



INTRODUCTION OF OFFSHORE FISHERIES RESEARCH CENTER: ALGAE AQUACULTURE CAPACITIES AND ACHIEVEMENTS IN CHBAHAR

Ashkan Ajdari

Aquatic Animal Health(Ph.D)

Head of Offshore Fisheries Research Center, Chabahar_ IRAN

A.ajdari@ifro.ir

رویداد بین المللی جلبک و دستاوردهای جدید جداسازی، خالص سازی و تولید صنعتی



**Algae and new achievements
Separation, purification technologies
& industrial cultivation**

لینک شرکت در وبینار:
b2n.ir/g73031

تاریخ برگزاری:
۹ و ۱۰ شهریور ماه ۱۴۰۰
زمان برگزاری:
۱۰:۳۰ الی ۱۲:۳۰

- اهداف:**
- تولید مشترک در اسکیل صنعتی
 - تکنولوژی های جدید استخراج (for Omega 3, β carotene, and Astaxanthin production)
 - تولید زیست توده (for *Euचेuma spinosum*, *ucheuma cottonii*, *Chondrus crispus*, *Gelidium spicie*)
 - تجهیزات
 - توسعه سویه های صنعتی

**۱۰ شهریور ماه: پنل تجاری
و نشست های B2B**

۹ شهریور ماه: پنل سیاست گذاری و قوانین و مقررات



Andy Mu
CEO of Qinghai Biopharmaceuticals
British company

دکتر جلوه سهرابی پور
مدیر عامل شرکت دریا پلوماCTA هیتا

دکتر مهدی محمدی
رئیس هیات مدیره شرکت توسعه فناوری جنبش های خلیج فارس

دکتر سیاوش صدیقیان
مدیر عامل شرکت زیست پالایشگاه پرچامک گتو

موسسات علمی و فناوری

Prof. Yonghong Bi
Director of research center for algae biology and its application of institute of hydrobiology, Chinese academy of science, Wuhan, china

پروفسور محمد پورکاظمی
رئیس کارگروه زیست فناوری دریا ستاد توسعه زیست فناوری و صنایع وابسته دانشگاه خلیج فارس

Dr. Chen Lin
Associated professor of Qinghai Institute of Chinese academy of science (CAS)

دکتر اشکان آژدری
رئیس مرکز تحقیقات شرفانی آب های دریاچه ارومیر

افتتاحیه

پروفسور مصطفی قانعی
مدیر ستاد توسعه زیست فناوری معاونت علمی و فناوری ریاست جمهوری

Amir Ghorbanali
Director of Chinese-Iran House of Innovation and Technology

Dr. Ramazan Parvaz
Deputy General of the Islamic Republic of Iran in Shanghai

Mr. Adam Zhang
Director of Jiangsu International Science and Technology Exchange and Cooperation Center



تماس با ما:

- international@isti.biodc.ir
- ۸۸۰۳۱۱۹۸ (internal) ۱۲۲



Islamic Republic of Iran,
MINISTRY OF AGRICULTURE-JAHAD



Iranian Fisheries Research Science Institute

Affiliated center

Northern Part

Southern Part

Inland provinces

South Aquaculture Research
Center

Shrimp Research Center

Persian Gulf and Oman Sea
Ecology Research Center

Offshore Fisheries Research
Center

<http://english.ifsri.ir/pages/affiliatedcenters>

Was founded in 1989 with the aim of on the basis of fisheries and aquaculture development plan



Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center

Located in southeastern of Iran on the coast of Gulf of Oman, Chabahar



**This Research center has 3 departments including:
Aquaculture, Ecology, Biology and stock assessment.**



**Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center**

Five Lab.(Tree of them have passed ISO: 17025 License)

10 Scientific member and research expert doing Applied research with support of more than 120 Scientific member of IFSRI



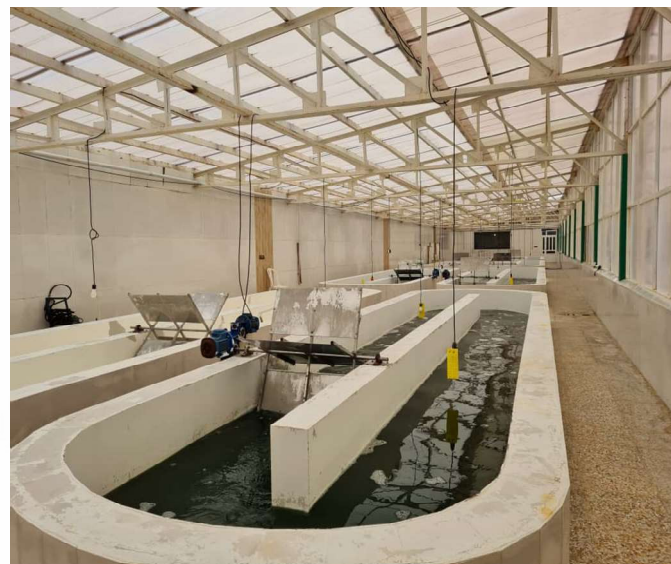
8 Different
spices stock
maintain in
Phaycolab



The major activities of the center are Macro algae(Seaweeds) and Micro algae, lobster, tuna Fish , sea cucumber and shrimp reasearch studies.



Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center





Seaweeds(macro algae) and Hypersaline micro algae are the big potential of Sistan & Baluchistan province **costal zone : 541 Km shore line** from Gwatr area (with $25^{\circ}, 10' N$, $61^{\circ}, 30' E$) to Mydani ($25^{\circ}, 24' N$, $59^{\circ}, 5' E$) is a rich habitat of different species of seaweeds and micro algae

Rocky Shore



Lipar (Pink)wetlan



Most important achievements of the center over the past 10 years



Atlas of marine algae of Gulf of Oman
(Sistan and Baluchistan province)

Distribution, abundance and diversity
of Phytoplankton in the Gulf of Oman
(Sistan and Baluchistan Province)

Biomass estimation of demersal
resources in the Oman Sea using swept
area method

Polyculture of *Litopenaeus vannamei*
shrimp and *Mugil platamus* mullet in
Gwater shrimp farm



Survey about commercial catch of the
rock lobster, *panulirus homarus* linnaeus
1758 in the Iranian seashores of Oman
Sea

Effect of different harvesting methods
of produced *Dunaliella salina* biomass
on beta-carotene extracts

Quantitative evaluation of feeding
interaction between some economically
important species and determination of
fishing effects on their ecological
relation in Oman Sea



Investigation on stock status of Indian
shrimp (*Penaeus indicus*) stocks in
coastal waters of Sistan and Baluchistan
province

Identification of appropriate fishing
ground for lanternfish in Oman Sea-
Sistan and Baluchistan province

Evaluation the effectiveness and
protective duration of *Vibrio harveyi*
bacterine in Asian seabass

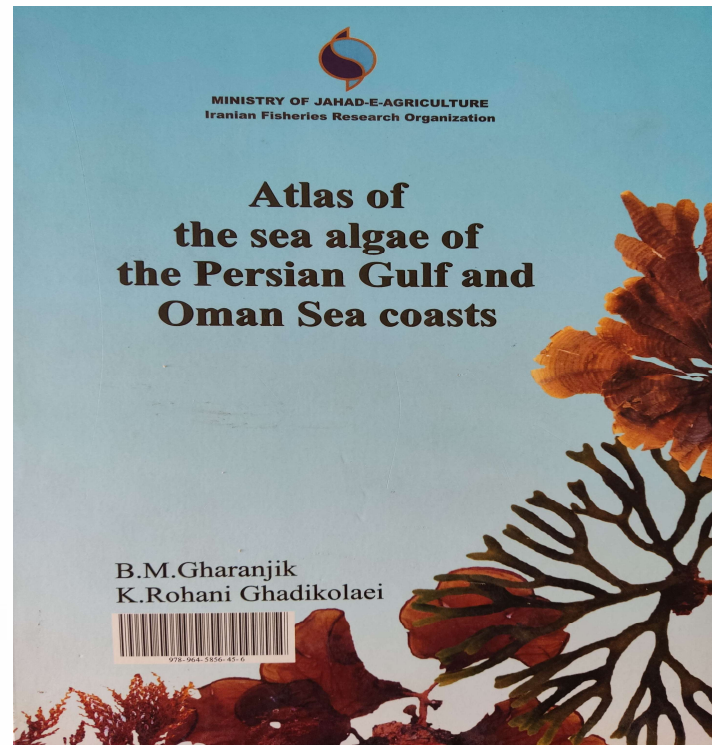


Among identified seaweeds, there are some important ones such as:

Green seaweed (Ulvaceae, Ulvales)

Red seaweed (Gigartinales, Gelidaceae, Hypneaceae, Gracilariaceae)

Brown seaweed (Sargaceae, Fucales).



Every year, in Average 3000 MT of seaweed washes up on beaches of Makoran



Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center

Gharanjik, B. M., Nazari, B., Saeedpour, B., & Valinassab, T. (2016). **Distribution and estimation of washed out seaweeds biomass in Oman Sea coastal waters.** Iranian Scientific Fisheries Journal, 25(3), 51-61.



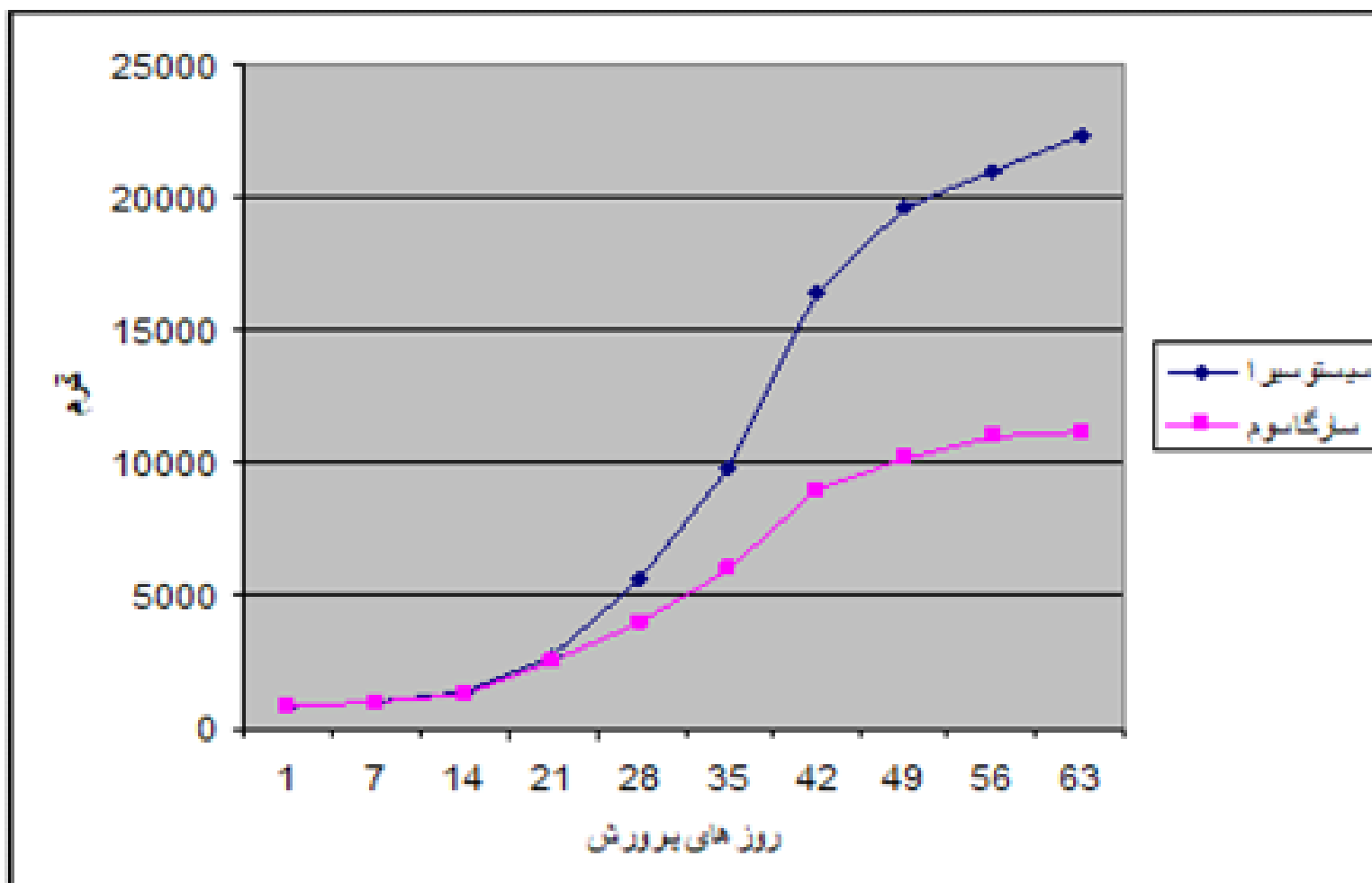
The foul-smelling Sargassum seaweed devastates the tourism industry and harms fisheries and ocean ecosystems.

Pond culture



Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center





Pilot *Ulva* sp. Seafarm 2020- 21









Hafezieh, M. (2014). Nutritional value of Chabahar Bay (Oman Sea) *Sargassum lentifolium* before and after monsoon season. *Iranian Scientific Fisheries Journal*, 23(1), 31-40.

Hafezieh, et al. ,(2014). Using Oman Sea *Sargassum illicifolium* meal for feeding white leg shrimp *Litopenaeus vannamei*.

Fariman, G. A., Shastan, S. J., & Zahedi, M. M. (2016). Seasonal variation of total lipid, fatty acids, fucoxanthin content, and antioxidant properties of two tropical brown algae (*Nizamuddinina zanardinii* and *Cystoseira indica*) from Iran. *Journal of Applied Phycology*, 28(2), 1323-1331.

Hafezieh, M., et al.,(2017). Dietary effects of seaweed *Sargassum illicifolium* on reducing cholesterol level of white leg shrimp (*Litopenaeus vannamei*). *Iranian Journal of Fisheries Sciences*, 16(4), 1248-1256.

Taheri, A., et al.,. (2018). Cytotoxic effect of the extract of seaweed *Sargassum glaucescens* against breast (MCF-7) and colorectal (HT-29) cancer cell lines. *KAUMS Journal (FEYZ)*, 22(3), 292-301.



Khajouei, et al.,(2018). Extraction and characterization of an alginate from the Iranian brown seaweed *Nizimuddinia zanardini*. *International journal of biological macromolecules*, 118, 1073-1081.

Shahri, E., at el.,. (2021). **Metal Contamination of Oman Sea Seaweed and Its Associated Public Health Risks.** *Biological Trace Element Research*, 1-10.

Akbary, P., et al., (2021). Sterol and fatty acid profiles of three macroalgal species collected from the Chabahar coasts, southeastern Iran. *Aquaculture International*, 29(1), 155-165.

Gahramzei, M., & Taheri, A. (2021). Antioxidant Properties of Organic Extracts of Seaweed *Rhizoclonium Riparium* from Oman Sea. *Journal of Marine Medicine*, 3(2), 107-115.

Hafezieh, M., et al.,(2021). **Biochemical composition and investigation on the economic feasibility of sodium alginate production of brown seaweed *Sargassum illicifolium* (Turner) C. Agardh, 1820 from Chabahar Bay (Gulf of Oman, Iran).** *Iranian Journal of Fisheries Sciences*, 20(1), 1-12.



4th International Congress of Fisheries and Aquaculture Research – Tehran- IRAN 2020

**The final production price for one kg feed grade sodium alginate
extracted from *Sargassum ilicifolium***

	Procedure	Amount	The cost \$
1	Collecting, rinsing and drying	one kg DW seaweed	1.14 \$
2	Chemical including formalin, sulfuric acid and sodium carbonate, ethylic alcohol and bleaching	0.5 lit.	3 \$
6	Drying, powdering and packing	Produced one kg sodium alginate	1.2 \$
7	electricity	Produced one kg sodium alginate	0.66 \$
8	Water supplying	Produced one kg sodium alginate	0.33 \$
9	Workers	Produced one kg sodium alginate	1.33 \$
10	Total production cost	Produced one kg sodium alginate	7.66 \$
11	Price in market (Chinese brand)	One kg	11.6 \$
12	Benefit of local production		4\$

4th International Congress of Fisheries and Aquaculture Research – Tehran- IRAN 2020



Micro Algae

Attaran Fariman, G., et al.(2014). **Identification of local microalgae & their evaluation as live food in aquaculture from Oman Sea.**

Totally **25 species** were isolated and purified, of which **12 strains were recorded in GenBank** and their nutritional potential were assessed.

Dunaliella cf. bardawill, *Isochrysis sp.* , *Cheatoceros sp.* , *Clorella cf. vulgaris*, *Ochromonas sp.* and *Synechococcus sp.* were the most important species research.

In our Phaycolab 5 species as live food stock

- *Chaetoceros calcitrans*
- *Nannochloropsis Oculata*
- *Isochrysis galbana*
- *Skeletonema costatum*
- *Spirulina sp.*



In 2018

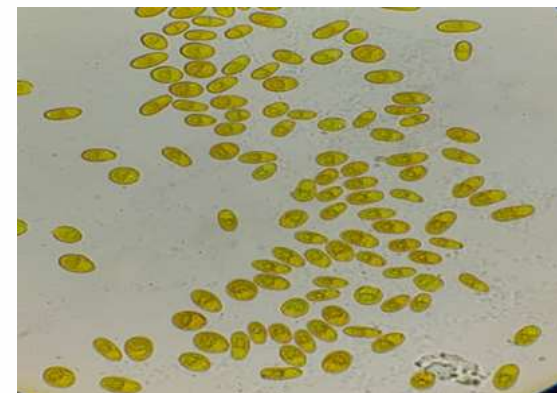


Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center

Isolation and identification of *Dunaliella salina*

Lipar lagoon, a bar built estuary with highly saline water

- Lipar Lagoon is known as one of Chabahar's main attractions due to its unique nature
- There are hyper Lagoon along the coastal path of Chabahar to Gwadar Bay on the coast of Gulf of Oman.
- look pink because of the presence of phytoplanktons.





In vitro and mas culture was done



Biochemical and molecular characterization(DNA sequence) was done.

Deposited of new Iran strains of *D. salina* in the culture collection of the ACECR





Biomass harvesting of microalgae *D. salina*

- Based on the obtained results, induction of alkaline environment at pH: 9/8 is an cost-effective technique for harvesting microalgae *D. salina*





Amini, M., Khoei, Z. A., & Erfanifar, E. (2019). Nitrate (NO_3^-) and phosphate (PO_4^{3-}) removal from aqueous solutions by microalgae *Dunaliella salina*. *Biocatalysis and Agricultural Biotechnology*, 19, 101097.

Aminikhoei, Z. (2021). Evaluation of flocculation induced by pH increase on harvest efficiency and fatty acids content of microalgae *Dunaliella salina*, isolated from Lipar lagoon-Chabahar. *ISFJ*, 29(6), 109-120.

Attaran-Fariman, G., & Sharifian, S. (2014). Distribution and Abundance of Phytoplankton Species with the Potential of Harmful Bloom in Southeast Coast of Iran. *Journal of Oceanography*, 5(18), 1-10.

Attaran Fariman, G., & Asefi, M. A. Checklist of Phytoplankton of the Persian Gulf and Sea of Oman. *Journal of the Persian Gulf (Marine Science)*, 10(35), 40-0.

Biomass production and harvesting of *Spirulina* sp. Saline water strain(On going project)



Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center



An opportunity for development and investment



Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center

Salt marsh / lagoon/ Coastal desert

The ministry of agriculture & Jihad support interested investors with loans and funds



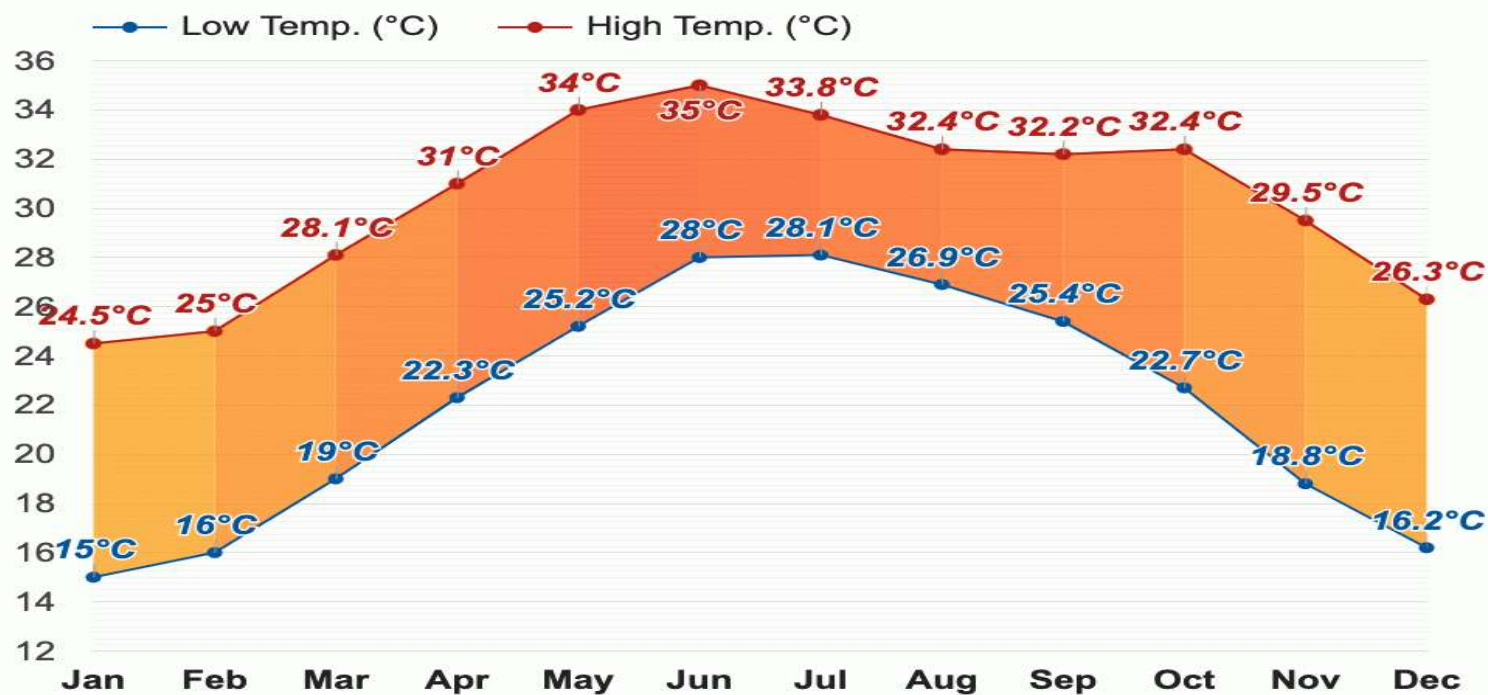
More than 42,000 hectares of Aquaculture site have been identified along the Makran coastline.

Average temperature Chabahar



Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center

Temperature - Chabahar, Iran



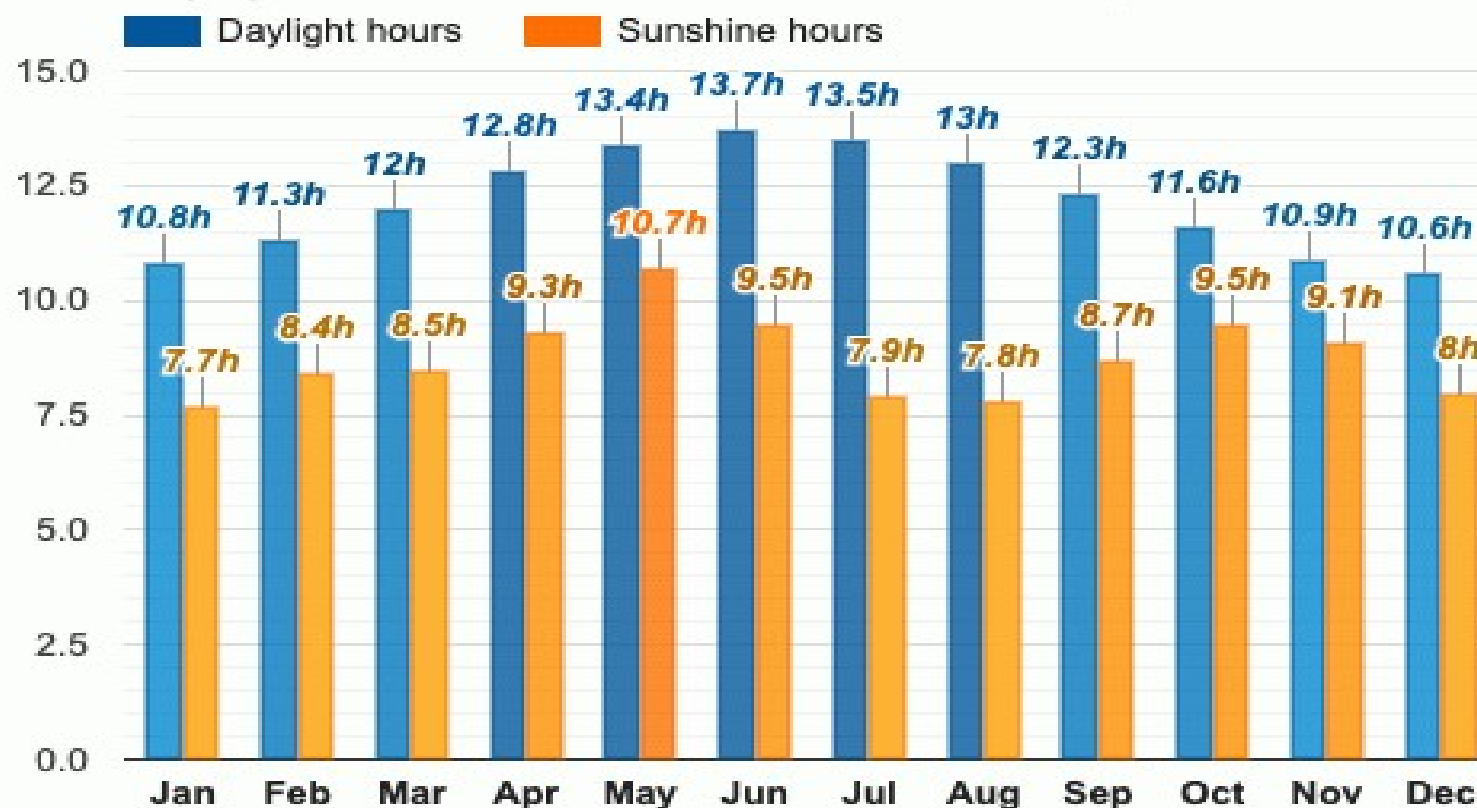
<https://www.weather-atlas.com/en/iran/chabahar-climate>

Average daylight / Average sunshine Chabahar



Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center

Daylight hours / Sunshine hours - Chabahar, Iran

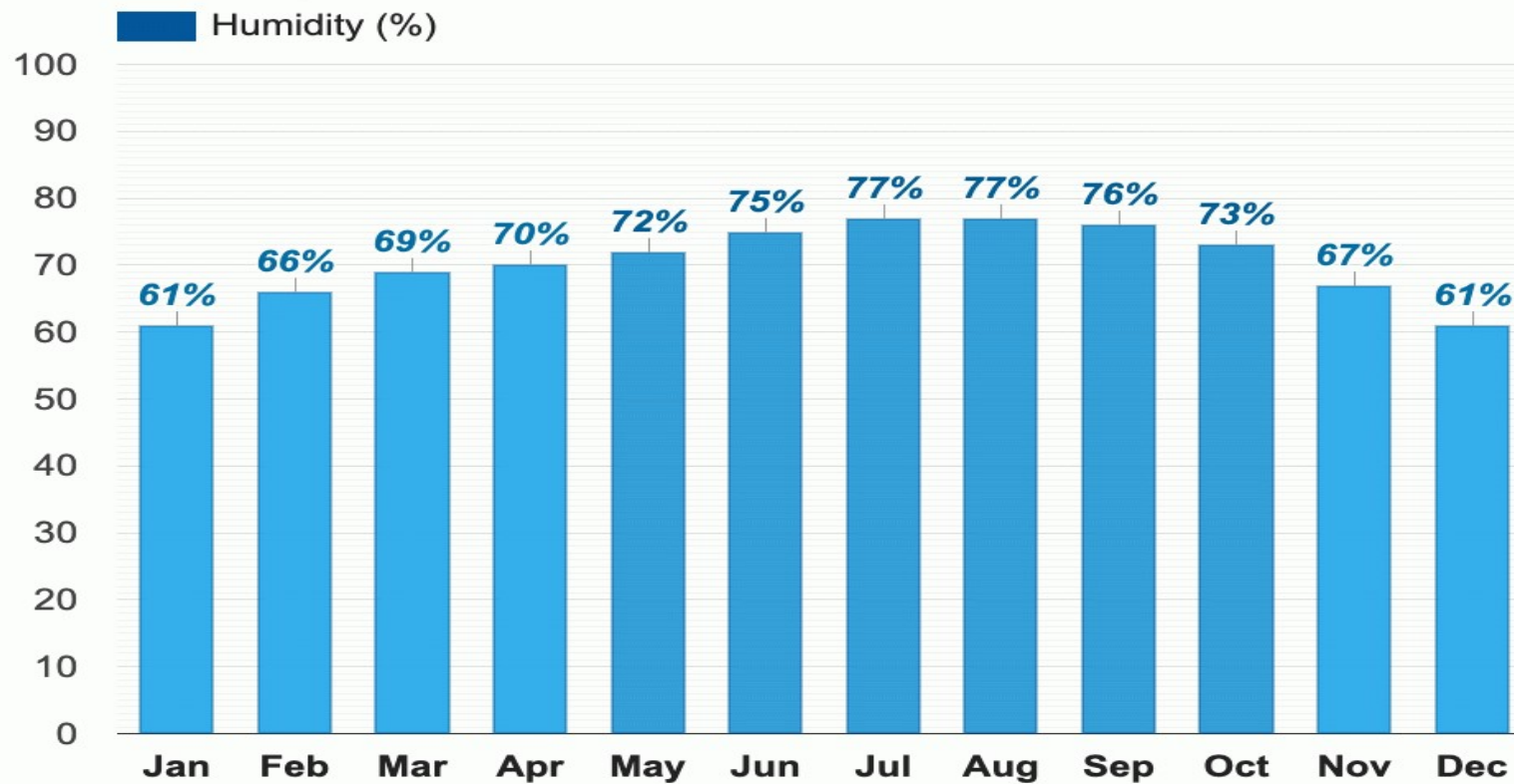


Average humidity Chabahar



Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center

Humidity - Chabahar, Iran





Agah, H., Saleh, A., & Jalili, M. (2021). Assessment of Environmental Parameters in Pre-and Post-Monsoons at Chabahar Bay, Gulf of Oman. Civil Engineering Infrastructures Journal, 54(1), 111-127.

The results showed that water salinity and pH with low variations were relatively higher in post-monsoon.

The average of **water alkalinity levels** in pre- (2.42 ± 0.02 mmol H⁺/kg) and post- (2.44 ± 0.01 mmol/kg) monsoons were comparable to that of oceanic surface water (2-2.5 mmol H⁺/kg).

66 phytoplankton genus and species belonging to 13 groups were identified in pre-monsoon.

Results demonstrated that nutrients were at higher levels inside the Chabahar Bay.

The **physicochemical parameters** of water samples were investigated and compared with international standards and data from other marine ecosystems.

The results indicated that the water quality falls within the stipulated range of **acceptability** and sampling area can be classified as **a good, stable, and healthy aquatic ecosystem**.



- ✓ - 12 fishing harbors and 6 multi-purpose breakwaters in the coastal strips from east to west of the province
- ✓ - Skilled native workforce familiar with navigation and aquaculture techniques
- ✓ - Access to open water, Good water quality, free of any industrial pollution, on the coasts of the province
- ✓ - Appropriate depth of water at a minimum distance from the shore
- ✓

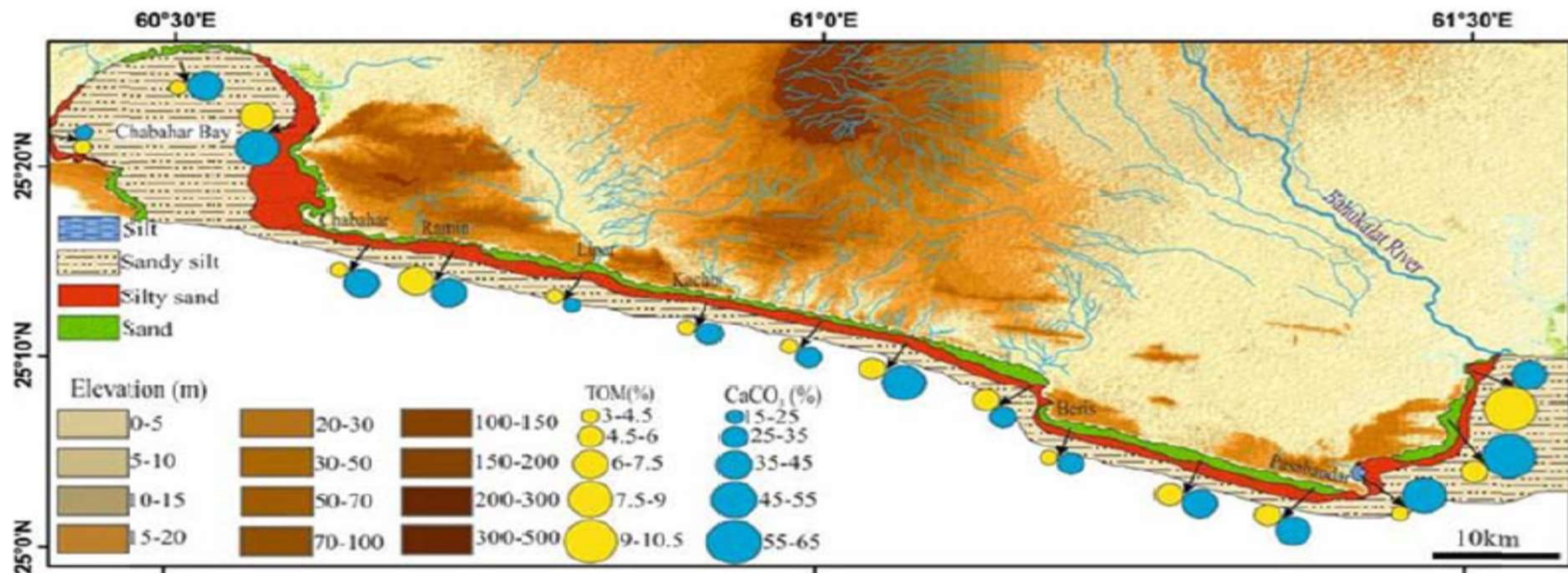


Fig 3: Distribution pattern of sediments along Iranian Makran coasts. TOM% and CaCO₃% of sediments are also shown



https://en.cfzo.ir/shahrak_detail/8

Why Chabahar Business Climate **Investment Opportunities** Investment in the Chabahar About Us Tourism News

Trade

Industry

Welfare Services

Tourism

Specialized Parks

Download Investment
Opportunity Booklet

WHY CHABAHAH?

INVESTMENT IN THE CHABAHAH

Facilities / Costs / Infrastructures





In collaboration with **Sis.&Balu. science and technology park** and **Chabahar Maritime University** : is going to do new areas of algae filed

- ✓ Extraction of high value-added products (polysaccharides, antioxidants...).
- ✓ **Production of seedlings for large scale farming.**(Marine macroalgal nursery)
- ✓ Germination, acclimatization and transplantation of seedlings obtained under laboratory conditions.
- ✓ Identification of carotenoids productivity under controlled conditions (irradiation and temperature).
- ✓ Evaluated to determine the most productive strains and to obtain a pool of potentially exploitable strains for **commercial production of β -carotene.**



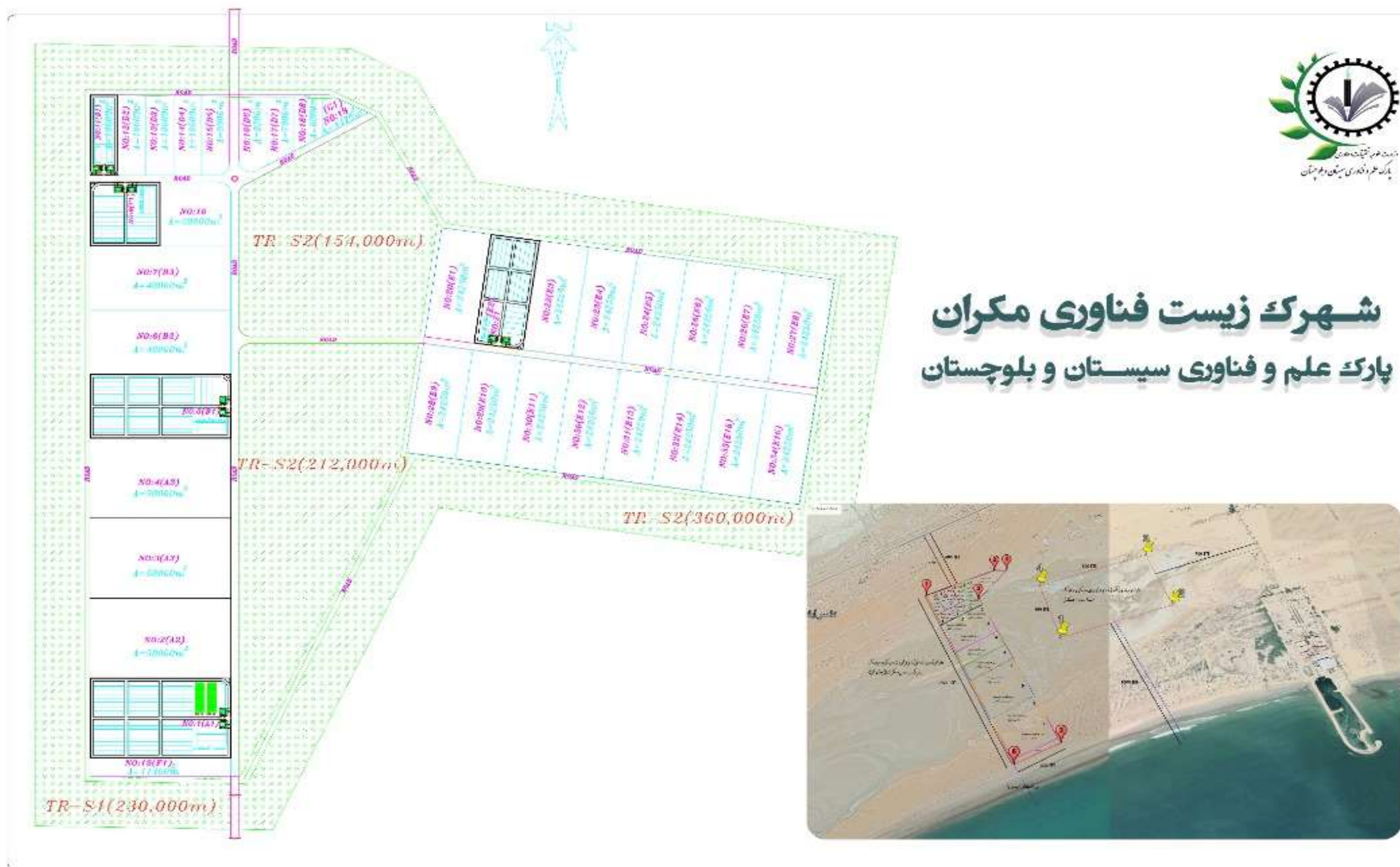
Algae Park In Chabahar



Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center



دانشگاه هرمز
پارک علم و فناوری سیستان و بلوچستان



شهرک زیست فناوری مکران
پارک علم و فناوری سیستان و بلوچستان

We can collaborate with China



Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center

- ✓ Exchange of science and technology through short periods in order to exchange knowledge on the methodology
- ✓ Instrumental techniques used in the field of micro and macro algae biotechnology.
- ✓ Workshops on **commercialization techniques**.





Iranian Fisheries Science Research Institute
Offshore Fisheries Research Center

Thank you for attention

