A study on Environmental management practices in Rajkamal and Pace20 shrimp hatcheries P.v.t ltd at Thimmapuram near Bheemili of Visakhapatnam

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Abstract: Producing young ones from eggs are called hatcheries or producing young ones from eggs by incubation or brooding. Fish, Prawn and other products of water have always been a staple part of diets in many cultures and it is not surprising that man requires some control over this in due course of time .Aquaculture industry faces many problems like stable supply of seedlings , disease control and adequate food supply or development of suitable artificial diets. Shrimps are now cultured in many areas and significant expansion of the shrimp aquaculture industry appear likely result in acute demand for shrimp seed which mostly come through intensified systems like hatcheries. Areas like Pace 20 hatchery Pvt ltd and Rajkamal hatchery Pvt ltd are selected from Thimmapuram near Bheemili The mother prawns take from sea if 7.5g to 200g and artificially grown prawn in hatcheries only has the size of 2.5 to 30 g. Rajkamal hatcheries produce 60 million production per year where as Pace 20 hatchery produce 125million production per year. This paper explains the environmental impacts of shrimp hatcheries its problems and the steps taken by the management to eradicate the problems.

Key words: 1Introduction about the shrimp hatcheries 2 Hatchery cycle 3 Some common diseases in shrimp hatcheries, 4 Environmental problems and Environmental management practices taken by the shrimp hatcheries

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1 INTRODUCTION

Producing young ones from egg are called 'hatcheries or to produce young ones from eggs by incubation or brooding. Fish prawn and other products of water, have always been a staple part of diets in many cultures and it is not surprising that man will want some control over this in due course of time. Aquaculture can be defined as the artificial propagation & culture of aquatic organisms for a commercial purpose aquaculture started way bank in 3500 BC with the Chinese growing carb in the ponds on the silkworm farms. Aqua culture industry faces problems like stable supply of seedlings, disease control and adequate food supply or development of suitable artificial diets The government has certain restrictions on the number of young fish that can be taken from coastal waters. This restriction hampers the growth of production though the seedling can be produced by artificial fertilization in the hatchery.

Shrimp aquaculture has dramatically increased in importance as a means to supply the world's demand of shrimp. Shrimps are now cultured in many areas and significant expansion of the shrimp aquaculture industry appear like resulting in acute demand for shrimp seed which mostly come though intensified systems like hatcheries.

SHRIMP HATCHERIES

Modem shrimp farming the production of marine shrimp in impoundments, ponds, race ways and tanks, got started. in the early1970S,andtodayoverfifty countries have shrimp farms. In Ecuador and Brazil the leading producers in the western hemisphere, exporter venue surpass $200million year. In Thailand, the leader in Eastern hemisphere they have passed the billion dollar mark this year if prices had not been so low India, Indonesia China, Malaysia, Taiwan, Bangladesh, Srilanka, Philippines,Vietnam, Australia and Myanmar have shrimp farms and there are shrimp farms throughout central and South America Honduras, panama Belizeand Mexico have big industries white smaller industries exist in Coltsnbia Guatemala, Venezuela, Nilarga and Peru. The shrimp important nations like the United States, western Europe, Japan specialize in high tech "intensive (more below) shrimp farming but thus far, their production has been in significant many countries in the middle east have shrimp farms with Iran apparently the leading producer in the region.

2 HATCHERY CYCLE

The adult shrimp are captured in the wild or matured in the hatchery, they invariably spawn at night, but with photoperiod manipulation they can be induced to spawn at anytime depending on the number of variables (temperature, species, size, wild/captive and number of times previously spawned), they produce between 50,000to1000000eggsafter one day the eggs hatch into nauplii, the first larval stage nauplii looking move like tiny aquatic spiders, than shrimp feed on their egg yolk reservesor a couple of days they then metamorphise into zoeae, the second larval stage which have feathery appendages and elongated bodies, but few adult shrimp characteristics zoea feed on algae and a variety of formulated feeds for three to five days then metamorphise in to mysis, the third and [mal larval stage mysis have many of the characteristics of adult shrimp like segmented bodies, eye stalks and shrimp like tails, they feed on algae, formulated feeds and zooplankton. This stage lasts another 3 or 4 days &then mysis metamorphise into post larvae post larvae look like adult shrimp& feed on zooplankton, dentrites and commercial feeds.
Hatcheries come in 3 sizes they were .
Small scale hatcheries, ,Medium scale hatcheries and Large scale hatcheries

Small scale hatcheries

Small scale hatcheries are usually operated by a family group on a small plot of land called "mom and pop' or 'Back yard" hatcheries, they adopt a green thumb non technical approach. Their chief advantage slow construction and operating costs & the ability to open and close, depending on the season & the competition from suppliers of wild seed they utilize small tanks (less than 10 tons) and concentrate on just one phase of production like nauplii or post larvae production they often use low densities &untreated H_20. Diseases the weather & water quality problem often knock them out of production but they can quickly disinfect & restart operations .Small scale hatcheries achieved great success in South East Asia, particularly in Thailand, Taiwan, china etc.

Medium scale hatcheries

Most medium wale hatcheries are based on design developed in Japan and popularized by the Taiwanese called" Japanese/Taiwanese", "eastern" or "green water" hatcheries, they use large tanks low stocking densities, low water exchange and discourage an ecosystem growth of "bad" bacteria& encourage the growth of "good" bacteria.

Large scale hatcheries

These are multimillion dollar, high tech facilities that produce large quantities of seed stock in a controlled environment originally developed at the Galveston laboratory of the united states National marine fisheries service ,they are referred to as "Galveston", "western" or" clear water hatcheries requiring highly paid technician and scientists, they utilize big tanks(15to30tons) filtered H_2O high densities, and high rates of water exchanges, allowing them to take advantages of the economy of sale by producing seed stock through out the year. They grow algae and brine shrimp &feed them to the developing shrimp. Large swale hatcheries may also heave problem with disease and water quality and they are slow to recover from production failures in the Western Hemisphere. Big hatcheries are the established bend but large scale hatcheries can also be found in all the major shrimp farming countries.

Hatchery feed

Hatcheries utilize a combination of live feeds, such as microalgae and brine shrimp nauplii (Artemia), with one or a number of prepared diets, either purchased commercially or prepared at the hatchery. The principle algal species employed at skeletonema, chaetoceros, Tetraselmis, chlorella and Isochrysis, again dry formulated feeds are popular but they don't work on a 100% replacement basis.

3 SOME COMMON DISEASES IN SHRIMP HATCHERIES

Disease has been defined as a definite morbid process having a characteristic brain of syndrome it may affect the whole body or any of its parts, and the Etiology, Pathology and Prognosis may be known or unknown. Disease may be infections or non infections.

Bacterial diseases in shrimp

1)Lmninous Bacterial disease caused by vibrio algindytious whole causes death of the larvae It can be prevented by using UV irradiated H20or by employing series of fibration equipment and) Shell disease, brown or black spot 'blisters necrosis of appendages caused by bacteria beginning to Vibro Aeromenas, pseudomonas symptoms like appearance of brownish to black erosion the carapace. It results is cigarette but like appearance it can be prevented by maintaining good water quality.
2) Filamentous bacterial disease caused by leucothix spsresultsin showing infected eggs show a thick mat of filaments on the surface which may interfere with respiration or hatching preventive methods like maintain good H_20 quality with optimum dissolved 0_2 levels & low organic matter levels.

Fungal diseases in shrimp

1)Common name = larval Mycrosis
causative agents = Legenidium sps Halipthoros sps
Effectson-
host=heavymortality100%soonafterinfection.
Preventive method - siphon sediments & dead shrimps.
Reduce maturity density increase water circulation etc.

Protozoan diseases

Commonname = protozoaninfestation
Causative agent = vorticella and zoothamium
Effects on = morphologically protozoans may be observed attached to any external part of the shrimp.They cause locomotary and respiratory difficulties.Preventive methods = maintain good H2O qualityAvoid high organic load, heavy siltation, turbidity & low 02 levels

Nutritional toxic and environmental diseases

Common name = Black gill disease
Causative agent = chemical contaminants like cadmium copper,oil,zinc, potassium-permangnate 03, NH_3 & nitrate in H_20
Effects on host = Microscopic observation. Shows that the blackening of grills may be due to heavy deposition of black pigment at sites of heavy hemocyte activity.
Preventive Methods = Avoid over feeding change water frequently, avoid heavy metal discharges of nearby factories form getting into rearing facilities.

Infectious hypodermal & hematopoietic Necrosis
Laval stage = post larvae
Affected parts= Hypodenns & Hemopoietic organs
Symptoms = massive distruction of cuticular Hypodenns & Hemopoietic organs. Nerve cord loose connective tissues and gut serosa
Preventive methods = disease free stock has to be selected.

SHRIMP HATCHERY PRESENT STATUS IN INDIA

Shrimp (prawn) culture Industry is taking roots in India since long the fisherman in India have been following the traditional rice /shrimp rotating aquaculture system. However during the last decade the traditional system which apart from producing rice,produced140kgsofshrimpperhectareof land began to give away more intensive methods of shrimp culture which could produce thousands kilometers per hectare .A large number of private companies & multinational corporations have started investing in shrimp farms.Inthelastfewyearsmorethan80,000hectaresoflandhavebeen converted to shrimp farming. India's marine export weight edinat 70,000 tonnes in1993andtheseexportsareprojected to reach200thousand tones by the year 2000. The shrimp farming advocates regard aquaculture as potential savior of developing countries because it is a short duration crop that provides a high investments return and enjoys an expanding market. The said expectation is fought to be achieved by replacing the environmental benigh Traditional mode of culture by semi-intensive and intensive methods. More and more areas are being brought under semi-intensive and intensive modes of shrimp farming indeed the new trend of more intensified shrimp farming in certain parts of country without much control of feeds seeds and other inputs and water management practices had brought to the fore a serious threat to the environment & ecology.

OBJECTIVES

1) To study about the environmental managemental practices in shrimp hatcheries .
2)To study the impacts of shrimp hatcheries on surrounding environment& give proper suggestions.

METHODOLOGY

Study Areas:

I had selected two hatcheries in the area of Thimmapuram near Bheemili. This hatchery had the abbrevation of the power and control engineermg Company. It is located at Thimmapuram near Bheemili in Visakhapatnam. It is about 20 K.M. from Visakhapatnam. It had started in the year 1990 with an area of 10 acres. The species grown in this hatchery eg P.Mondon .

RAJKAMAL HATCHERY:

This hatchery is located at Thimmapuram near· Beemili in Visakhapatnam. It is an area of 6 acres. It had started in the year 1995 the Species like P. Mondon are grown here.

PACE 20 & RAJKAMAL

These hatcheries are surrounded by 50 coconut trees. It hadgood garden with number of plants like Mango, Gauva, Neem, Badam etc., The are represented n the table below:

	Local name	English Name	Botanical Name
1	Kobbari	Coconut	Cocas - mucifera
2	Ashoka	Mass tree	Polyalthia longifera
3	S.NO	Indian Tulip tree	Thespsia populnea
4.	1.	Neem	Azadiracta indica
5.	2.	Almond	Terminalia catappa
6.	3.	Gauva	Psidium guajava
7	Thati	Palmtree	Borassus flabellifera

ON THE ROAD SIDE THE PLANTS LIKE:

S.No.	Local name	English Name	Botanical Name
l.	Marri	Banyan	Ficus benghalensis
2.	Kanuga	Pongam	Derris pinnata
3.	Amruthanjan chettu	Eucalyptus	Eucalyptus
4.	Eetha	Palm tree	Phoenix synvestris
5.	Turayi chettu	Peltophorium	Delonix regi
6	Thati	Palm tree	Borassus flabellifera

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RAJKAMAL HATCHERY

1.	Cultivating area	Hatchery
2	Preparation of cultivated area	To some extent
3.	Special instructions	Shelter and food provided
4.	Brooders	Collected from wilds plus artificial propagation
5.	Stocking density	Nauplius 100 animals per litre Post larvi 50 animals per litre
6.	Fertilization	Not required
7.	Food source	Chaetoserus algae + artrimia and some artificial feeds
8.	Water quality analysis	Analysed daily
9.	Diseases	They may be fungal, bacterial, viral protozoal and environmental.
11.	Income	50% to 100% (depending on market)
12.	Yield	60 millions per anuum
13.	Cost of products	Depending on market and season
14.	Net Income	Depending on market
15	Management	Fairs

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9.	Diseases	They may be fungal, bacterial, viral protozoal and environmental.
10.	Loss due to predators	Due to diseases
11.	Income	50% to 100% (depending on market)
12.	Yield	125 millions per annum
13.	Cost of products	Depending on market and season
14.	Net Income	Depending on market
15	Management	Fairs

4 ENVIRONMNETAL MANAGEMENT

PLANNING

It should be planned near sea coast due to the availability of water. Water is the heart of the Hatcheries. Before Planning for hatcheries the following factors are required Both fresh and seawater sources are available or not
Requirement of 24 Hours Power Supply Generators had to be used in both these hatcheries 2 generators are used they are of 125K .V.4) Availability of Mother Prawn
Area related to these hatcheries should be far away from the Residence
Labour should be available Locally for daily Hatchery Operations.
Salanity should be with in the range of28.34PPT
Sea Water pH should be with in the range of7.7 to 8.2 and should be free from agricultural, Industrial and sewage Pollution
Temperature required is 27- 29 Degrees Centigrades.
Soil physical composition i.e., Sand, silt and Clay content of the soil should be checked be for determining the soil type.

ORGANISING

There are 4 Sections to Organise the hatchery .
They are 1)Algal Section
2)Maturation
3) Larval and
4)Post Larval Section

Algal Section:- It can be done in both In S door & out door larval section foralgal section they use tanks with 10 tons volume. In algal section Ketoserous strain is obtained from central marine center at Pedawalatair.This algal strainis cultured on agar medium. This Algae is used to provide food for the brooders .If algal is not available Spirulina micronutrient is used as food.
Feed like both vegetable feed like ketoserous and non vegetable feed like Artimea is used. Algal section consists of I technician, under him assistant technician. Under him facilitator looks after the entire algal section.

Maturation section
Larval section and Post larval section

It consists of I Technician, under him I assistant technician followed by facilitator. Brooder collection from sea took place during evening time in both hatcheries It requires the period of 30 days.
The mother prawn taken from the sea is 75gm to 200gmand artificially grown prawn hatcheries has the size of 25to 30 gms.

For the management of hatcheries requires the investment of nearly 1-1.5 crores.Rajkamal hatcheries produce 60 million production per year where as Pace 20 hatchery production 125 millions per year.Brooder collected from sea during evening times in both the hatcheries.It requires a period of 30 days.Brooder is collected and kept in the spawning tanks and 2-10 lakh eggs are collected and introduce them in hatching tanks.They are hatched in to nauplius with time requirement of 12 hours.The nauplius has six sub stages and the time required is 36 hours,It is converted into Zoea 1 with 1112 or 2 days time and later zoea 2 (1 day), zoea3(lto2days) brooder is collected and keep the brooder in the spawning tanks. And 2 to 10 lakhs egg are collected and introduce them in the Hatching tanks. They are hatched into nauplis with time requirement of 12 Hours. This nauplius had 6 sub stages and the time required in 36 hours. It is converted into zoea I with 1/2 or 2 days time and later zoea II (1 day), zoea III(11/2 to 2 day) Mysis(1112to2 days~ Mysis II (1 day) Mysis III (1112 to 2 days) finally after 1 day Post larvae I is obtained it is transformed into Post Larvae 20with a size of 13m. There post Larvae are sold to farmers they will grow them into Paneusmondon which is about 13 cm there P. mondon are send to nursery ponds and grown about 3 Months later send them to processing plants Cold Storage)and then to exporter.

TRANSPORTATION

This larvae are transported in the vehicles in the plastic covers. The plastic covers are filled with oxygen and 5liters water and then 500 seed are kept in it and then transported .In summer, they use ice to freeze them. These covers with seed are kept in the plastic trays and then exported to the farmers.

ENVIROMENTAL PROBLEMS AND MANAGEMENTAL PRACTICES TAKEN BY THE SHRIMP HATCHERIES

Sea water from the pump is taken and stored in the tanks,200-300 tonnes of the water is used

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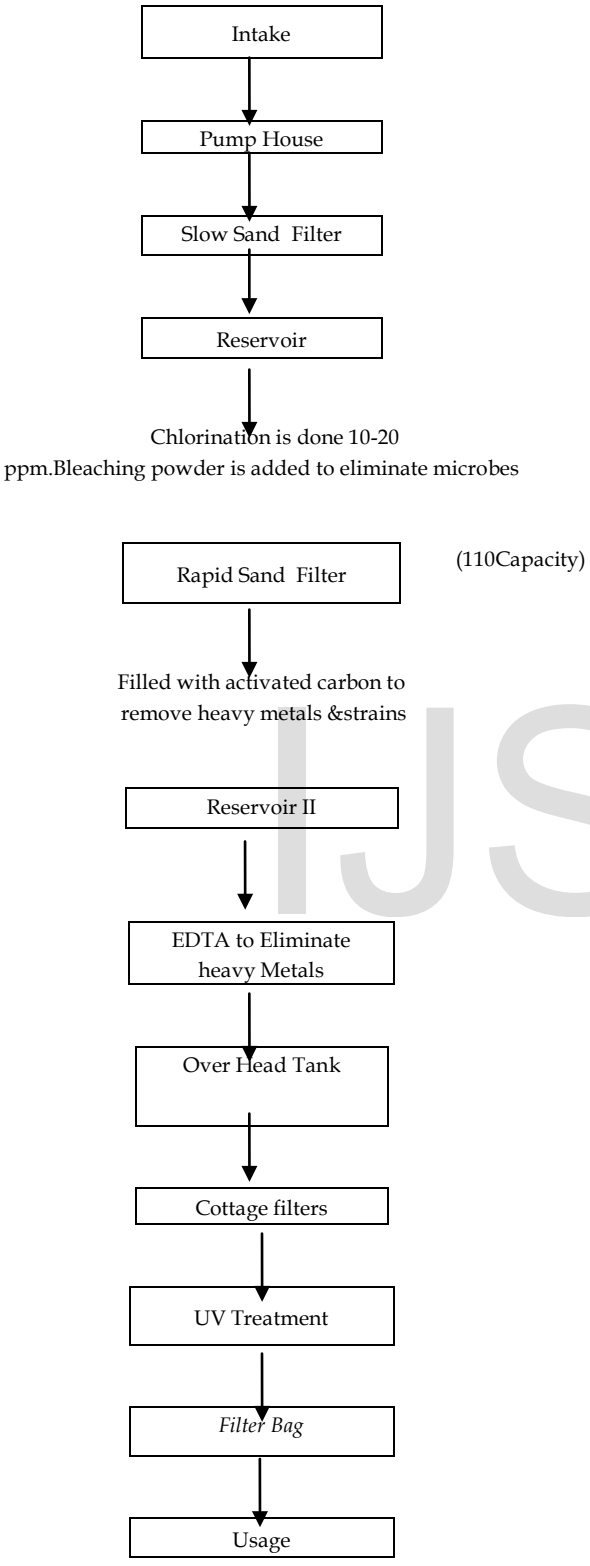
Treatment of water is as follows



Sea water is taken through pumps and it is stored in the tanks 200to300tonsof sea water is required this Sea water is treated as follows.

Sea water is taken into the pump house later to slow sand filter then send into the reservoir in the reservoir chlorination is done 10 to 20 ppm of bleaching power is added to chlorinate microorganism.

Rapid sand filters with 1 ton capacity which is filled with activated carbon

To remove heavy metals and strains.

Reservior 2 it is dechlorinated with Sodium thiosulphate.

EDTA

It is treated with EDTA to remove heavy metal and allowed to settle.After that the water is sen to over head tank from there to cottage filters which is about 5 microns or 1 microns or 0.5 microns and then subjected to UV treatment after that send through Filter bags of 0.20 micron capacity and then used.

Bleaching Powder is used as disinfectant in cleaning all the utensils

They will use sea water and remaining contaminated water and waste is thrown in sea water

To prevent cross contamination foot box or -dips are used in every section to section Hand dips for hand wash are provided for every culture tank in hatchery to prevent cross contamiation" Turbidity can be checked by filteration of microflora and fauna. Pollutants can be removed by sea water treatment.

Disinfect and wash all glass wares pitchers buckets screened stand pipes ,serenade tubs cleaning pads and other equipments use and store in proper location.

In Post Larval tanks an antibiotic and antifungal drug are used as prophylaxis on the first day during tank preparation Symmetrically siphon the entire tank bottom making sure to remove any residual food left from previous feedings.

If any disease like bacterial, viral and fungal infection are occurred tothe organisms they will be thrown or discarded .

Water is changed in the reservoirs for every 24 hours.

PROBLEMS

PRIMARY PROBLEM:

1 The hatchery after using the sea water. Polluted sea water is thrown into sea water again which result in the ecological disaster.

2 Most of the toxic substances like antibiotics and chemicals are used in the hatcheries to prevent from pests which result in health hazards.

SECONDARY PROBLEMS

Ecological in balance is caused.

Loss of wild species like flora and fauna

Salinization of soil and water.. Shrimp farming results in social damage ..

Another damaging effect that impacts local fishing communities.

Health risks to people in local communities.

PRIMARY PROBLEMS

1The hatcheries use much amount of the sea water for their purpose and later the polluted water is pumped back into the sea which result in pollution of the marine water. The Organisms present in the water gets effected. If once species is affected. The species depending upon the former species get effected and results in the ecological disaster.

2The Chemicals used in the hatcheries becomes toxic and result in the health hazards. These chemicals which are used in hatcheries of seedling to prevent them from diseases may gets observed by these species further affect the human beings who eats it.

SECONDARY PROBLEMS

1.) Ecological imbalance is caused
All the organisms in the oceans are connected to each other in the form food chain. affecting one species may effect another and results in ecological inbalance.
2). Loss of wild species like flora and fauna
Antibiotics and some other drugs used in the aquaculture may be toxic not only to targeted pathogen or pest but also to non targeted population such as cultured species wild flora and fauna and human consumers. For example Oxytetracycline Erythromycin etc. have been found to be health hazards associated with digestive disorders allergies.

3)Salinization of soil and water

The sea water from shrimp ponds was salinization of agriculture land 45000ha of once productive rice and also shrimp forms in central Thailand have become and ecological desert
This may result in declined of rice land and drop in rice production that had already occurred in countries like khula, Bangladesh.

4.) Shrimp farming result in social damage

The growth of shrimp forming over the past 10 15 years occurred because Government and international development agencies promoted it by enormous profits to be made. Investors were quick to cash in on the cooperative business ,but it is largely only a relatively few investors that have received the lions share of benefits, while .large portions of society ,particularly the ruler poor, have become disenfranchised and marginalized into severely degraded environments

5.) **Another damaging effect that impacts local fishing communities**

Is the capture of young shrimp by aquaculture farm for their hatchery .It is not only in the construction of ponds but also in their operations that makes the -an environmental damage and socially destructive time bomb
60. Health risks to people in local communities
Effluent from shrimp ponds is commonly dumped onto surrounding land and include water always where it chemicals mix can post health risk to people in local communities.

OBSERVATIONS AND SUGGESTIONS

The environmental impacts of shrimp hatcheries and its problems had already discussed. The following suggestions for reducing the environmental impacts of shrimp hatcheries are as follows .To achieve long term sustainability ,the shrimp forming industries will need to seriously considered its effect on the environment.ess the impacts, and improve environmental management, of postal aquaculture development, FAO recommends the protection of resources and environments require of such development this may include strengthened efforts in planning and management of coastal aquaculture development, integrated coastal area management (ICAM) implementation of the environmental impact assessment (EIA) monitoring of pollution , and environmental legislation, among others .F or shrimp culture these measures include management of pond effluents, Regulations (of species introductions, chemical used etc) CAM and rehabilitation of wild habitats and populations . Because shrimp is a product traded mainly in international markets and the cultured species are common to countries with in a region, these actions will need international cooperation's. Shrimp aquaculture should harm neither coastal nor marine ecosystems, and should be environmentally economically and socially sustainable .Where the industries is inherently unsustainable, it should be closed down and appropriate measures taken for regeneration of damaged coastal zones

Best management practices, including those based or traditional methods or technological innovations should be promoted. Their should be no net mangrove loss as a result of shrimp aquaculture, in terms both of area coverage and of environmental services provided by this habitat type.
Identified and demonstrate specific methods, techniques and policies that contribute to sustainable shrimp aquaculture .Established mechanism to ensure that guidelines and best management practices are effectively implemented. Develop globally acceptable guidelines for sustainable aquaculture through multi stakeholder process, shrimp consumers, who are ultimately responsible for the dramatic growth of this industry can play an important role and WWF will support efforts to develop an independent third party certifications system to provide economic incentive for sustainable shrimp aquaculture. Raise awareness of key issues in shrimp aquacultures among consumers, the general public, policy makers, investors, the industry itself, and other key target groups. Use of sea water by the hatcheries and again pump the polluted water back into sea water should be avoided. Toxics compounds which are used for bacterial, fungal and viral diseases used in aquaculture should be banned which effect wild flora and fauna.

.In order to maintain good sanitation and hygiene, movement of people from one section to the other should be restricted The aides should be trained to disinfect every equipment & even their hand before & after dipping them in a tank
The seawater and fresh water reservoirs should be cleaned disinfected at frequent intervals If these hatcheries will not follow the rules that had conducted by the Government should be severely punished Pollution control board should be take responsibility to check the pollution levels in hatcheries.

Pace 20 hatchery

Rajkamal hatchery

Rotemia, Rotifer, Frppak, Cyclopeeze, Spirulina and Microencapsulated hatchery feed

Buffered Oxytetracycline,BufferedNeomycin,Deoxycycline and Furazolydine

Indoor algal culture

Rajkamal -foot dip

Outdoor culture

Packed and ready for transportation

CONCLUSION

Shrimp culture industry is taking deep roots in India. The hatcheries are using modem technical and mechanical instruments to reduce environmental pollution. The used sea water is first treated chlorinated and than disposed back into the sea, using a pipe that carries the used water to the middle of the sea to avoid the shore pollution. In case if the shrimp culture gets infected, they treat the culture, disinfect it and then let it into the sea Raj Kamal and Pace 20 carrying out their environmental management practices with utmost care) so as to reduce environmental pollution They are even maintaining the green belt.

ACKNOWLEDGMENT

I would like to thank my elder sister MVKSridevi ,Assistant professor who had inspired me to do this work and both the hatcheries of Visakhapatnam. My sincere thanks to VignanUniversity for its support.

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