



सत्यमेव जयते

GOVERNMENT OF GUJARAT

Development of Pearl Culture Unit

Agro and Food Processing

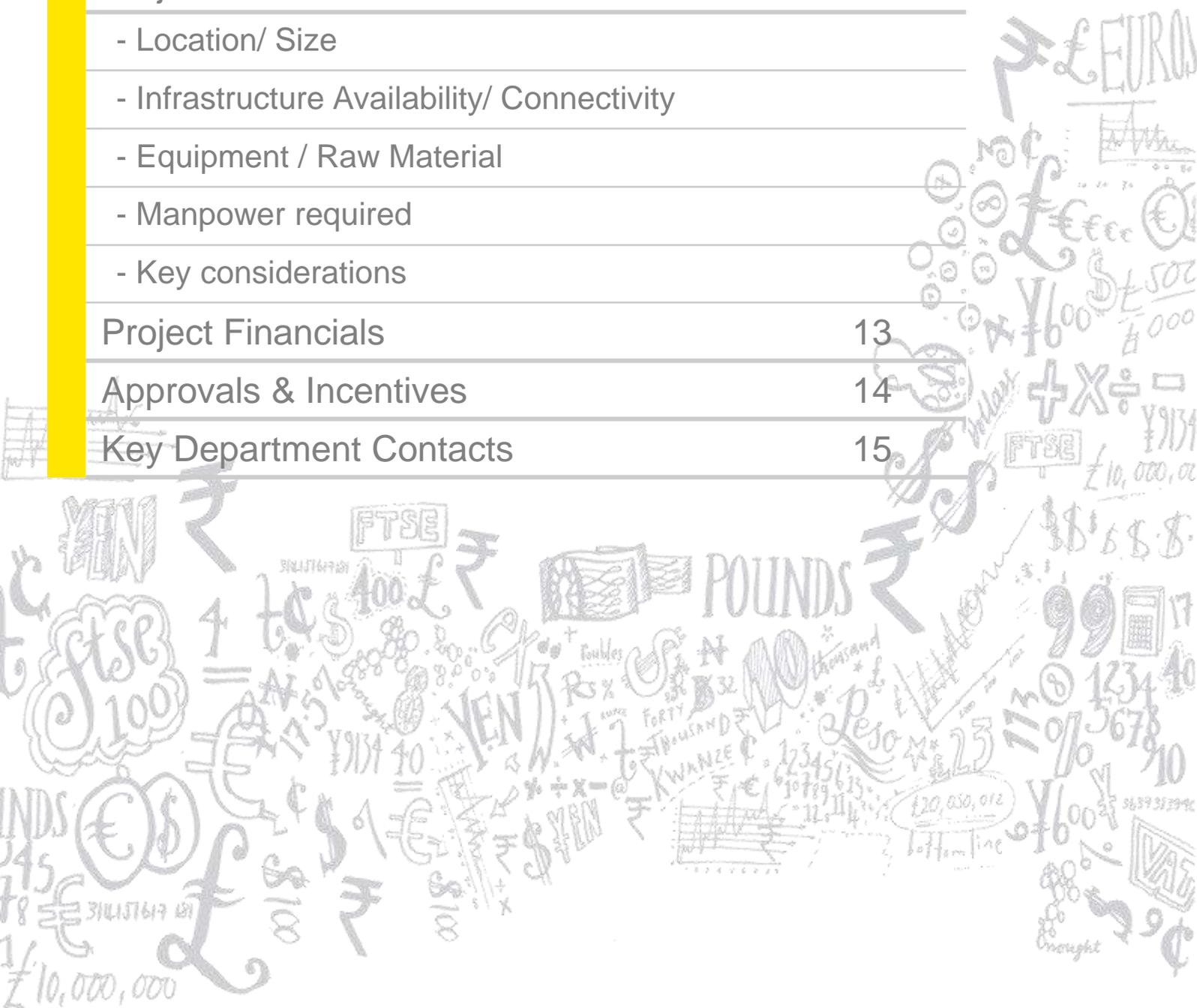
Government of Gujarat



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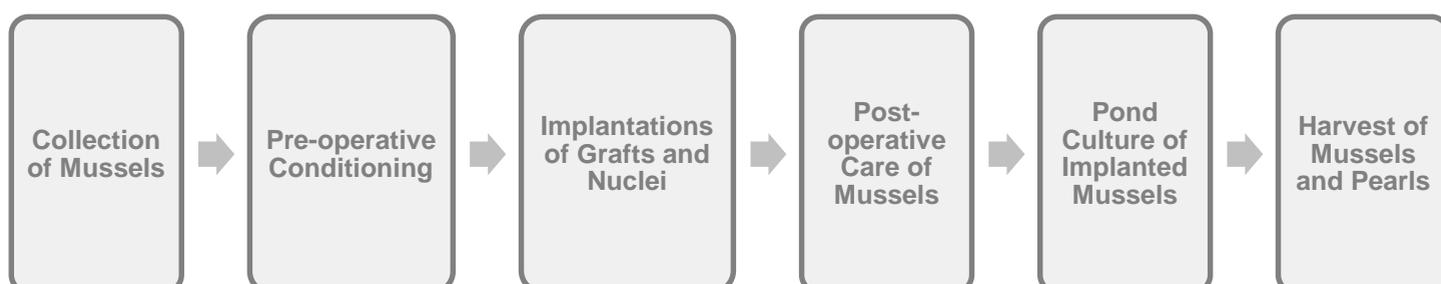
The concept

The project aims at establishing pearl culture given the high potential of raw material availability and local market demand.

Overview: Pearl Culture

- ▶ Pearls are precious, biological gems having smooth, lustrous and variously coloured deposits (nacre) around a grain of sand or other foreign particles in the shells of certain marine oysters and freshwater mussels.
- ▶ The nacreous deposit is composed of 82-86% calcium carbonate (aragonite crystals), 2-4% water and 10-14% organic substance conchiolin, which impart shining to the pearls.
- ▶ Pearls are of three types —
 1. **Natural:** Natural pearl is formed when a foreign particle viz. piece of sand, animalcule, small parasite, algae etc. enters the body of certain oysters/ or mussels by instance, and is not rejected out easily. Oysters or mussels start depositing a shiny coating on the particles layer by layer that ultimately results in formation of pearls.
 2. **Cultured:** Cultured pearls are produced by inducing oysters to deposit nacre around a surgically implanted foreign body of a particular shape and size into some identified locations.
 3. **Artificial:** The artificial pearls are made of plastics, marbles, glass, talc, ivory or shell beads etc. They are painted with pearl essence, which is a mixture of enamel and silvery extract of fish scales.
- ▶ Historically, Japan, China, Australia and French Polynesia have had exclusive authority on pearl culture techniques. Currently, Australian, Chinese, Tahitians, American and Indian technicians are also engaged in the grafting process.
- ▶ For millennia, pearl have fascinated humanity around the world. In ancient times, the demand was met by natural production. However, to meet the rising demand of pearls in the modern world, entrepreneurs and researchers resorted production of pearls by culturing pearl producing oysters and mussels.
- ▶ Pearl culture is a billion dollar business and one of the world's largest aquaculture activities in terms of value. Until recently, opportunities for investing in this specific area have been limited. The hatchery and indoor production of juveniles have created an avenue for taking up this venture even in regions where pearl mussel resources are depleted. India is in the process of establishing its own niche market employing indigenous mussel fauna.

Steps involved in freshwater pearl culture operations



Pearl Culture in India

- ▶ Pearls from India are known and admired all over the world as the finest of 'Oriental Pearls' and have been in high demand.
- ▶ However natural pearl resources in India as in other parts of the world have depleted and pearl fishery was stopped in India about four decades ago. There is a huge gap between production and demand and the only option left is culture of pearls.
- ▶ India has a wealth of marine pearl producing oysters and fresh water pearl mussels. Pearl producing oysters in India are *Pinctada fucata* in Gulf of Mannar, Palk Bay and Gulf of Kutch and *P.margeretifera* in Andaman and Nicobar Islands. Fresh water pearls have been successfully produced in three species of bivalves, viz., *Lamellidens marginalis*, *L. corrianus* and *Parreysia corrugata*.
- ▶ Central Marine Fisheries Research Institute (CMFRI) has standardized the technology of culture of marine pearls and Central Institute of Fresh water Aquaculture (CIFA), that of freshwater pearl.
- ▶ Hatchery technology of *P.fucata* has also been successfully developed. A number of entrepreneurs in Orissa, West Bengal, Andhra Pradesh, Gujarat and Maharashtra have adopted the technology of Fresh water pearl culture and a few projects with institutional finance and NABARD refinance have taken up in Andhra Pradesh for producing marine pearls.
- ▶ In case of marine pearl oyster culture, farming can be either 'on farm' or off shore/open sea. Off shore culture can be of different types: floating raft, long line systems or racks fixed on stacks.

Floating Raft Culture

- ▶ In this system, the oysters are placed in box cages of 40/40/40 cms and suspended from the raft at 5m depth in the sea.
- ▶ All the cages containing implant oysters are stitched with velon screens of 1.5 mm mesh at the bottom to prevent the rejected nuclei from falling into the water.
- ▶ In a box cage, 85-100 oysters of the size 40- 45 mm can be accommodated. The cages are numbered with aluminium /plastic plates. Once in two months the cages are lifted to remove the predators from the cages.
- ▶ The duration of post operative culture varies from 4-18 months depending on the size of nucleus and maturity of the pearls. These floating rafts are used for farming oysters in the open sea.

Fixed Raft Culture

- ▶ In shallow sheltered bays racks are employed.
- ▶ In rack system which is a fixed culture, teak wood polls are driven vertically into the sea bottom and the rack is constructed by lashing horizontal and cross polls on them with coir ropes at a convenient height of 0.5 m above the water level so that the rack thus erected remains always above the water.
- ▶ The oyster cages are suspended from the wooden frame.

Global Pearl Culture Outlook

Asia-Pacific The Largest Market



**Cultures Pearl Market
projected to reach
US\$10.7 billion by 2020**

- ▶ The global market for cultured pearls is projected to reach US\$10.7 billion by 2020, driven by rising affluent middle class population and demand for pearl jewellery.
- ▶ More than 90% of pearls traded today are cultured pearls.
- ▶ Asia-Pacific is the largest as well as fastest growing market for pearls growing at a CAGR of 6.5% with China and Australia being the largest players.

Top Three High Growth Markets

Asia-Pacific
(CAGR to top 6.5% through 2020)



Key Players

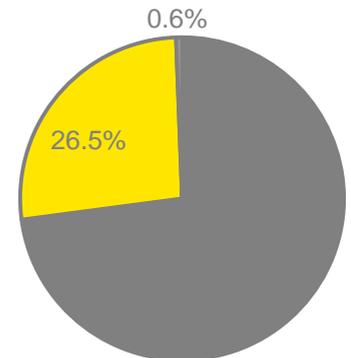
A&E Pearl Company	Autore South Sea Pearls Pvt. Ltd.
American Pearl Company	Atlas Pearls & Perfumes Ltd.
K MIKIMOTO & CO. LTD.	Paspaley
Zhejiang Grace Jewelry Co., Ltd.	

Market Potential



- ▶ The world trade of cultured pearl is reported to be over US\$3 billion per year. The major pearl producing countries are Australia, Tahiti, Indonesia, Japan and China.
- ▶ India is one of the major importers of pearls importing pearls worth US\$4 million every year to meet the growing domestic market demand.
- ▶ India has great potential for pearl culture, as it is bestowed with a long coast-line and of marine zone along south India and Andman and Nicobar islands. The seas around the Indian mainland are rich in Pinctada fucata in Gulf of Mannar, Mandapam, Tuticorin, Trivandrum etc. While sea of Andman and Nicobar islands has abundant P. margaritifera, several sites at these islands have been identified as prospective pearl oyster beds.
- ▶ The freshwater pearl mussels are also available abundantly in easily accessible natural water bodies like pond, river, lakes, reservoirs etc. India possesses rich biodiversity of freshwater mussel with over fifty species described all over the country out of which three species viz. Lamellidens marginalis, L. corrianus and Parreysia corrugata are found to possess high potential for pearl formation.

Sources of India's worked cultured pearls imports (2014)

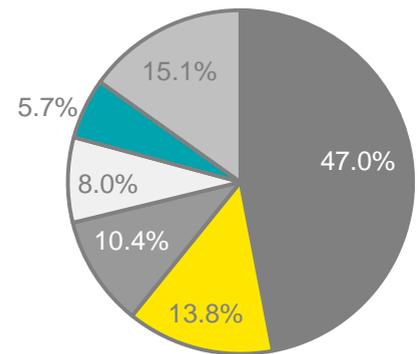


■ Hong Kong ■ UAE ■ Others

Most of it is coming from Hong Kong

Source: International Trade Centre

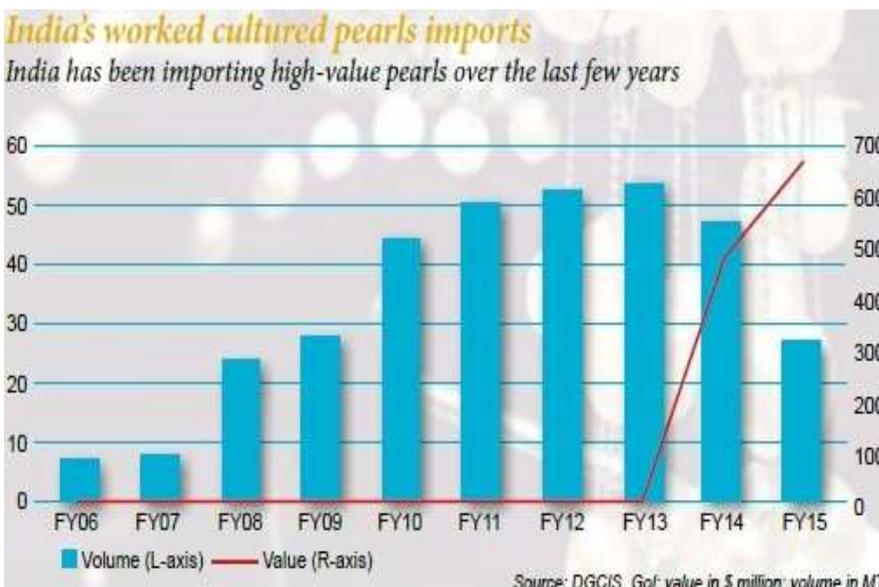
Biggest importers of worked cultured pearls globally (2014)



■ India ■ UAE
 ■ Hong Kong ■ US
 ■ Japan ■ Others

Indians have huge demand for pearls

Source: International Trade Centre



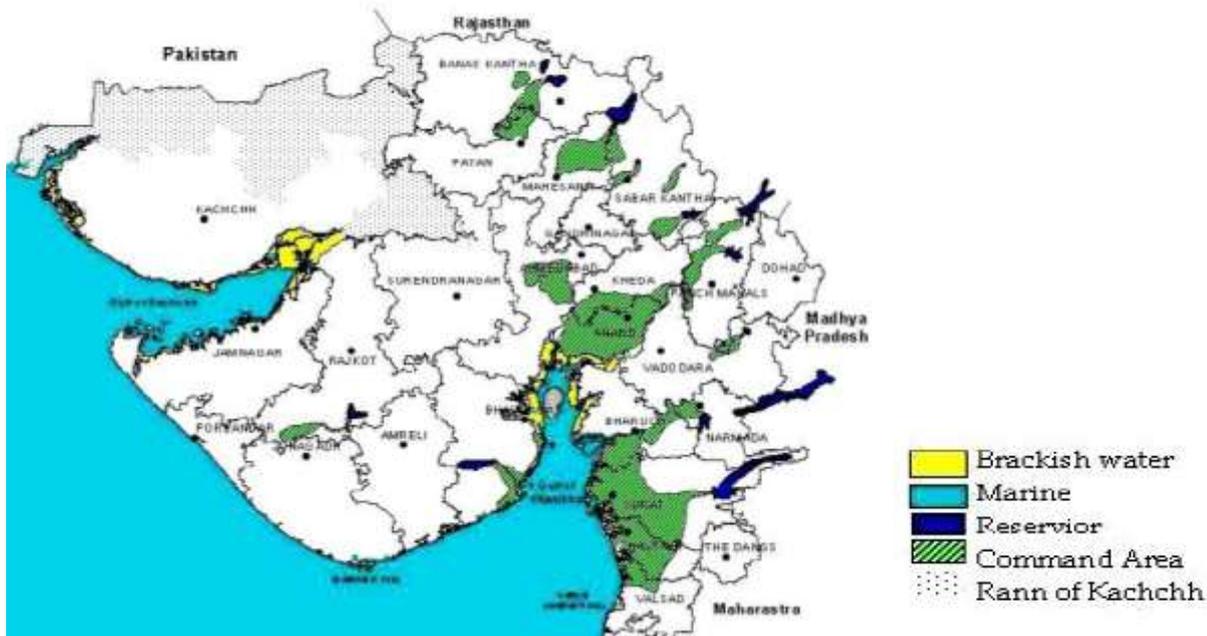


Gujarat - Competitive Advantage



Gujarat has a long coastline and a great potential for aquaculture and marine resources

Fisheries Resources



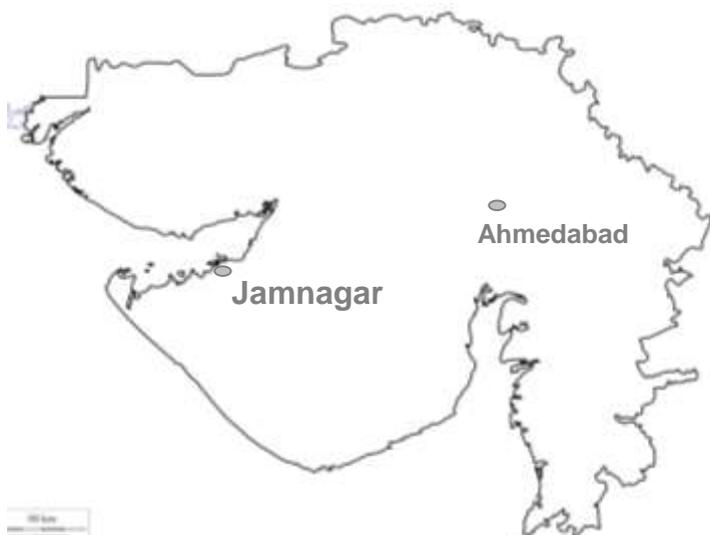
- ▶ Gujarat's climate condition, geographical status and the soil fertility are all suitable enough for pearl farming.
- ▶ The soils in Gujarat are rich in potassium, which makes it fertile and suitable for algae and mollusc to grow up in the pond made for freshwater pearl farming.
- ▶ Gujarat has the largest coastal area in India and mostly plain land, making it suitable for both freshwater and saltwater pearl farming.
- ▶ The Presence of sea water at coastal area makes Gujarat suitable for pearl farming.
- ▶ Infrastructure facilities are available in this state with low construction and operational costs.
- ▶ Availability of cheap & skilled labor in the state.
- ▶ Availability of financial support from the government and banks.
- ▶ In some parts of the states, people have started freshwater fish farming, making them trained for the start of Pearl farming and can earn high income than that of the fish culture.

Project Information

Location/ size



Agro and cold chain projects in Gujarat



10 cold chain

projects have been approved at Surat, Kutch and other locations

Marine-based food parks

to be established by 2019 in Ahmedabad and Surat

Agriculture export zones

to be established by Agricultural and Processed Food Export Development Authority (APEDA)

210

APMCs operating in Gujarat, under the National Agriculture Market (NAM) initiative.

GoG plans to...

...establish linkage from farm gate to the consumer, end to end, to reduce losses through efficient storage, transportation and minimal processing.

INR110 million has been earmarked for financial assistance to the Agro industries in 2016-17.



Prioritize public investment in establishment of post harvest storage and marketing infrastructure at Agriculture Product and Market Committees (APMCs)



Establish multi-purpose and multi control atmosphere chambers, packing facility, cleaning in progress fog treatment, individual quick freezing and blast freezing facilities.

Project Information

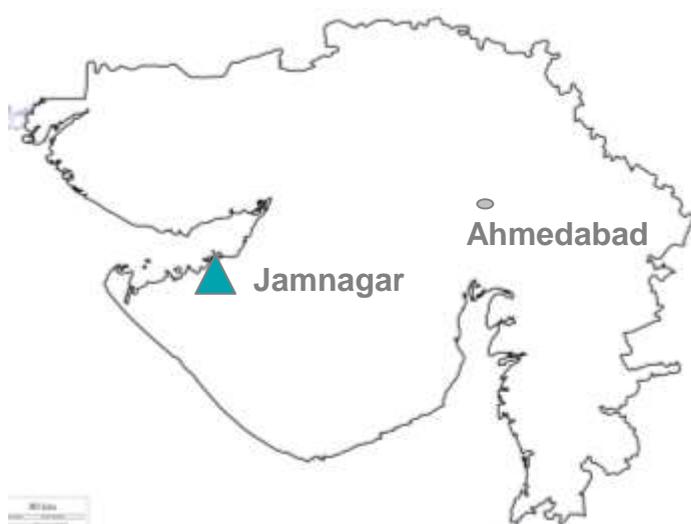
Location/ size



Project at a Glance

Project Name	Development of pearl culture
Location	Jamnagar, Gujarat
Area of the Estate	14,184 sq. kms
Focus Sector	Pearl culture, agro-based industries, fisheries and food processing

Project site – Jamnagar (Gujarat)



10 Talukas
17 Towns
694 Villages

- ▶ Located in the North West of Gujarat
- ▶ Bounded partly by Gulf and partly by the desert of Kutch in the North, Junagadh District in the South, Rajkot District in the East and Arabian Sea in the West

- ▶ The district has significant minerals wealth.
- ▶ The important minerals are Bauxite, Lime Stone, Black tap, Molding Sand etc.

- ▶ The district has 2 Special Economic Zones (Reliance SEZ and ESSAR Jamnagar SEZ), and
- ▶ 9 GIDC Industrial Estates

- ▶ Focus industry sectors include brass parts, petroleum and petrochemicals, salt and port related business
- ▶ The district is famous for brass products, tie-dyed fabrics and handicrafts

- ▶ NH8 Ext. passes through the district, which is connected to Somnath, Porbandar, Dwarka. It is well connected by road to Ahmedabad (313 km); Gandhinagar (337 km); Vadodara (382 km); Vapi (638 km); Rajkot (88 km); Mehsana (387 km); and Bhavnagar (266 km)
- ▶ The district is also well connected to other districts and cities in India by an extensive rail network
- ▶ There is one domestic airport in Jamnagar located at a distance of 10 km from the city, connecting the district to Mumbai and Bhuj
- ▶ There is a 355 km long coastline in the district with 9 ports. Bedi, Okha and Sikka are intermediate ports, while Salaya, Jodiya, Pidara, Bet are minor ports

Project Information

Infrastructure Availability



Gujarat has the longest surfaced road network in the country and is a power surplus state with the longest coastline and the largest number of air strips in the country

Logistics & Connectivity



Rail

- ▶ The total length of railway lines in the State as on 31st March 2014 was 5,258.49 route kilometres (~9% of India)
- ▶ India's first bullet train to run between Mumbai and Ahmedabad by 2023



Road

- ▶ Out of the total road length of 79,755 kilometres., the length of surfaced roads was 77,725 kilometres. (97.45%) in 2015
- ▶ National Highways – 3,884 kilometre
- ▶ State Highways – 18,017 kilometre
- ▶ IRI (International Roughness Index) for Gujarat is less than 4 meters/kilometre,



Air

- ▶ 9 operational domestic airports
- ▶ 1 International airport – Ahmedabad
- ▶ 6 new airstrips are being developed in Ankleshwar, Dahej, Palitana, Ambaji, Morbi and Dwarka



Port

- ▶ 46 ports along 1,600 kilometre coastline, including 1 major port at Kandla and 45 minor ports
- ▶ Gujarat leads in project clearance in coastal areas with a success rate of 93%

Utility



Water

- ▶ An extensive water grid network of 75,000 kilometre for irrigation and drinking
- ▶ Currently, the Gujarat Water Supply and Sewerage Board (GWSSB) is providing water to 490 villages in 22 districts



Power

- ▶ 2nd largest state in terms of installed power capacity after Maharashtra
- ▶ Power generation capacity : 29,431.13 MW
- ▶ Per capita power consumption was 1,839 units in 2014-15 against the national average of 1010 units

Key Players

Indian Pearl Company
Venus Enterprises
American Pearl Company

Project details for setting up marine pearl culture in Jamnagar district

- ▶ **Capacity:** 1 lakh marine pearls (Mabe type) per cycle of 12 months using marine pearl culture technique.
- ▶ **Equipment:** The key equipment includes surgical tools, culture tanks, aeration equipment, water filter, water storage tanks and glassware.
- ▶ **Land and Water Area:** 100 sqm of water area can be leased out in the coastal area to set up a pearl culture unit. Hydrographical, climatic, environmental and biological diversity in the area determine site selection. The industrially polluted areas and areas with freshwater influx are not suitable for marine pearl culture. In addition 200 sqm land is required in the proximity of sea for hatchery and implantation laboratory purpose.
- ▶ **Manpower requirement:** Require 10 technicians.

Raw material requirement

Item	Quantity
Pearl oysters	60,000
Nuclei	120,000

Key considerations

- ▶ The biological parameters need to be checked before initiation of pearl culture including water quality, water source, water depth, substratum type, nutrient load, temperature and superior quality of recipient as well as donor mussels.
- ▶ Site selection has to be convenient for operational activities.
- ▶ Mussels collected from the wild are ideal, however pathological parameters of the indoor produced animals need attention prior to selection.
- ▶ Pearl culture demands various ancillary activities that require appropriate attentions viz. mussel collection, implantation, nucleus preparation, culture unit fabrication, farm management and harvesting.
- ▶ The product should have a steady market avenue for better remuneration.
- ▶ Large pearls have superior value.

Estimated financial outlay for setting up a pearl culture unit

S. No	Financial parameters	In INR lakhs
A.	Fixed Assets	
a)	Hire cost of land and shed for 12 months	2.2
b)	Raft and Cages	1.1
c)	Water tanks, culture tanks etc.	0.54
d)	Pump set	0.22
e)	Accessories	0.54
f)	Miscellaneous	0.54
	Total	5.14 lakhs
B.	Recurring expense (per cycle of one year)	
a)	Raw material	27.34
b)	Manpower	3.91
c)	Utilities	0.33
d)	Contingencies	0.43
	Total	32.01
C.	Technology know-how	54.25
	Total Capital Investment	INR 91.36 lakhs

Source: DCMSME

Financial analysis

Turnover	INR 100 lakhs per cycle of 12 months assuming an average price of INR 100/pearls
Net profits	INR 68 lakhs
% profit of sales	70%
Return of investment	83%
IRR	51%

Source: DCMSME

Pearl culture (marine & fresh water)

S. No.	Details
Unit Cost	As per actual with a ceiling of INR 25 lakh per project.
Central financial assistance	<p>(a) 50% of the unit cost with a ceiling of INR 12.50 lakh per project in General States/UTs.</p> <p>(b) 80% of the unit cost with a ceiling of INR 20 lakh per project in North-Eastern and Himalayan States.</p> <p>(c) 100% of the unit cost with a ceiling of INR 25 lakh per project to UT Administrations, ICAR/ other Central Government Institutes.</p>
Terms and Conditions	<p>(a) The applicant shall obtain necessary prior permissions from the concerned State/UT Government and other Competent Authorities for installation of pearl culture rafts.</p> <p>(b) Fishermen Cooperative Societies, SC/ST Cooperative Societies, Women Self Help Groups, Registered Companies of Private Entrepreneurs etc. shall be eligible for central assistance for one project each group at suitable sites/locations.</p> <p>(c) The unit cost includes capital, operational and maintenance costs on one time basis</p> <p>(d) The applicants shall be required to submit self contained project proposals together with documentary evidence of necessary permissions and technical knowhow to avail of the assistance.</p> <p>(e) The proposals shall be routed through the concerned State Govt./UT Administration with</p>

Commissioner of Fisheries

<https://cof.gujarat.gov.in/contact-us.htm>

Department of Animal Husbandry, Dairying & Fisheries

<http://dahd.nic.in/>

Gujarat Agro Industries Corporation Ltd.

<https://gaic.gujarat.gov.in/index-guj.htm>

Office of the Commissioner of Fisheries, Gujarat

<https://cof.gujarat.gov.in/contact-us.htm>

Industrial Extension Bureau

www.indextb.com

Gujarat Industrial Development Corporation

www.gidc.gov.in

Office of Industries Commissioner

www.ic.gujarat.gov.in

This project profile is based on preliminary study to facilitate prospective entrepreneurs to assess a prima facie scope. It is, however, advisable to get a detailed feasibility study prepared before taking a final investment decision.

For further details:

INDEXTb
INDUSTRIAL EXTENSION BUREAU
(A GOVT. OF GUJARAT ORGANISATION)
ISO 9001:2015 Certified

- Block No. 18, 2nd Floor, Udyog Bhavan, GH-4, Sector 11, Gandhinagar - 382 010 Gujarat, INDIA
- +91-79-23256009, 23250492 / 93
- +91-79-23250490
- indextb@indextb.com
- www.indextb.com



**Gujarat Fisheries
Department**

Commissioner of Fisheries

3rd Floor, Block no-8,
Jivraj Mehta Bhavan,
Gandhinagar
Phone : +91-232-53739
Fax: +91-232-53730

Email: commi-fisheries@gujarat.gov.in
<https://cof.gujarat.gov.in/index.htm>