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Research Article

Effluents of Shrimp Farms and Its Influence on the Total Dissolved Solids, Nitrate and Total Suspended Solids in Gwatar Region (Sistan and Baluchestan-Iran)

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ABSTRACT

All farmed shrimp are of the family Penaeidae, and just two species namely litopenaeus vannamei (Pacific white shrimp) and Penaeus monodon (giant tiger prawn) account for roughly 80% of all farmed shrimp. There are more than 50 varieties of shrimps and seven of them are identified for aquaculture. The amount of total dissolved solids in water may be taken as a measure of organic load. In shrimp culture, waste from the artificial food pellets, shrimp excrement, fertilizers and mineral conditioners used to boost the growth of the phytoplankton are some of the reasons to increase solids in pond water. This research is integrated shrimp farm Gwatar region in the east city of chabahar in sistan and baluchestan was carried out. Chabahar is a free port (Free Trade Zone) on the coast of the Gulf of Oman. Total Dissolved Solids of the sea has not changed much before entering the pools. But the quantity of effluent from ponds slightly increased. This amount has remained almost stable into the sea.

Key words: TDS, TSS, Nitrate

INTRODUCTION

The amount of total dissolved solids in water may be taken as a measure of organic load. In shrimp culture, waste from the artificial food pellets, shrimp excrement, fertilizers and mineral conditioners used to boost the growth of the phytoplankton are some of the reasons to increase solids in pond water. Indirectly they may also decrease the water depth and transparency. Suspended and total solids recorded in the present study were high on day 90 and total dissolved solids were high (20±1.2mg/l) on the day of culture and harvest. Coastal ecosystem is very valuable due to the many uses such as fisheries, aquaculture, agriculture and human settlement. Large areas of coastal areas are developed into aquaculture ponds to meet the increasing demand of protein and an alternative to reduced landings of capture shrimp. Shrimp aquaculture is a lucrative industry worldwide and more so in the tropics where two or three crops could be produced per year. As shrimp culture requires brackish water, ponds are normally constructed at mangrove areas. However, negative impacts have been reported in many shrimp producing countries such as Taiwan and Mexico. Negative impacts of shrimp aquaculture include coastal ecosystem damages, decrease in fisheries yields and environmental pollution by solids and nutrients from shrimp ponds (Paez-Osuna *et al*., 2003). Shrimp farming has rapidly expanded over the last two decades, with the total world cultured shrimp production reaching 3.4 million tons, valued at over 14 billion USD in 2008 (FAO, 2010). However, the industry is receiving increasing criticisms as effluent discharged from shrimp farms can be a major source of pollution in estuarine and marine ecosystems (Graslund *et al*., 2003; Paez-Osuna, 2001; Senarath and Visvanathan, 2001). Pollution from shrimp farms is in the form of waste feed, shrimp faeces and excreta that can lead to nutrient enrichment, eutrophication and increased suspended solids in receiving waters (Boyd and Green, 2002; Jackson *et al*., 2003; Senarath and Visvanathan, 2001). Studies have revealed that a large portion of input nitrogen and phosphorus into shrimp ponds as feed is not converted to shrimp biomass, but is released into the environment (Jackson *et al*., 2003; Teichert- Coddington *et al*., 2000; Thakur and Lin, 2003; Xia *et al*., 2004; Paez-Osuna and Ruiz-Fernandez, 2005); andtherefore the waters receiving

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farm effluent often has elevated levels of nutrients leading to excess primary productivity (Anh *et al*., 2010; Biao *et al*., 2004; Costanzo *et al*., 2004; Lemonnier and Faninoz, 2006; Jones *et al*., 2001; Nguyen, 2008; Rodriguez-Gallego *et al*., 2008; Samocha *et al*., 2004; Islam *et al*., 2004; Trott and Alongi, 2000). The temporal and spatial scale of such impacts, however, vary considerably depending on farm management practices, the number, scale and proximity of shrimp farms, farm flushing rates and carrying capacity of receiving water bodies (Senarath and Visvanathan, 2001). Hence, spatial and temporal assessment and monitoring of coastal aquatic environments in shrimp farming areas are essential if estuarine and marine ecosystems are to be protected and economic development of coastal areas is to be sustainable (Boyd and Green, 2002). Hypoxia or oxygen depletion is a phenomenon that occurs in aquatic environments as dissolved oxygen (DO; molecular oxygen dissolved in water) becomes reduced in concentration to a point detrimental to aquatic organisms living in the system. Dissolved oxygen is typically expressed as a percentage of the oxygen that would dissolve in the water at the prevailing temperature and salinity (both of which affect the solubility of oxygen in water). An aquatic system lacking dissolved oxygen (0% saturation) is termed anaerobic. Reducing or anoxic is a system with a low DO concentration in the range between 1 and 30%. DO saturation is called hypoxic. Most fish cannot live below 30% DO saturation. A "healthy" aquatic environment should seldom experience DO of less than 80%. In response to a low concentration of dissolved oxygen in the water, the fish can respond in two ways: the blood flow can be increased by opening up further secondary lamellae to increase the effective respiratory area (it may be difficult to increase significantly the blood flow rate through the capillaries themselves), and the concentration of red blood corpuscles can be increased to raise the oxygen carrying capacity of the blood per unit volume. The latter can be achieved by reducing the blood plasma volume (e.g. by increasing the urine flow rate) in the short term, and by releasing extra blood corpuscles from the spleen in the longer term (Thetmeyer *et al*. 1999).

MATERIALS AND METHODS

This research is integrated shrimp farm Gwatar region in the east city of chabahar in sistan and baluchestan was carried out. Chabahar is a free port (Free Trade Zone) on the coast of the Gulf of Oman. At the 2014 census, its population was 120,000. Chabahar is Iran's southernmost city. Chabahar is situated on the Makran Coast of the Sistan and Baluchestan province of Iran and is officially designated as a Free Trade and Industrial Zone by Iran's government. Due to its free trade zone status, the city has increased in significance in international trade. The Chabahar has hot, humid weather in the summer and warm weather in the winter, giving it a hot desert climate (Köppen climate classification BWh). The western winds in the winter bring about scattered rainfalls in this region, and very occasionally winds from the Indian monsoon affect the region, as in July 1976 when 46.6 millimetres (1.8 in) fell. In most years around 100 millimetres (3.9 in) will fall; however, a positive Indian Ocean Dipole in 1997/1998 led to a record total of 470 millimeters (18.5 in); in contrast between July 2000 and June 2002 only 57.5 millimeters (2.3 in) fell in two years. The summer monsoon winds from the Indian subcontinent make Chabahar the coolest southern port in the summer and the warmest port of Iran in the winter. It has an average maximum temperature of 34 °C and an average minimum temperature of 21.5 °C. It has the same latitude as Miami in Florida, USA, and temperatures are very similar to those in Miami. The Gwatar is located at 100 km east of Chabahar along the coastal waters of Gwatar Gulf which is joint to the Oman Sea, and covers an area of approximately 4000 hectares of shrimp farms which are operated by a cooperative body of shrimp farmers.

Design of effluent treatment system (ETS)

Three pools to choose and prepare the purification process. Settling pond with dimensions 1.2m* 24m* 90m Equivalent to 142 cubic meters to reduce turbidity and dimensional biological pool 1.5m * 36m * 30m equal volume 1620 cubic meters to 200 species of sea cucumber that this species has a very interesting behavior, ecology. That suddenly engulfs organic matter sediments and then feed the disposal of sediments devoid of organic matter, leading to the waste water treatment. The purpose of biological treatment to minimize the amount of nutrients and balance biological cooperation in the maritime environment is to drop it so receptive that sea water. Given that the required water breeding sites of the sea funded. Thus, sampling stations for each set includes a sample of sea water entering the system as a control sample, a sample of water before entering the complex a few samples of effluent the pools at the beginning of the withdrawal of plant breeding and eventually a sample of the effluent before it enters the sea.

RESULTS AND DISCUSSION

In order to clarify the status of water pollution output of shrimp farms and its possible impact on the environment, undoubtedly require a full and accurate record of environmental information area so that any changes in the rate of self-purification and environmental factors to estimate the pollution load. Now given the lack of comprehensive information and rigorous, the results can be based on two methods discussed. The first direct comparison of the results with the limit values for each factor and the second method to compare different sources of data are approximate and with the results of this study and previous studies have investigated the area around the main emphasis in this study compared data with the results of previous phases of the project and review the past and how they compare with the data collected in the area before the arrival of waste to the environment.

Total Dissolved Solids (TDS)

Total Dissolved Solids of the sea has not changed much before entering the pools. But the quantity of effluent from ponds slightly increased. This amount has remained almost stable into the sea.

Table 1: The average of the Total Dissolved Solids (TDS) measured stations receiving water from the sea to discharge waste in the sea

	1	2	3	4
Total Dissolved Solids (TDS)	2	2	20	20

Table 2: Nitrate levels in water in the main pool

Input channel	May	June	July	August	September
No3	0.5	0.6	0.7	0.6	0.5

Table 3: Nitrate levels in the water main pool

Main pool	May	June	July	August	September
No3	0.6	1.1	0.8	0.3	0.1

Table 4: Nitrate levels in the water Sediment pool

Sediment pool	May	June	July	August	September
No3	0.7	0.7	0.3	0.7	0.5

Table 5: Nitrate levels in the water biological pool

Biological pool	May	June	July	August	September
No3	0.6	1	0.8	0.3	0.1

Table 6: Nitrate levels in the water biological output pool

Biological output pool	May	June	July	August	September
No3	0.6	0.8	0.6	0.5	0.4

Total suspended solids (TSS)

Total suspended solids (TSS) of the sea have decrease before entering the pools. But the quantity of effluent from ponds slightly increased. This amount has remained almost stable into the sea.

Nitrate

Nitrate in seawater before entering the Pools slightly increased but it is a significant increase in effluent ponds. The nitrate content of waste inputs to the sea and a unit 6 is shown. The result in this study is expected to grow shrimp in standard and should not be a problem.

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