

## Recycling, Waste Utilisation and Energy Conservation in Seafood Processing

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The recent trends show that the seafood sector is becoming more and more competitive and rising costs of raw materials necessitate performance improvement at each processing step. Gone are the days when there was abundance of raw material, labour and energy were cheap and overall profit margins were obscenely high. As we continue to exploit the natural resources in a unsustainable way, there is scarcity of raw material. This in turn causes wide demand and supply gap and raw material prices have sky-rocketed. There is now lot of pressure on improving profit by improving the performance and reducing wastage of resources. Hitherto, thought to be non-lucrative and unnecessary, the conservation methods are now a compulsive fallout of financial squeeze caused due to high cost of inputs and increased market sensitivity.

Apart from this, the availability of labour is drastically reducing and most of the seafood factories are now employing workers from far North-East. The labour costs are going up as the economy is being globalized.

These factors will continue to affect the Food processing industry in future and it is therefore pertinent to improve efficiency of process and resource utilization. Many a times, implementing improvements is difficult in the already existing establishments due to either the space limitations or the type of process equipment already installed.

Further, most government as well as customers in world are now becoming sensitive to conservation of natural resources and are demanding certifications such as MSC which deals with the conservation of natural resource. The customers are also becoming sensitive to pollution and sustainable environment, human factors involved in process etc. There is an increasing trend towards such issues and therefore, every business, either as social crusader or as a part of its own financial viability, will be forced to undertake measures to conserve resources.

With the above in mind, it is therefore envisaged that atleast the future establishments should be able to put up cost-effective programs at the design stage itself. Wherever possible, the existing establishments should also keep exploring possibilities of process improvemnets. The broader heads under which the cost effective programs can be undertaken are :

1. Waste utilisation/reduction of wastage
2. Conservation of water
3. Conservation of electricity
4. Conservation of energy such as heat etc.
5. Quality improvement

### Waste Utilisation/Reduction of Waste

The habitual negligence continuing from the earlier times of abundance are no more valid. Every piece of flesh that is available has to be converted into value added product and every wastage or down grading of value/quality has to be arrested.

It is estimated that about 39% of total seafood resources caught are either totally rendered unfit for human consumption or are downgraded in quality and become unfit for human consumption. The seafood being highly perishable commodity, care is required for proper preservation and quick processing. The offal or parts of seafood which are unfit for human consumption can be utilized as under:

- a. Pet food
- b. Fish meal
- c. Protein concentrates
- d. Value added items such as collagen, chitin, etc
- e. Plant fertilizers

A suitable product can be chosen depending on the kind of offal available in consultation with Central Institute of Fisheries Technology.

Regarding reduction of wastage, care should be taken in various aspects as below:

1. Avoid spoilage and rejections by proper handling, icing, temperature maintenance etc. Need to use

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innovative ways rather than continuing traditional methods.

2. Avoid physical damage to product and use proper system for storing and transportation.
3. Avoid any spillages and damages from any equipment, trolleys, storing bins etc.
4. Avoid processing more than capacity.
5. Impart proper training to handlers so that care is taken at each stage.

### Conservation of Water

Water is the most important resource required in the seafood processing. Also availability of quality treated water has come down drastically with the increasing human population and the reduced precipitation. Increasing human population has also resulted in ground water contaminations. It is therefore becoming more and more critical to-

1. Reduce water usage by using innovative process. Shorter the process cycle the less water is required. For example, counter current methods similar to the ones used in ore refining should be implemented.
2. Recycle water as much as possible by-
  - a. Recycling in-process.
  - b. Recycling for gardening.
  - c. Recycling after effluent treatment for process.
3. Rain water harvesting needs to be undertaken by every factory. A certain portion of factory area should be converted into pond or rain water should be diverted into deep bore-wells to recharge ground water.
4. Avoid contamination of ground water.
5. Recovery of reusable solids from effluent reduces cost of effluent treatment thereby saving capital investment as well as energy saving.

### Conservation of Electricity

Power is another important requirement of seafood/ Aquaculture. Usually a capital item, once bought, is very difficult to be replaced and therefore it is very important to choose a correct motor size at the design stage itself. Apart from the motors, the control system is equally important. Many a times, the investors take a short cut and invest in cheap equipment to save capital cost but in long run, it actually incurs huge operational cost. Use of AC drives wherever necessary should be incorporated in the system. Use of timers and cut off mechanisms can be used to avoid wastage of power.

Regular maintenance is also must to ensure that all the

equipment is in condition to avoid any losses of power either due to overloads, worn out bearings, or worn out electrical contacts. A condition based monitoring of equipment should be undertaken to ensure that the equipment is in good condition to avoid mechanical frictional losses. Also electrical maintenance is important to ensure proper contacts and terminal condition to avoid resistive losses.

### Conservation of other Energies such as Heat

The aqua and the processing industry needs sub zero to super zero temperatures. Almost 60% of the power requirement is for refrigeration for chilling, freezing and cold storage. It is therefore necessary to minimize the cost and load by inter exchanges of heat of various equipment. For example, the chilled effluent can be used for cooling down the condenser water or even precooling incoming chilled water to get substantial benefit. Though the heat exchangers may seem expensive this is a static system with minimum wear and tear and long term benefit. The operational cost of heat exchangers is very minimal.

### Quality Improvement

As mentioned above, substantial food is either rendered totally unfit for human consumption or down graded due to improper handling and post harvest technique.

All seafood/Aqua raw material is highly perishable and also very delicate. To avoid physical damages and qualitative degradation, it is important to use innovative handling methods. Losses /damages due to long distance transportation can also be avoided by using improved handling methods. Use of salt water slurry ice is one such example to reduce physical as well as osmotic damages to raw material.

Time and temperature are important factors and speedy and effective transportation and transfer techniques should be used. Fish pumps and conveyors should be used for quick transfer.

Many factories have implemented such techniques and are benefiting hugely from implementing such effective methods. A true benefit is difficult to quantify as most private organizations will not share data due to competitive advantage over the rival organizations. Many a times, lot of time and money is invested in the trials by organisations and they will not share the data easily. However, synergies from other industries such as poultry, agriculture, meat processing etc should be identified and implemented.