

Sustainable development of pulp and paper industry- Indian Perspective

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ABSTRACT

Potential threat of environmental pollution has caused global awareness for concerted efforts for its abatement. The Rio conference is a testimonial to this concern of industrial pollution. Pulp & Paper industry in India is a major polluting sector and no further time should be let off for proper preventive and curative measures. Looking into the complexity of the problem the industry should chalk out short term and long term objectives for environmentally compatible sustainable development of the industry. In this regard, extensive research work needs to be carried out in the area of biotechnology which must play its key role for survival of the industry in next century.

Introduction :

The quality of life does not depend only on the material comfort of the human race - it lies in protecting and preserving the nature in its pristine form. Industrialization has brought prosperity and material comforts in many spheres of life but it has brought misery in its trail too. Environmental pollution is one and most critical one the society needs to combat for healthy living. Pulp and Paper industry is no exception to it. Industrialization thus demands properly planned programmes, in parallel path, for protection of environment. Albert Einstein said, "The concern for man and his destiny must always be chief interest of all technical efforts. Never forget it between your diagrams and equations". For many years now our industries have been polluting the environment indiscriminately as hardly few industrial units earlier had adopted proper pollution abatement and treatment strategy. Lessons of industrialized nations indicate that it is already late for Indian pulp and paper industry and no further time should be allowed to roll over. If one looks beyond 2000 AD, the picture would appear more gloomy. Environmentally unfriendly presnet production technology and raw material shortage are the two basic issues which must be addressed to, for sheer survival. It's time for policy makers to think and decide future trends of the industry in the coming years.

Today environment has become an important aspect and concerned efforts are going on through out the world to improve the environment by reduced pollution. It has become a matter of importance whether to reduce the pollution at source or at the end of the pipeline. Intensive efforts are needed to reduce the pollution at source rather than going for treatment of effluents.

Policy Options for Environmentally sound Technology ;

The emergence and acceptance of the concept of Sustainable Development in recent years has brought in the general realization than societal perception must shift towards ecological determinism so as to achieve qualitative growth within the limit of ecosystem's carrying capacity. The carrying capacity based planning process, innovative technologies for enhanced material and energy effectivity of production and consumption, structural economic change towards less resource intensive sectors, and preventive environmental management through increasingly interventionist policies are some of the strategies for reconciling developmental goals with ecological capabilities.

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The analysis of existing and future environmental issues emanating from development objectives and policies in populations, agriculture and forestry, energy industry and human settlement sectors in India reveal that the aspirational goals of sustainable development demands environmental reorientation of entire developmental process. There is need for introduction of right mix of preventive and curative approaches in environmental policy and the administrative structures and institutions need to be redesigned accordingly and the priority areas of environmental action at policy, plan and programme levels need to be tackled on an urgent basis.

Sustainable Development :

Sustainable development is a process in which the exploitation of resources, the direction of investments, the orientation of technological development and the institutional changes are all made consistent with future as well as present needs. The concept of sustainable developments has following underlying premises :

- Symbiotic relationship between consumer race and producer natural systems.
- Compatibility between ecology and economics.

The following enlarged constitutional preconditions must also be satisfied for the goals of sustainable development :

- Equity and social justice.
- Endogenous choices.
- Economic efficiency.
- Ecologic harmony.

The concept of sustainable development is closely linked to the carrying capacity of ecosystems. Accordingly, the underlying correlation between population, poverty and pollution must be analysed against the backdrop of ecosystem's capacity to provide supportive capacity for development and assimilative quality of environment. With these preconditions, following points for sustainable development ensues :

- Carrying capacity based developmental planning process.

- Preventive environmental policy including technology assessment.
- Structural change in economy.
- Environmental impact assessment.

Carrying Capacity Based Developmental Planning Process :

Developmental planning in most developing countries has been traditionally based on the concept of minimum needs in which the planning priorities and activity targets are established to meet certain basic minimum needs of poorest sections of population. This approach leads to greater inequality in the societies of developing countries as it overlooks the basic requirement of availability of resources that form building blocks in developmental process. In contrast, the developmental planning process based on regional carrying capacity takes cognisance of the fact that the environment, with its biotic and abiotic components, provides the basic resources that support production-consumption activities and assimilates the residues produced during the course of these activities.

Preventive Environmental Policy :

Preventive environmental policy is directed towards the conditions that give rise to environmental problems and anticipatory actions to readjust these conditions so as to prevent potential environmental damage. It must be recognised that preventive strategies cannot avoid future environmental damage totally, but can, at best, limit it more effectively than reactive policy. Adoption of preventive strategies does not make reactive strategies superfluous as environmental backlogs must be cleared and unforeseen problems dealt with.

Identification and implementation of environmentally sound technologies warrant evaluation of various feasible options based on economic, environmental and social considerations. While the decisions at the industry level are guided by the economic analysis of resources conserved, pollution control cost avoided, the cost incurred on new technologies; the decision at the national level must include analysis for the benefits to society, impact on environmental quality and also stock and quality of natural resource base. The methodologies for technology assessment relate to

two over-all process of conversion of raw materials into finished products, viz manufacturing process and residue/waste management

Structural economic change :

Structural change involves large scale technological substitution towards environmentally - benign technologies, such as :

- Cleaner technologies for industrial production.
- Recycle and reuse technologies for end-of-pipe treatment.
- Biotechnology for substitution of non-renewables with renewable resource base.
- Integrated technologies that minimize cross-media transfer of pollutants thus minimizing over-all pollution induced risks in all environmental components.

Structural change aims at raising the levels of both ecologic and economic efficiency by increasing material and energy effectivity in production and consumption in order to minimize the expense on environmental protection while keeping the cost of natural resource exploitation within acceptable limits.

Environmental Impact Assessment (EIA) :

EIA is potentially one of the most valuable, interdisciplinary, objective decision - making tools with respect to alternate routes for development, process technologies and project sites. It is an anticipatory mechanism which establishes quantitative values for parameters that indicate the quality of the environment and natural systems before, during and after the proposed developmental activity, thus allowing measures ensuring environmental compatibility with economic efficacy. EIA could form a major instrument for the assessment of developmental activities in the context of regional carrying capacity, provided the conceptual framework is extended to the cumulative assessment of policies, plans and projects on regional basis. EIA should ideally be undertaken at the policy and planning levels as environmental consequences of projects often arise due to higher level decisions. Policy EIA, however, is viewed as an extremely complex issue,

largely due to the fact that the potential range of alternatives to achieve a desired goal can be almost unlimited.

Environmental management in present day context warrants a dynamic policy framework in which the time lag between problem awareness, technical solution and remedial action is minimized through combination of four strategies :

- Anticipation and prevention of environmental problems that may arise as a consequence of decisions taken.
- Restoration of environmental quality whether necessary.
- Structural changes in economy, and
- Inter-policy coordination.

Indian Perspective :

Stockholm to Rio, Via Delhi, may seem like a travel agents gimmick but in the environment field it has a special meaning. The Stockholm conference on Environment took place in 1972 and concentrated mainly on the micro-environmental problems, the national picture. The Rio Conference of 1992 is devoted to macro-environment, the global picture. The perspective has much enlarged in 20 years from the National to Global level. Somewhere in between is the Delhi picture. We have still a lot to do at the micro-level and must have our feet firmly on the ground before we concentrate on global items. Delhi is trying to keep a balance between the ground realities of the Indian situation and desire to participate in the global programmes. So Stockholm to Rio via Delhi may slow one down a bit but it makes sense for countries like ours.

Structure of Indian paper industry is very complex. The size of the mills varies from 5000 tpy to 80,000 tpy and the industry has to rely on diverse cellulosic fibres. Indian Paper industry uses much more raw materials, energy, water, etc and discharges more pollutants than those in developed countries. Viewing the complexity of the problem, short term and long term objectives should be formulated. The short-term objectives should comprise :

- Economic use of cellulosic fibers by going in for high yield pulping for possible grades of papers.
- Increased usage of secondary fiber through deinking.
- Reduced water usage by closing up the backwater system.
- Appropriate process-internal measures for less generation of pollutants.
- End-of-pipe treatment of effluents.

The long term objectives should comprise :

- Organosolv pulping.
- Application of bio-technology for plantation, and storage of raw material, pulping/bleaching etc.
- Chemical and biological end-of-pipe treatment of effluent.

In order to fulfill the long term objective much work need to be carried out in the area of biotechnology. An ideal pulp and paper unit in the next century should be using bio-technology for production and chemical/biological methods for end-of-pipe treatment of effluents.

Biotechnology has aroused wide interest due to its diverse applications in various fields. Over the decades biotechnology has changed from empirical art to predictive, optimized design. It has wide application in pulp and paper industry in the areas of forest agriculture, biopulping/bleaching, production of chemical, effluent treatment with bio-energy generation.

Forest Agriculture :

Biotechnology can be helpful in boosting up the forest productivity by cloning of superior trees using tissue culture techniques, by developing trees that assimilate naturally occurring nutrients or applied fertilizer, developing trees having more resistance to diseases and pests. Growth of trees can be enhanced by increasing the rate of photosynthesis and/or improved breeding methods.

Bio-Pulping :

Microbial delignification of lignocellulosic materials by micro-organisms and their cellulose-less mutants and enzymes can be highly cost effective as these

require mild condition compared to conventional chemical and mechanical processes which are carried out at high temperature and pressure. Biopulping will help in reducing energy consumption.

Bio-Bleaching

Bleaching can be carried out by micro-organisms requiring less costly deleterious bleaching conditions. Net result of bio-bleaching is increase in brightness with same level of yield, higher viscosity, reduced effluent load; less chemical requirements and less energy requirement. Lignocellulosic wastes from pulp and paper industry can also be utilized biotechnological way for production of animal food, food extenders, soil conditioners and chemicals. Further, fibrous raw materials for papermaking undergoes decay on storage due to microbial attack, Slimes produced in the paper-making process causes damage to finished paper and corrosion of equipments. All these problems are responsible for substantial financial loss. Biotechnology and genetic engineering can be helpful in developing suitable technology for reducing above losses.

Conclusion :

Industrial pollution of environment has become a matter of great concern world over. In our country pulp and paper industry is one major polluting industry. The present environmentally unfriendly production practice and effluent treatment measures adopted by mills has been polluting the environment indiscriminately. Sustainable development measures with short-term and long-term objectives must be initiated without further delay. For fulfilling long-term objectives much R&D work is necessary especially in the area of bio-technology.

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