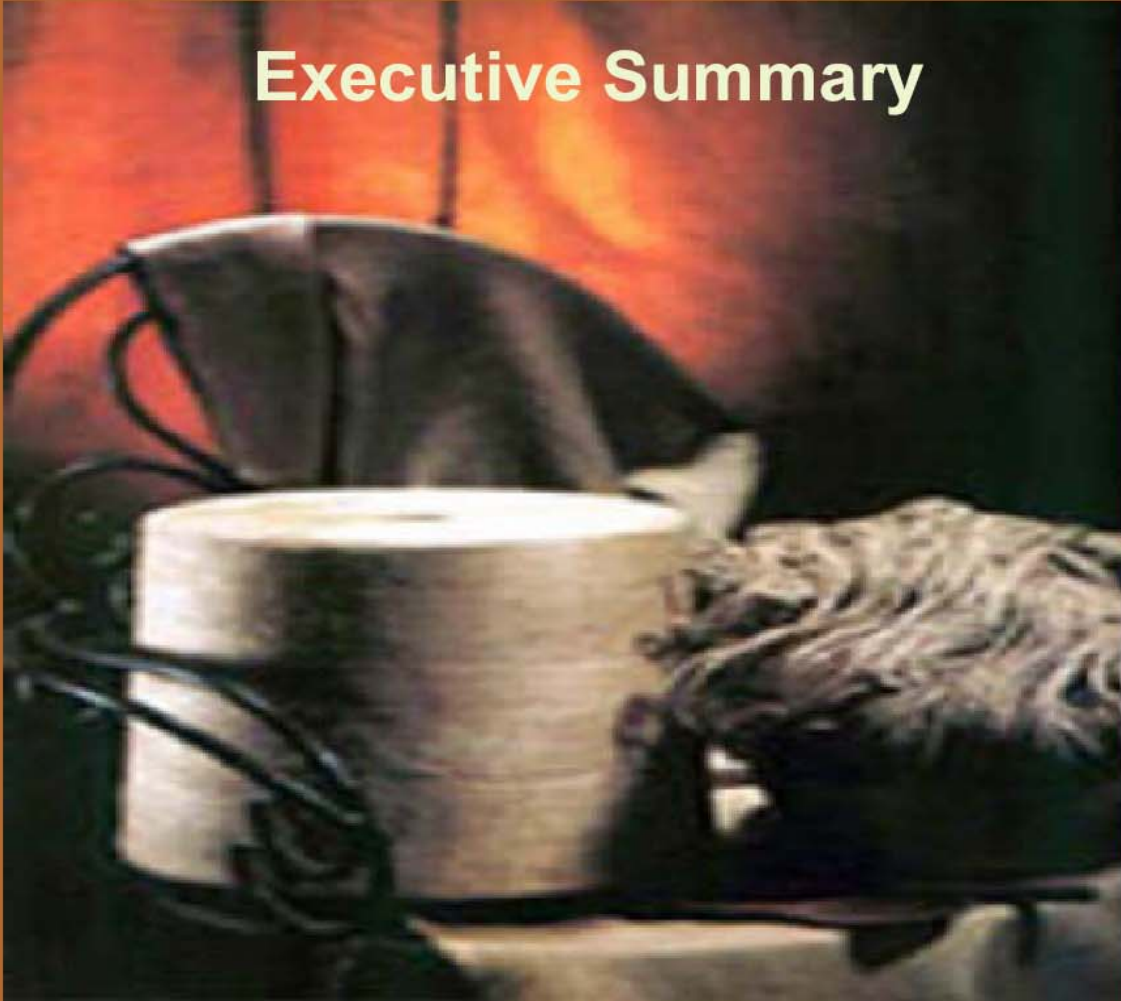


# Life Cycle Assessment of Jute With A View to Develop Ecolabel Protocol

## Executive Summary



for  
Jute Manufactures Development Council,  
A Government of India Statutory Body,  
Ministry of Textiles

**June 2007**

*PRICEWATERHOUSECOOPERS* 

# Executive Summary

Jute Manufactures Development Council (JMDC) had retained PricewaterhouseCoopers Pvt. Ltd. (PwC) to conduct a Life Cycle Assessment based study leading to the development of an Ecolabelling protocol and a Disposal Protocol for selected Jute products. PwC completed the study and submitted the final report on 31<sup>st</sup> May, 2006 followed by a final presentation on 2<sup>nd</sup> August, 2006. Further to this, as requested by the then Secretary JMDC, Mr. R.K. Pathak and other delegates present during the presentation on the final report on 2<sup>nd</sup> of August, 2006, we had also submitted a document outlining the next steps in order to maximize the future benefit of the jute ecolabel study targeted to the exporting jute mills in India.

As requested by JMDC we submit this document to provide a perspective of the study that has been undertaken and how the benefits can be harnessed.

The purpose of the entire jute ecolabel study was two fold:

- Developing of ecolabel protocol in order to bring out the environmental benefits of the jute products and therefore positioning jute against the competing products in the export market
- Developing of disposal protocol in order to inform the consumer about the end of the life benefits of jute products and addressing all legal obligations which are of particular interest to the export market

## How Ecolabelling of Product refers to Life Cycle Assessment study? A brief understanding:

Ecolabels are used on products and packaging to provide consumers with information about a product's environmental performance. This is based on *ISO 14020 "Environmental labels and declarations – general principles"*. This document sets out the basic rationale and foundation for the three categories of certifiable labelling standards as follows :

- Type I – Stamp of approval label: ISO 14024 Environmental labels and declarations – Environmental labelling Type I - Guiding principles and procedures

- Type II – Self declaration label: ISO 14021 Environmental labels and declarations – Self-declarations environmental claims
- Type III – report card label: ISO 14025 Environmental labels and declarations – Environmental labelling Type III - Guiding principles and procedures

A comparative analysis of the three types of the ecolabel has been carried out.

	Type I	Type II	Type III
Criteria	Multiple	Single	Multiple
Life Cycle Consideration	Yes	No	Yes
Selectivity	Yes	No	No
Third Party Verification/ Certification	Yes	No	Yes

To achieve the goal or objective of JMDC, Type I ecolabel was recommended by the industry representatives.

Ecolabelling in jute is intended to stimulate environmental design across the life cycle, from cradle to grave, in keeping with emerging buyer requirements, to provide information to consumers to enable them to select products that are the least harmful to the environment and also to address the end-of life issues.

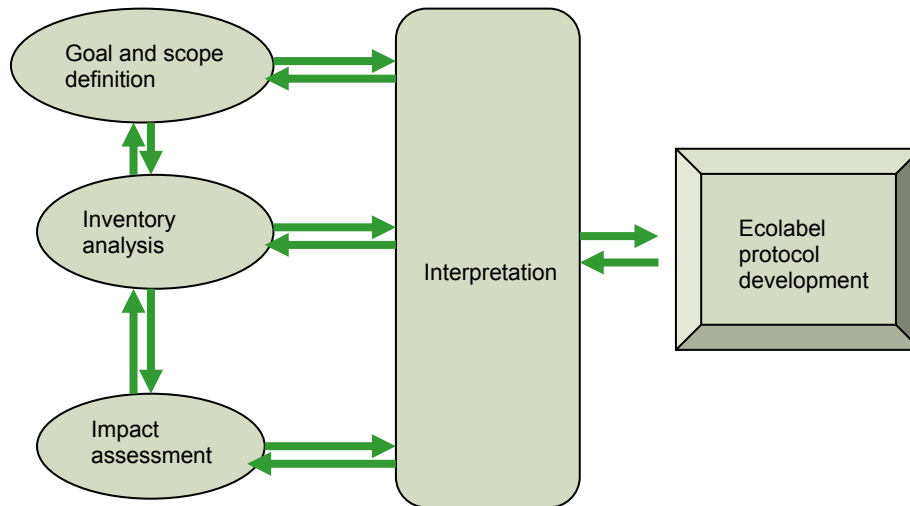
Development of Ecolabelling protocol for Jute Industry was guided by the International Environmental Labelling Standard ISO 14024 and based on

- Life Cycle considerations
- Stakeholder preferences
- Legislative requirements

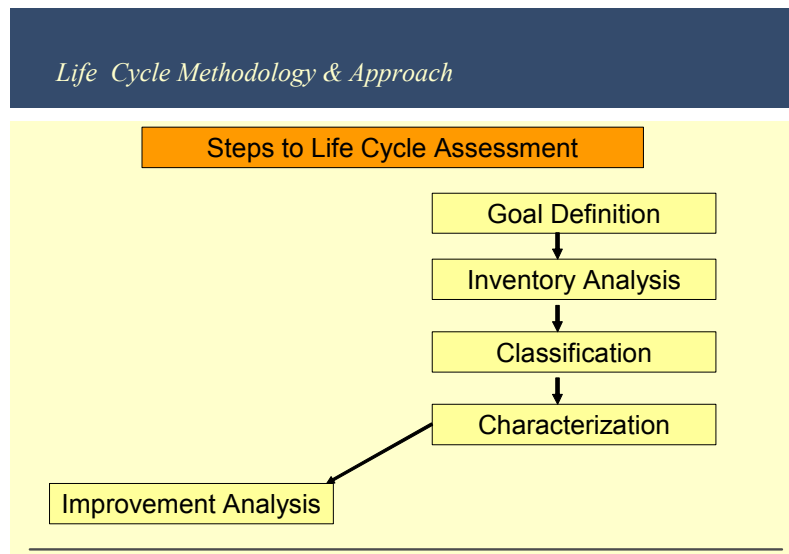
The approach taken to emerge with ecolabelling criteria were in line with the following parameters:

- product criteria
- data management practices
- process types
- markets
  - Buyer preferences
  - Disposal protocol / regulations

As depicted in the following diagram, the Life Cycle Assessment has been carried out as required for Type I Ecolabels in order to select the relevant criteria for Jute ecolabel that would be appreciated by European and American buyers.



The following schematic diagram has been drawn to indicate the life cycle methodology and approach.



Cut-off criteria has been delineated in the scope of the project for the selection of materials and processes to be included in the system boundaries in line with ISO LCA

standard 14040 and the guideline by the Society of Environmental Toxicology and Chemistry (SETAC). The scope covered by this study was as follows:

- Delineation of major unit processes and their main sub-unit processes for preparation
- Life Cycle Inventory Delineation of material inputs, outputs for each sub-unit process including consumption of natural resources, chemicals, releases to air, water and soil, etc.
- Quantification of each input and output
- Modeling of system into TEAM and feeding of data into modeled system
- Consistency check of model to ensure material balance at each stage for each input/output
- Life Cycle Inventory Analysis
- Life Cycle Impact Analysis
- Life Cycle Interpretation
- Improvement Analysis

### **Development of Ecolabel Protocol for Selected Jute Products: the structure of the study:**

As mentioned, the jute ecolabel is developed as a Type I ecolabel that followed the ISO 14024:1999 standard: "Environmental labels and declarations - Type I Environmental Labelling – Principles and procedures". The criteria are based on evaluation of the environmental impacts during the product's life cycle. The life cycle assessment of the product was done according to the requirement of ISO 14024 standards, broadly on the basis of the standard ISO 14040; "Environmental management - Life cycle assessment - Principles and framework". Based on the outputs of this study, literature review, stakeholder consultation inputs, ecolabel criteria were developed to address possible environmental adverse impacts across the life cycle and maximize environmental benefits of jute.

The product groups have been selected by JMDC members, through stakeholder consultations. Jute Ecolabel criteria have been designed for six selected jute products viz. jute Yarn, Hessian, Hydrocarbon free quality jute Hessian or Sacking, Jute Geotextile (JGT), Floor Covering and Jute Shopping bag.

The Ecolabel criteria document has been formulated as a ready reference for jute manufacturers, exporters and the stakeholders such as buyers in Europe and USA, industry associations and others. The environmental requirements to be complied with throughout the jute life cycle comprising jute growing, manufacturing, handling and storage, transportation and recycle reuse potential and the procedures to be followed for applying for an ecolabel have been delineated in the document. An application guide has also been designed. The contents page of the application package was as follows:

- Introduction
- Definition of Product Group
- Application Guide
- The Environmental Impact of Jute Products
- Environmental Performance Criteria
- Product Information
- Compliance to Environmental, Social and Safety Legislations
- Environmental and Quality Assurance
- The Institutional Modalities
- The design of the Ecolabel
- The validity of the criteria document
- Future Criteria
- Part A: Applicants are required to fill in the special form No. A
- Part B: Applicants are required to fill in the Ecolabel criteria document, as required (Please refer to the requirements stated in sections 5 and 6 of Ecolabel Criteria Document and enclose relevant supporting document)

The Environmental performance criteria have been developed based on the following parameters:

1. Fitness for purpose: Certified products should be products that meet the requirement of the buyer in their intended application. That is, the certified product must ensure that
  - a. The product meets the performance requirements of the relevant IS Standard for its intended application; or
  - b. The product meets any other internationally accepted standard if it is to be exported; or
  - c. Where appropriate, the product meets industry codes of product performance and market expectations.
2. Requirements as to fibre sources: The fibre used for the ecolabelled jute product should be sourced in such a manner that the following requirements for each applicable fibre type must be addressed.
  - a. The retting process
  - b. chemical/Pesticide residue content
3. Requirements as to the chemical used in different stages of Manufacturing Processes of respective Jute Products with regard to the following parameters
  - a. Detergents, fabric softeners and complexing agents
  - b. Bleaching agent
  - c. Heavy Metals
  - d. The levels of ionic impurities in the dyes
  - e. Pigment and dyes
    - i. Chrome mordant Dyeing
    - ii. Metal complex dyes
    - iii. Azo dyes

- iv. Dyes that are carcinogenic, mutagenic and toxic to reproduction or are endocrine disrupters
  - v. Dyes with Risk Phrases
  - vi. Potentially sensitizing dyes
  - f. Printing chemicals
  - g. Flame retardants
  - h. Coating, laminate and membranes:
  - i. Hydrocarbon
  - j. VOC
  - k. Odour
4. Requirement as to the Wastewater discharge from wet processing: Waste water from wet-processing sites like batching and piling process, bleaching and dyeing process shall, when discharged to surface waters after treatment (whether on-site or off-site), have a COD content of less than 25 g/kg, expressed as an annual average.
  5. Requirements as to Waste minimization and management: The manufacturing process must include processes to minimize waste through recovery and reuse or reprocessing and/or use of jute waste or caddies as a fuel for steam generation. The product must be designed in such a way that it can be safely processed after use by means of the disposal protocol as annexed with the Ecolabel Criteria document and disposed (e.g. re-use, recycling/reprocessing and/or safe disposal). Manufacturers will only be responsible for providing the relevant disposal document to the consumers along with the product in order to provide information regarding disposal, but in no way will be responsible for the disposal process.
  6. Requirements as to energy and resource consumption: At least 20% of the fuel consumption for steam generation should be of renewable energy sources like jute caddies, rice husks, biomass etc. Moreover, energy usage for per unit of product manufacturing has also been specified.
  7. Other requirements, such as, Legislative requirement, as regards ecolabelled products: Following requirement have been taken care of:
    - a. Compliances to environmental Regulations:
    - b. Compliances to Labour, Anti-discrimination and Safety Regulations
    - c. Environmental and Quality Assurance

As a part of the qualifying as under environmental criteria, information on the product specification parameters are required to accompany the respective product:

1. Specification of the intended applications
2. Means of recycling/reusing and or disposal Product information

Some future criteria on Product Stewardship and Environmental footprint and life cycle assessment of the product have also been included.

The Life cycle assessment of Jute aims at identifying the environmental impacts associated with the growing, manufacturing and use of jute products right from the stage of extraction of raw materials to the final disposal, when the fibers after use in one form or the other are disposed to the environment with or without multiple use or recycle. Therefore the entire life cycle of jute has been categorized into three phases:

***Phase I: Production of raw jute; a cradle to gate approach***, comprising of the following sub-phases

- Cultivation and production of fibre
- Transportation from farm to mill

***Phase II: Processing of fibre into finished product by mills, a gate to gate approach***; processing within the mills premises, delineation of impacts of additional processing for select jute products (i.e. dyeing, leaching etc.)

***Phase III: Use and disposal of the product; a gate to grave approach***, comprising the following sub phases

- Transportation from production end to consumer end
- Use and disposal of jute products by the ultimate consumers

As mentioned earlier, the Life cycle assessment report was developed based on the basic requirements of the International standard ISO 14040. Accordingly, the report has been divided into the following sections based on the requirements of the standard:

- Goal and scope of the study
- Life cycle Inventory analysis
- Life cycle Impact assessment
- Life cycle Interpretation
- Life cycle Improvement analysis

The TEAM software has been used to analyse the inventory and to reach the life cycle interpretation. The result of interpretation has been utilized as inputs to formulate Ecolabel as well as “disposal protocol” for two European countries and the USA.

## **Development of Jute Disposal Protocol:**

In addition to the Jute Ecolabel Protocol, a Disposal Protocol for different jute products such as Jute Hessian, sacking, Food grade jute (Hessian or sacking), floor covering and shopping bag has also been designed to recommend the disposal options that are permissible from an environmental standpoint.

The disposal protocol has been developed based on the following background:

- The regulatory and other requirements for the disposal of biodegradable matter in USA and two EU countries;
- The physical and chemical properties of jute and the end products of its disposal through various methods such as incineration, land-filling, waste to energy, recycle etc.
- Different options for end of life disposal of respective jute products.
- Different alternative options for disposal permitted by regulations, and
- The disposal options those are permissible from environmental standpoint.

The economic and commercial aspects of jute disposal were beyond the scope of the assignment and were not required to be considered while recommending the disposal options. The background document to the disposal protocol describes the disposal regulations that apply for jute waste (such as jute) in two countries in Europe (Germany, the UK and France) and in the United States. All routes of disposal applicable for biodegradable packaging waste currently practiced and proposed such as: landfill disposal, incineration with energy recovery, mechanical biological treatment, recycling (including composting and anaerobic digestion) have been considered. For each country, the document delineates the current waste treatment options and its recycling and recovery objectives to comply with the regulations. A list of the existing waste recyclers in the UK has also been presented.

## **Jute Ecolabel: The Way Forward**

The ecolabel criteria developed can be used as a marketing tool to inform discerning customers in the EU and USA on the due care taken by ecolabeled mills to further reduce the environmental footprint of an already eco-friendly product. As already discussed during the presentation to the JMDC on 2nd August 2006, there would be two direct applications of this ecolabel

- Institutional marketing: Focused marketing of jute in both “lost sectors” as well as emerging sectors in EU and USA delineating ecological benefits to potential buyer groups for immediate business gains.
- Advocacy : Setting up of an ecolabel institution in India for Jute and applying for mutual recognition with other ecolabels in EU and USA for the promotion of jute and

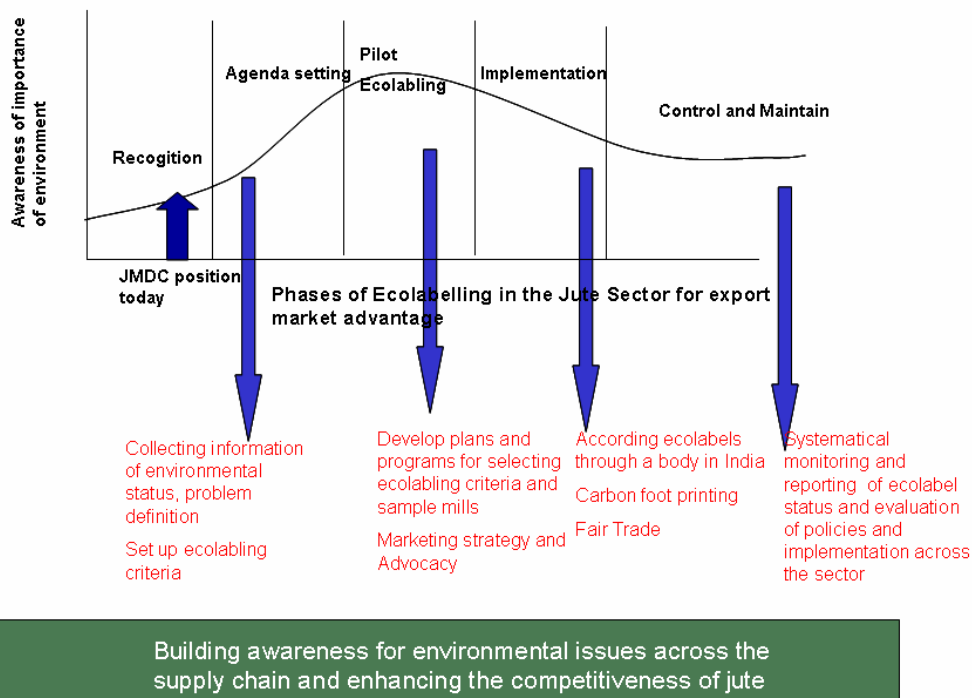
- Other : Exploring carbon foot printing and fair trade based marketing

This study will delineate in a step wise fashion the setting up of an institution for ecolabelling and for the introduction of a third-party certification system. The study will bring the experiences and methodology adopted in setting up similar institutions from other ecolabelling efforts around the world together with the various certification/labeling programs that exist particularly in the target jute markets in EU and in the USA. The roles of the ecolabelling body, government policy, and third-party ecolabelling certification bodies would be delineated.

**Jute technology mission and Ecolabel:** This study can be dovetailed with the four mini missions covering raw jute farming research, transfer of technology, fibre marketing infrastructure, diversified product and machinery development and mill modernization which has recently obtained approval from the Textile Ministry. The Ecolabel can contribute to the raw jute farming research, fibre marketing infrastructure, diversified product and mill modernization.

### Advocacy of Jute through Ecolabel

The concepts of enhanced cooperation, mutual recognition and equivalence play an important role in dealing with trade issues and also serve as a basis to expand ecolabelling worldwide. However, before designing the placement strategy for the ecolabel, it is relevant to frame the institutional modalities for establishing the ecolabelling body in India. The outline of this study envisages the following areas of activity.



The way forward should be to use the ecolabelling tool to gain market advantage.