevant new developments.

Convention 169 of the International Labour Organization recognizes and protects the social, cultural,
religious and spiritual values and practices of indigenous and tribal peoples. Article 4 provides for
special measures to be adopted as appropriate for safeguarding the persons, institutions, property,
labour, cultures and environment of the peoples concerned. Article 8 states the need for the
recognition of customary law systems.

A sui generis legislation has to be developed for the purpose similar to those provided for under the
WTO/TRIPS Agreement Article 27 (3) (b). The core IP issues can be protected by the WIPO treaties
and the TRIPS Agreement.

**Attempts at Protection of TK in India**

Recently amended patent law of India contains provisions for mandatory disclosure of source and
geographical origin of the biological material used in the invention while applying for patents in India. Provisions have also been incorporated to include non-disclosure or wrongful disclosure of the same as grounds for opposition and for revocation of the patents, if granted. To protect traditional knowledge from being patented, provisions have also been incorporated in the law to include anticipation of invention by available local knowledge, including oral knowledge, as one of the grounds for opposition as also for revocation of patent. In order to further strengthen these provisions, a new provision has been added to exclude innovations which are basically traditional knowledge or aggregation or duplication of known properties of traditionally known component or components from being patented.

India is a party to the Convention on Biological Diversity (CBD), which came into force in December 1993. The CBD offers opportunities to India to realize the benefit of these resources. India has already enacted an Act to provide for protection of biological diversity, sustainable use of its components and equitable benefit sharing arising out of the use of the biological resources. It addresses the basic concerns of access to, collection and utilization of biological resources and knowledge by foreigners and sharing of benefits arising out of such access. The legislation also provides for a National Authority, which will grant approvals for access, subject to conditions, which ensure equitable sharing of benefits. The main intent of this legislation is to protect India’s biodiversity and associated knowledge against their use by individuals/organization without sharing the benefits arising out of such use and also to check bio-piracy. The legislation provides for a federal management structure with the National Biodiversity Authority (NBA) at the apex and Biodiversity Management Committees (BMCs) at local community level. The BMC and the NBA is required to consult BMC in decisions relating to the use of biological resources/related knowledge within their jurisdiction. The legislation also provides for promotion of conservation, sustainable use and documentation of biodiversity. Prior approval of NBA would be required for applying for any form of IPR within or outside India for an invention based on research or information on biological resource obtained from India.

The Indian legislation for the Protection of Plant Varieties and Farmer’s Right Act 2001 also acknowledge that the conservation, exploration, collection, characterization, evaluation of plant genetic resources for food and agriculture are essential to meet the goals of nation food and nutritional security as also for sustainable development of agriculture for the present and future generations. It also acknowledges that the plant genetic resources for food and agriculture are the raw material indispensable for crop genetic improvement. The concept of effective benefit sharing arrangement between the provider and the recipient of the plant genetic resources forms an integral part of our Act. The amount of benefit sharing will be based on the extent and nature of the use of genetic material of the claimant in the development of the variety and also the commercial use and sale in the market of the variety. To make this meaningful, mandatory disclosure of the geographical location from where the genetic material has been taken and information relating to the contribution, if any, of the farming community involving such variety, has been made. The protection provided to a plant variety bred by a breeder can be cancelled if there is an omission or wrongful disclosure of
such information.

The Geographical Indication of Goods (Registration and Protection) Act, 1999 passed by Parliament is another step taken by India. The Act primarily intends to protect the valuable geographical indications of our country. The protection under the Act is available only to the geographical indication registered under the Act and to the authorized users. The Act permits any association of persons or producers or any organization or authority established by law representing the interest of the producer of goods to register a geographical indication. It may be possible for the holders of the traditional knowledge in goods produced and sold using geographical indication can register and protect their traditional knowledge under this law.

Various suggestions have been advanced in India to extend protection to knowledge, innovations and practices. These include: (i) documentation of TK; (ii) registration and innovations patent system; and (iii) development of a *sui generis* system. It is sometimes believed that proper documentation of associated TK could help in checking bio-piracy. Documentation could be a double-edged sword. It is assumed that if the material/knowledge is documented, it can be made available to patent examiners the world over so that prior art in the case of inventions based on such materials/knowledge are readily available to them. It is also hoped that such documentation would facilitate tracing of indigenous communities with whom benefits of commercialization of such materials/knowledge has to be shared.

Documentation has one clear benefit. It would check patent based on TK in the public domain that are today difficult to prevent due to lack of availability on information with patent examiners. In pursuance thereof, we have documented Traditional Knowledge in the form of a digital library.

Documentation of traditional knowledge is also acknowledged as a means of giving due recognition to the traditional knowledge holders. This particular aspect of documenting formulations in the Ayurvedic system of medicine in India in the shape of Traditional Knowledge Digital Library (TKDL) is already on. The scope of the TKDL work relates to the transcription of 35,000 formulations used in Ayurvedic system of medicines. These details are being converted into Patent Application Format and will include description, method on the preparation, claim and the usage of the bibliography. The retrieval will be based on the Traditional Knowledge Resource Classification (TKRC) and International Patent Classification (IPC). The original Sanskrit text is translated and presented in French, German, English, Japanese, Spanish and Hindi through unit code technology that is language independent. The total number of pages in each language will be 1, 40,000. The local names of plants are converted into botanical names and Ayurvedic descriptions of diseases into modern medical terminology. The TKDL will eventually cover other indigenous system like Unani, Siddha, Naturopathy, folklore etc. The documentation of such traditional knowledge in a digitized format would, it is hoped prevent patenting of knowledge which is already in the public domain. Work on such libraries is also being pursued in WIPO where a specialized Task Force including representatives from China, India, the USPTO, and the EPO are examining how such
libraries can be integrated into the existing search tools used by patent offices.

Also in India, preparation of village-wise Community Biodiversity Registers (CBRs) for documenting all knowledge, innovations and practices has been undertaken in a few States.

With all these efforts some experts still suggest that a *sui generis* system separate from the existing IPR system should be designed to protect the traditional knowledge of the local and indigenous communities of India. However, the parameters, elements and modalities of a *sui generis* system are still being worked out.

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