A Survey on Causes of Bleaching, Breaking and Dislocation of Coral Colonies in Chabahar Bay.

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Abstract

At south east side of Chabahar Golf, nearby the storage tanks of "The Administration for Harborage and Shipping" and at the verge of Shahid Beheshti jetty, there is a wide vast area covered by Coral Reefs.
This area is located in [52 25 17] degree of northern Longitude, and [60 36 66] degree of eastern latitude, and has been recognized, studied and protected since the year 2000.
On 2002 a secondary breakwater was established between the Beheshti jetty and the area of growing coral reefs. During the year 2004, the coral reefs in that area faced quite a serious problem due to dredging operation took place in the area, and also the existence of a new breakwater.
In order to estimate the loss and damages received by the coral colonies in the area, different methods were applied such as the Direct Observation method (via scuba-diving operation), Line Transect method, and the new method of Coral Watch. The results of the studies revealed the fact of an increase in the water's temperature and a decrease in the water's transparency, as well as accumulation of a great deal of sediments in sea bed.
A great deal deposits silted over the area, with a thickness up to 5 cm from the joining parts of the corals to the sea bed due to dredging operation, building a secondary breakwater and also diminishing the natural water circulation in the area.
After this event, the corals lost their symbiosis unicelloular algae living in their connecting parts to the sea bed and have turned into white color.
The direct observation showed that a great deal of the staghorn corals have been detached from their rear connecting parts the bed, and were leaned to one side. The studies made through the Line Transect and Coral Watch are also proving the existence of the pressure and appearing the unwanted agents in the area, which prevents the growth and developing the coral reefs.

The key words : *Chabahar Golf, Coral Reef, Coral Relocation, Coral Bleaching, Coral Watch, Line Transect, Zooxantellae.*

INTRODUCTION

The coral reefs are one of the most variable producer colonies on the earth, which are distributions among the warm, shallow and clear waters of the tropical areas. The coral reefs have a vital role in providing food and shelter for the fishes and mollusks living in the area. They are also helpful in breaking the erosive power of the waves, and saving the costal areas from being damaged and destroyed as a result of being attacked by the powerful waves.
Due to the symbiotic living of a unicelloular alga named Zooxanthellae, the structure of the coral reefs has turned to a primitive generating colony (Richmond 1993).The active biological compounds produced by the organisms settled in the above colonies have an anti bacterial and anti viral functions. (Van Paul & Alsstyne 1988).These important compounds may be a basis for producing some medicines with medical applications, and also the beauty of the colonies could attract a lot of tourists and researchers to the area. The corals are systematically categorized in the order *Scleractinia* in the class *Anthozoa* of the phylum *Cnidarians*. Approximately 6,000 species of Anthozoans exist, all of them are marine (Pechenik 1991).
The coral reefs are one of the most important builders of lands and islands in tropical areas (Goreau et al, 1979).The general structure of them is compounded by Calcium Carbonate, which is produced by a small specie named “Polyp". The corals are not the only generators of the reefs, but the unicellular algae coexisting with the polyps, tubular worms and some types of the mollusks have a role in constructing this calcareous structure (Cousteau, 1985).
These organisms altogether will produce different variable corals. In Iran also, there are some islands with coral based structure occupied by the living society of human beings (Kish Island). A coral colony may consist thousands of polyps. They are very small carnivorous animals, fed with the small suspending animals and articles in the sea. Nevertheless, the unicellular algae coexisting with the coral polyps are considered as the most important food providers for corals (Rowan & Powers, 1991).There are great deals of the organisms situated in coral reefs; all of them have a little resistance against the environmental transformations. Moreover, coral reefs are by nature a very sensitive creature, and could be damaged very severely (Richmond, 1993).These aquatic animals are very much capable for being affected by bleaching or other diseases. Violent sea storms, deforestation, roughs waves from the sea and the human manipulations in the environment are of the most important causes for injuring these aquatics. The above aquatics have a very important role in increasing the bio-diversity, preparing a suitable shelter for the other aquatic animals, oxygen generating as well as developing and promoting the business of the fishermen in the area.
There are different methods for studying the health condition of the coral reefs, all of which are based on the depth and water transparency. One of the oldest methods is the method of direct observation through the diving operation.
Another method is called “Manta Tow” (Figure 1), which is famous for its rapid method of study. In this method the operator is pulled over the water by means of a floater, and indicates the specification of the target area. Considering the fact that Chabahar water from the matter of lucidity is categorized in highly blurred waters, the above method will not be useful for this very area.

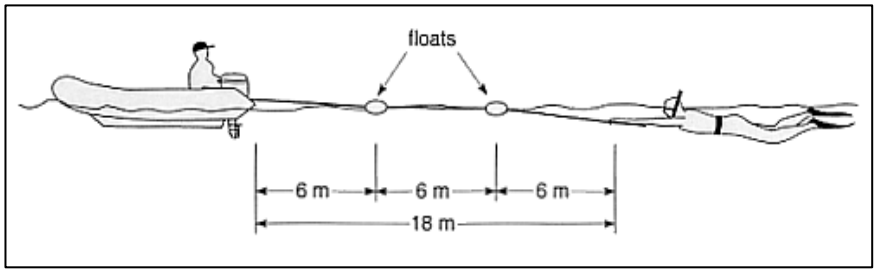


Figure 1. Manta tow method

The Line Transect method is another method performed by means of diving, and is designed by Reef Check. In this method different equipments are applied such as SCUBA (Self-Contained Underwater Breathing Apparatus), waterproof stationeries and some other stuff.
Then a distance up to 100 meter is chosen in a coral area, and the area within 2.5 meters from the both sides of the installed scale is scanned and exercised from the matter of the condition and the type of the sea bed, variety of the living creatures, physical condition and the type of the coral colonies. All the information obtained from this study will be indicated on the waterproof stationeries (www.reefcheck.org).
CoralWatch is another method, invented by Queensland University of Australia during the recent years, which is considered as one of the simplest and at the same time of the most accurate methods of viewing the coral reefs. In this method one waterproof table consisting different colors with variable ranks of colors measured from very dark to bright and fade color is used. You can easily determine the congestion level of the symbiotic unicellular algae living with corals by means of this method. There are different methods for performing the task such as SCUBA (Self-Contained Underwater Breathing Apparatus), Snorkeling as well as studying over the corals located above the tidal zone. In this last method, the colonies are chosen quite randomly by simply walking on the coastal area. Then the darkest and brightest parts of them are determined among the chosen colonies. In next step, each one of the selected parts is compared with the Coral Watch's color variation table, and the relevant code of the color for that part is recorded. The collected data will be transferred to the Coral Watch's website (www.coralwatch.org), and the results will be declared to the researcher by means of columnar charts. In the present study, all the methods are applied in order to find the causes of the breakage, bleaching, and dislocation of the colonies, and finally the practical methods and systems are provided in order to save the only coral area in Chabahar Bay.

MATERIAL AND METHOD

The researching area is located on the southwest verge of Chabahar Bay nearby the Shahid Beheshti jetty. In recent years, this area has been surrounded by the two northern and southern breakwaters built in Shahid Beheshti jetty.
In addition to the above two breakwaters, the "Hotel Daryaiy" breakwater, which was built less than six months ago, has been spread over an area more than 2 km of the north eastern part of the coral's growing area from west to east direction.

There are two different ways to reach to the area:

- Passing through the territory of “The Administration for Harborage and Shipping”, which a special arrangement and a formal permission is strictly needed for passing through the above area.

- By means of a fishing boat, through “Haft-e-Tir jetty” or via the northern bank of Chabahar Bay.

The coral growing area is almost a triangular shaped zone head of which, is joined to Shahid Beheshti jetty and the base, from one side is connected to the “Hotel Daryaiy” and from the other side is headed for the west and then resumed to Tiss district. The last estimation from its area reveals that a wide vast area over to 6 hectares was covered with coral reefs, staghorn and brainy corals and soft corals etc. The construction operation took place in Chabahar Free Zone for the purpose of developing the area, was reinforced almost since 2002. Most of those operations could be brought to the attention as follows :

- The construction of breakwaters.
- Extending the berthing stations.
- Prolonging the length of Shahid Beheshti jetty.
- Dredging operation in Chabahar Bay for increasing the depth of the area in order to help berthing process of the big ships and vessels in Shahid Kalantari wharf.
- The drainage project performed by Chabahar authorities for drying a part of the Bay in order to develop Chabahar port.

In the present study, which is executed through diving operation, the above area was examined minimum once a week, and all the changes made to the coral colonies, and the type of the changes, as well as the subsistence variety dominating the area, and any other inevitable events has been indicated.

Moreover, the coral colonies have been exercised from the matter of health condition by means of Coral Watch method. In this method, which is widespread during the recent years, and is going to be recognized as the simplest, most accurate and cheapest method of estimation, a colorful table consisting variable colors with different levels of measurements is used.
The colonies to be studied are chosen in a completely random way. The type of the sea bed, the type of the corals from the matter of appearance (e.g. branchies, brainy shape, dish like, and soft type) will be determined and registered. In order to find out the congestion level of the symbiotic unicellular algae living with corals, the brightest part of a coral bush is firstly selected, and then it is compared to the color ranked chart. Then the code of the relevant color matching the selected part of the coral is registered. The same procedure will also be applied for the darkest part of the coral bush, and the relevant code would be recorded as well. In each survey, this method should at least be applied on 20 different colonies, and the obtained information should be transferred to the “Coral Watch” website. The results will be revealed by the website to the owner of the data after analyzing the data. The physical factors of the water such as the transparency, the temperature, and the level of suspending sediments in the water were also recorded. The measurement of the level of suspending sediments in the water could simply be made through filtering one liter of seawater taken from the surface of the coral colonies (Roger, 1983). In order to determine of water’s transparency, sachi disc was used. In

this survey, the level of water's transparency was compared to the same obtained from the waters taken in three different steps in the past e.g., before, during and after the construction operation in Chabahar port. The water temperature will also be recorded by a digital thermometer taken to the water on the top of the corals.

RESULTS

The trend of sedimentation in the growing area for the corals were measured and recorded during 2001 till 2007, and the relevant results are brought in figure1. As you can see, the sedimentation indicator on the chart shows an ascending speed, except for the year 2004, which an outstanding discrepancy is observed comparing to the years before and after that date. During the surveying period, the minimum amount of sedimentation was observed in winter, and the maximum amount was found and registered in summer season.
The suspending sediments in the water on 2001 used to have an average level of 5.5 mg/liter. However, on 2008 the above measurement reached up to an average level of 12.6 mg/liter. There only exists an obvious illogical discrepancy during the year 2004, in which the suspending sediments in the water was reached and registered up to an average level of 15.5 mg/liter.

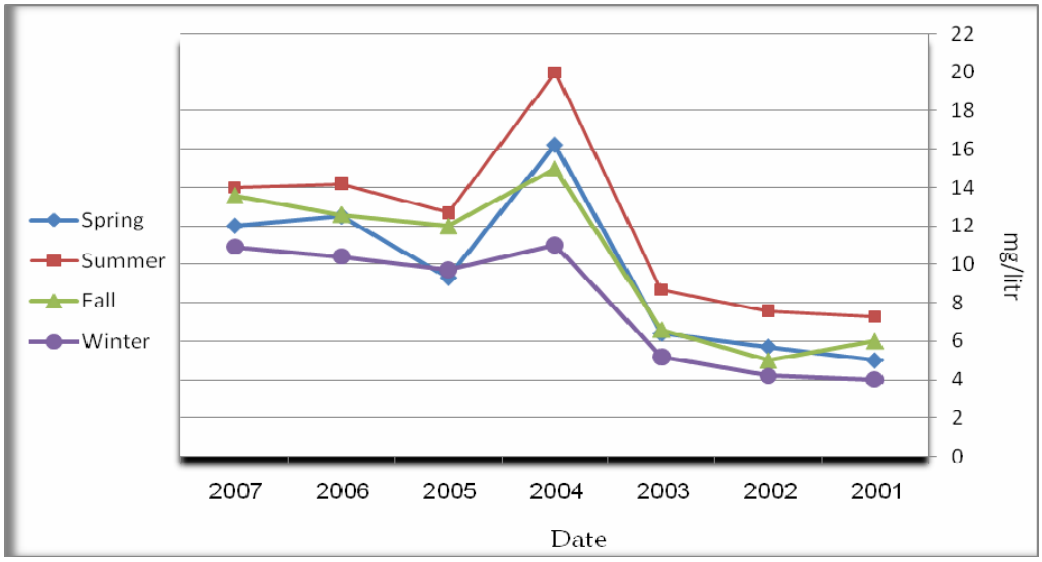
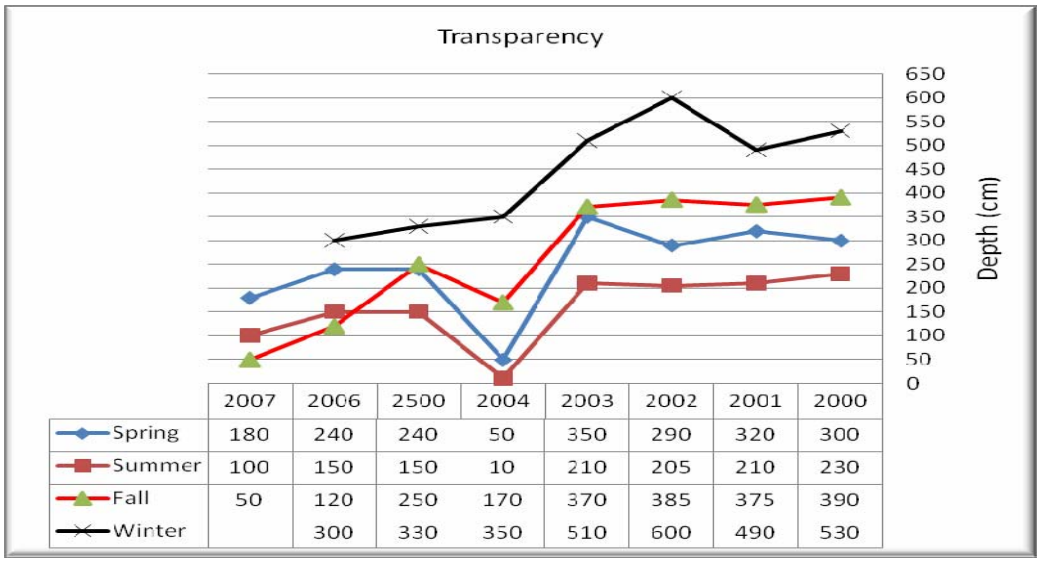


Figure1. Sedimentation rate from 2001 - 2007

In the meantime, the results of the surveys made on the water's transparency are showing that the rate of the clarity among the growing area of the corals enjoys a descending trend during the years 2000 till 2007.
As you can see on figure 2, the maximum level of transparency observed in Chabahar Bay was up to 6 meter depth, which was recorded during the early 2002.This was while; the recorded level for the same factor during 2001 till 2004 was between 5 to 6 meter depth.
Yet, the above level showed a continuous trend of diminishing, which on 2007 reached into 3 meters. The water's transparency level showed a great deal of fluctuation in different years. The amount of this factor, especially after the year 2004, shows a serious decrease comparing to that of in preceding years.

In this regard, the lowest rate for the transparency was observed and indicated during the summer, specially the summer of 2004.



	2007	2006	2500	2004	2003	2002	2001	2000
Spring	180	240	240	50	350	290	320	300
Summer	100	150	150	10	210	205	210	230
Fall	50	120	250	170	370	385	375	390
Winter		300	330	350	510	600	490	530

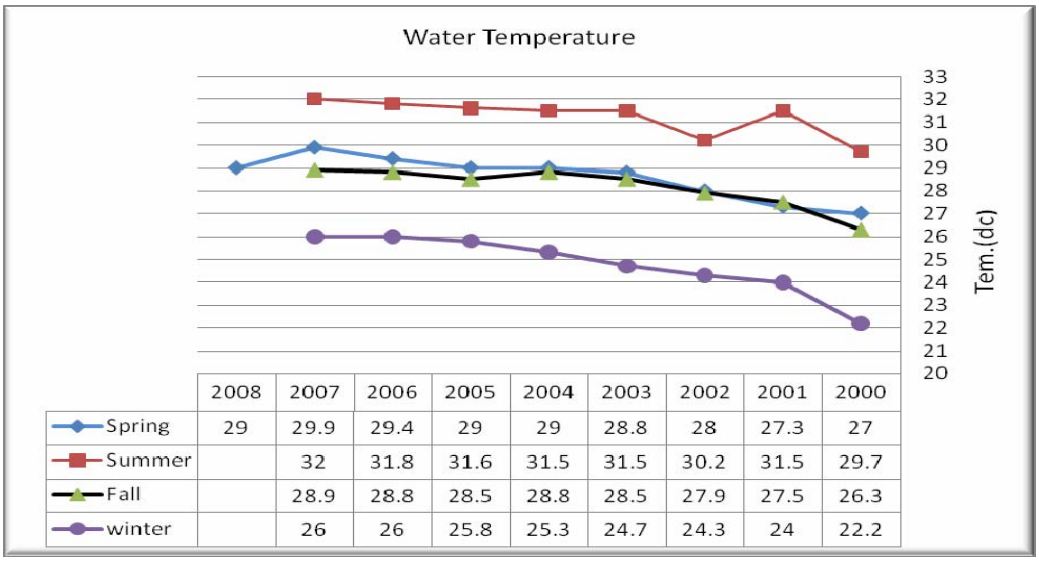
Figure 2. Water transparency rate from 2002 -2007

The temperature's indication started from the year 2000, and was continued till now (the year 2008). As brought in figure 3, the average of temperature in each season comparing to the same of the previous year, shows a relatively increase.

The water temperature shows a continual increase since 2000. As an example, the water's temperature on early 2001 was approximately 22.2 Centigrade degree, and right at the same date in next year; this temperature increased to 26 degree of Centigrade. The water's temperature on autumn of 2000 increased from 26.3 degree of Centigrade to 28.9 on the same season in next year. This factor varied from 29.7 degree of Centigrade on summer of 2000 to 32 during the same season on the year 2007. On spring 2000, the indicated temperature was 27 degree, which was reached to 29.8 degree during the same season on 2008.In addition to the continuous recording of water's temperature in Chabahar Bay during the years 2000 till the spring of 2008, this factor was also measured from the corals' surface in different parts of Chabahar Bay by means of a CTD machine after the *GONU* Hurricane, on 2007.

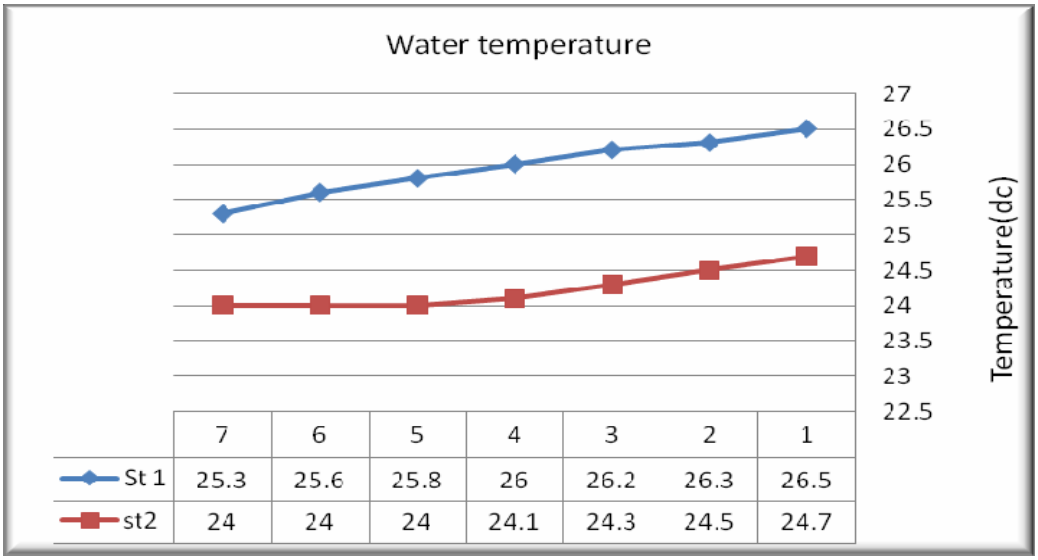
The figure 4 tells about the range of water's temperature in various depth of the growing area of the corals in Chabahar. As indicated, the station No. 1 (St. 1) is the main area of the growing corals in which, the water's temperature is averagely 1.78 degree higher than the station No. 2 (St. 2).

This area is almost located in the middle part of Chabahar Golf, and is receiving the least influence from the breakwaters.



	2008	2007	2006	2005	2004	2003	2002	2001	2000
Spring	29	29.9	29.4	29	29	28.8	28	27.3	27
Summer		32	31.8	31.6	31.5	31.5	30.2	31.5	29.7
Fall		28.9	28.8	28.5	28.8	28.5	27.9	27.5	26.3
winter		26	26	25.8	25.3	24.7	24.3	24	22.2

Figure 3. The comparison of the average of water temperature in different seasons of the year.



	7	6	5	4	3	2	1
St 1	25.3	25.6	25.8	26	26.2	26.3	26.5
st2	24	24	24	24.1	24.3	24.5	24.7

Figure 4. The comparison of water temperature in station 1 & 2.

Considering the existence of different types of the portable and laboratorial equipments for indication of the data obtained through the researches, direct observations of the coral reefs through diving, in order to monitoring of the corals' conditions and their requirements is still enjoying of a great and special importance. So, the growing zone of the corals in the present study was examined from the matter of the health condition of the coral bushes. The researches made from the area until the year 2000 is telling that the coral colonies are enjoying a good health, in a way that no unusual signs such as breakage, whitening, or any kind of disease had been observed until that time.
However, within the speeding up of the process of dock building in that area (started since 2004), and the dredging operation in Chabahar Bay at the same year, the quantity of suspending sediments was increased by a great deal.
Later, some unusual cases such as "White Band Disease", and abnormal conditions like moldiness of the corals were found in the area especially among the brainy type of the corals. (Figure No. 5)

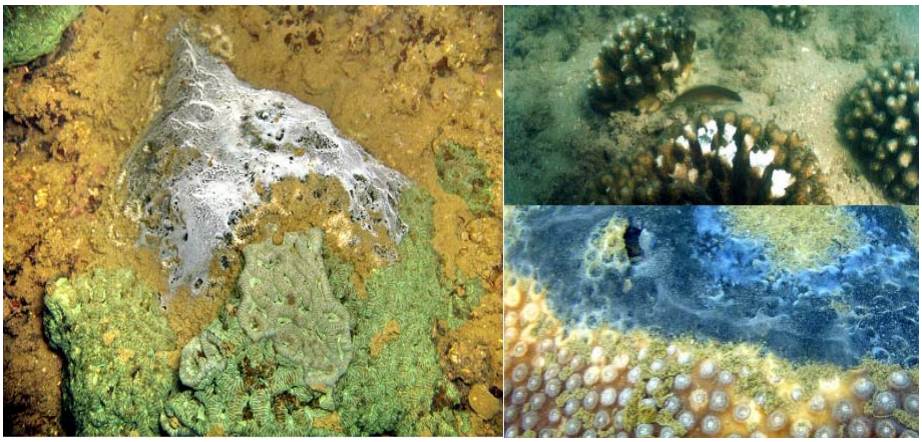


Figure 5.The damages due to port construction on the coral colonies

The damages made to the coral colonies began right after intensifying the port construction operation, which was pursuing the establishment of secondary breakwater in Shahid Beheshti jetty. The construction of this breakwater disconnected the coral's growing area from Shahid Beheshti jetty. The location of the above breakwater was shown in western side of the corals growing area alongside the wharf of Shahid Beheshti in figure 6.Due to development of the construction operation in the area (specially breakwaters construction), the trend of silting process in the area was gravely reinforced, in a way that in less than 6 months, the thickness of the sediments settled down in the area reached to a height of over 5 cm all concentrated at the rear parts of the coral right at their connecting parts to the sea bed. Direct observations revealed that the coral colonies lost their symbiotic algae from the rear part. Pursuing to the researches and the direct observations, it was distinguished that the population of some aquatics such as tubular worms, different types of geysers and sponges etc…. was grown in the lower parts of the coral bushes. In early 2004, the isolation operation of the new dock of Shahid Beheshti by wax was started. Right at the same period of isolation, the Line Transect studies showed that 80 percent of the coral bushes were detached from their bed. In one of the case studies was made parallel to the wax isolation procedure, the voice vibration was so dreadful that made the simultaneous working for the diving team in the area so impossible, and as a result, they finally

had to come up to the surface, and leave the water until the complete interruption of the waxing operation.

Figure 6.Chabahar Bay, Coral growing area and their position against the portal establishments.

The detached colonies from the sea bed were rolled or moved due to the traction power of the high/low tide. Then the crown parts of the most colonies were separated and took place among the deposits of the bed, and the colonies lost their symbiotic algae as a result. Figure 5, gives a bright view about the destroying effects of portal development activities performed in recent years on coral colonies. The bleaching of the upper side of the corals, penetrating of different unwanted materials to the fretwork, breakage on the junction parts as well as the disconnection of the wholesome colonies from the sea bed, are of the very important items that could be observed in below picture.

Figure 4. The effect of the human activities on coral colonies

Since the year 2007, Shahid Kalantrari and Shahid Beheshti's habitats went under the investigation and observation by means of "*CoralWatch*" method, and all the surveys are still being continued. Figure 5, shows the results of the surveys made about the health condition of corals only during the years 2007 and 2008. Out of the total of 127 coral colonies which were studied and observed, 9 colonies enjoyed the color score1 and 2, 42 colonies the color score 3, 59 colonies the color score 4 and 17 colonies the color score 5 and 6.

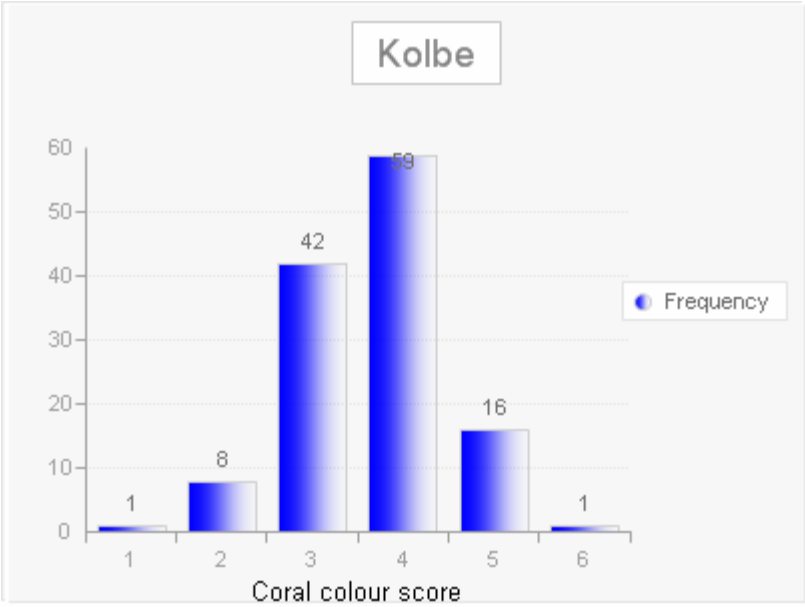


Figure 5. The numeral frequency of coral colonies in diferrent color scores

Figure 5) The CoralWatch's colorful chart and the method of conformity of the chart with a coral colony

Discussion

The corals are need of light for doing photosynthesis, and also in order to make food to be able to survive. Whatever that can prevents of the receiving light to them, will seriously bring stress to them. One of these factors could be the suspending sediments in the water. In case the congestion level of these sediments in the water reaches to 10 to 12 mg/liter, the corals will completely undergo a stressed condition (Roger 1983).The results of the examinations made in this research shows that the amount of the suspending sediments in the waters of Chabahar Bay, specially in growing area of the coral colonies are showing an ascending trend during 1999 till the early 2008. As brought in fig.1, this figure shows a growth from 5.8 mg/liter in 2001 to 12.62 mg/liter in 2008, which is already exceeding the stress limit for coral colonies (Roger 1983). Yet, in 2004 this figure was increased to 15.55 mg/liter once again, which is much higher than the stress tolerance for coral reefs.
The results obtained from the direct observations proved the sudden increase in the level of suspending sediments in the water and therefore, the destroying effects of them on the coral colonies. This is because a lot of colonies lost their symbiotic algae. Such an event could damage the coral colonies in different ways such as:

- The photosynthesis disorder due to diminishing the light's penetration to the water's depth as a result of increase in the level of suspending sediments in the water (Kinzie et al,. 2001).

- Due to the increase of suspending sediments and down fall of them on the coral surfaces, the polyps will have to sweep and clean the sediments from their surfaces. Resulted in, they will have to expend a lot of energy and use mucus for remove the sediments. These conditions will bring up the corals become seriously vulnerable.

- In addition to making their food through the daylight photosynthesis, the corals also struggle for gaining another part of their food through hunting the microscopic animals (zooplanktons). However, the suspending sediments in the water will sit over the planktons, cause them to become heavier and settle down the seabed, and finally it avoids the corals from being fed by such a nutritious microscopic animals (Rolf Back p.m. 1978)

In order to make the topic more clear, and to prove the existence of the suspending sediments in the water, specially on the surface of the coral colonies, all the results coming from the examination of water's transparency have been discussed. The compare of the obtained results reveals a descending trend for this topic especially in 2004, in which the water transparency reached to its lowest level. The port development operation, the construction of various breakwaters in the way of natural flowing of the water, as well as dredging operations has been of the most common reasons for decreasing the transparency of water (Carolin et al, 1997) Considering the fact that Oman Sea is classified in rich waters from the matter of nourishing sediments it contains, the level of suspending articles in this water should naturally be higher comparing to that of Persian Golf. On the other hand, the coastal waters of Sistan and Baluchestan province are affected by monsoon phenomenon during the summer of every year, and this phenomenon potentially could cause the water's blurriness. Now, due to the recent events happened in the corals area, the most important of which could be the construction of breakwaters, most of the suspending sediments of the area have been blocked in the area, resulted a blurry water and also speeding up the sediments laying process, and this event is vigorously dangerous for the coral colonies. In the meantime, the results obtained since 2004 are showing a severe decrease of water's translucency right at the time when dredging operation took place in Chabahar Bay. Because of this operation, which lasted for a period of 8 months, the density of suspending articles in the water was increased. As brought in graph 2, the average level of water transparency on summer 2004 was 10 cm, on autumn of the same year this score was 170 cm, on winter 350 cm, and on the next year's spring was 50 cm. Nevertheless, this level is much lower comparing to that of the previous years. While studying the graph, we also get that the transparency of the water in Chabahar Bay shows a descending trend. In order to make the matter quite clear, we found it necessary to have a comparison over the water transparency level on summer of 2001, whose results was obtained on 2007. The water's transparency on summer of 2001 (in which the water was at the most obscure level due to the monsoon phenomenon taking place in that season) was 230 cm. This is while this rate reaches to 100 cm on summer of 2007. In general, during the winter this factor will reach to the highest level in the area (e.g. on winter 2003 it was reached up to 530 cm), and on the same season in 2007 this factor reduced to 300 cm. The breakwater of Shahid Beheshti's jetty has been moving ahead up to 1500 meters to the west. Moreover, a secondary breakwater was established between the oil storage tanks and Shahid Beheshti's jetty during this period.
In 2008, a third breakwater with a length of over 2000 meters has also been created right in the area of growing corals. The disconnection of the area from the direct streams of the open sea, and therefore changing in the path of water flowing in the Bay, from one hand, and the continuation of the construction operation in the area from the other hand, left the area with more suspending sediments and therefore more sediments laying in the area of growing corals.

The increase of suspending sediments and reduction of water transparency is of the most obvious events observed during the diving operation (obtained from the observation of the native divers).
The streams of the water, as well as the air blow and the seasonal downfalls are of the most common reasons that could cause some changes in water's temperature. On the other hand, any kind of construction avoiding or diminishing the natural stream of the water in the area will raise the possibility of the changes in the temperature of the water in that area.
This event is apart from the gradual warming of the earth. The results obtained from the present study will also prove the accuracy of this theory. The suitable temperature for growing and spreading the coral colonies is between 25 to 29 Centigrade degree (Goreau et al., 1979). In case the water's temperature increase for 1 to 1.5 degree above the usual and normal temperature, the coral reefs of the area will face a sever problem (Robert et al 2003).
By having a look over the results obtained from the present study, we can easily learn about the ascending trend of the water's temperature in some parts of the Bay stopped by the breakwaters. As brought in graph 3, the difference between the averages of the water's temperature in Chabahar Bay in 2007 was registered for 2.9 degree of Centigrade.
Likewise, during the investigations made about the water's temperature in two different stations (one in the coral area surrounded by the breakwaters, and the other in an area out of the breakwaters influence), the water's temperature was measured from the depth of the sea bed till the surface of the water by CTD system. The results revealed that the average of the temperature registered in station No. 1 (the one surrounded by the breakwaters) was 1.8 degree higher than the one obtained from the station No. 2 (which was out of the area influenced by breakwaters). It seems that the severe reduction of water's flow due to the existence of the breakwaters, the gradual decreasing of the water's depth in the growing area of the coral reefs as a result of silting process, the increasing of sunlight's penetration (because of the depth reduction), decreasing of the downfalls in recent years have caused a relative and gradual raise in temperature of the surveyed area. The results of the studies made by the others are also describing that if the temperature in the hot months of the year goes up for 1.5 to 2 degree higher than the resisting limit of the corals, they will undergo a drastic damage, and in most cases they will totally be destroyed.
So, in most of the surveys made during the past two decades, the raise of the water's temperature has been considered as the main reason for corals whitening (Brown and Ogden, 1993). There also exist some other explanations for severe damages entered to the coral reefs, such as strong radiation of sunlight, settling down of too much sediment on the surface of the corals etc. (Berkelmans et al, 2003).
Considering the recent innovation of "CoralWatch" method, this method has just been applied (since 2007) for investigating of the area. As brought in figure 5, out of the total of 127 colonies examined in Shahid Kalantari and the nearby area, less affected by the portal development operation, 9 colonies scored number1 and 2, 42 colonies scored number 3, 59 of them gained an score of 4 and 17 colonies scored number 5 and 6. Considering the above graph, we can conclude that almost 50 percent of the colonies could allocate the score 4 and upper to themselves, showing to be enjoying of a good health condition. Yet, for the remaining 50% we can say that they are located in a border line, and even the tiniest changes in their living environment could cause a serious damage in their lives.

In evaluation of the coral colonies in *CoralWatch* method around Shahid Beheshti jetty (where the most construction operations are located), it has been found out that over 50 percent of the coral colonies are on a border line. The direct observations have also revealed that the coral colonies repeatedly lose their unicellular symbiosis algae during a period of one year, and replace them by new ones over and over. This phenomenon happens to the corals at any time they will undergo a stress, and as soon as their stress is disappeared, the corals will restore to their original condition. In other words, the corals will begin absorbing new symbiosis algae when their stress is removed.

In addition, the occurrence of this phenomenon is not useful to the corals, and if in one of the above events, the replacement procedure takes a time of longer than the usual period; the corals will most probable be terminated.

The most disastrous event during the survey process happened in 2004. During the investigations made by diving operation, it was observed that most of the colonies have been detached from their connecting parts to the bed of the sea, and have been leaned over to one direction. Since no breakage or any other sign was found on the appearance of the corals, we could conclude that no human manipulation caused this event. After a lot further studies, following two items have been supposed as the reasons for the detachment of the colonies:

a) The increase of the silted sediments on the bed in the corals growing area.

The observations indicated during the year 2004 shows that most of the colonies have been buried up to their crown area under the sediments heaped on bed, and this is due to the congregation of sediments at the sea bed.

It is evident that after such an event, the corals will lose their symbiosis unicellular algae at that zone, as a result of which, after a long lapse of time the bleached area of the corals will be attacked by a lot of unwanted creatures such as sponges, tubular worms, Ophiurids and etc. Then after a while, the calcareous tissue of the bleached area, will be weakened and perforated due to the activities made by the aquatic animals. In this condition, even a simple traction made by high/low tide, or a simple force by the waves power, could easily detach the corals from their bed. According to the present survey, one of the main reasons for the corals' detachment from the bed was intense waves, and the vibrations produced by the strokes of 60 MT electrical hammers used for installing the strong columns of Shahid Beheshti jetty.

There are lots of evidences proving the above event. Firstly we can say that the detachment of all the bushes happened within a sudden period of one or two days, which we can say that this event happened quite unexpectedly. Secondly, I could recall that right at the time the hammers were working, I (the composer) together with my colleagues was diving under the sea, and heard the sudden and horrible noises and vibrations, which were too unbearable that made us stop the operation and leave the water so quickly. Due to the vicinity of the corals area to the location of the electrical hammers, in each time of hitting, the soft layer of silted sediments on the bed of the sea were moving in a way that you could fancy the sea bed had gotten a heart beat, exactly like the body of a human being! As a result of the above beatings, those coral bushes, which had already become sensitive and bleached in their connecting parts, detached completely from the bed. Afterwards, most of the detached colonies were swerved to one side (rolled over their crown), and finally they sank to the silt from their crown parts upward down (due to the heavy weight of their crowns), and finally the main part of the body of the colonies became bleach due to sinking in the sediments.

The light colonies were also trundled over the sea bed by dragging forces coming from the high/low tide, which resulted that, they have been broken/ relocated.

CONCLOSION

In a general look, we can say that the initial operations made for the purpose of port development, totally mislead or even blocked the natural stream or of water in Chabahar Bay. This action along with the daily development of the portal operations caused a great deal of leftovers and sediments settling in the area over the corals body, and also resulted a big mass of sediments taking place right on the connection parts of the corals, and therefore damaged this delicate part of them.
In this situation, the colonies had no power to resist against the forces entering to them from the waves' movement, noises and vibrations from the operation of electrical hammers, as well as the attraction power of high/low tide, and this is why they were easily detached from their bed.
The present study, and the existing evidences in the area tells that a great number of the coral colonies in Chabahar Bay have been terminated, and only a small number of them have succeeded to survive. However, this little number is now being threatened by the construction projects taken by the authorities for the purpose of the establishment of a Mega port in the area, and the colonies are going to be devastated in a not far future.
Unfortunately, it was almost impossible for the research teams to take a more extensive investigation in the area due to the severe prohibitions directed by the portal authorities in the area. Considering the inevitable process of the projects running in the port by the portal authorities for the purpose of extending the area, I believe that the only way to protect the remaining small number of the colonies in the area could be:

- The permission of the authorities for continuation of the researches, surveys and investigations in the area.

- Moving the stressful delicate colonies to a secure and remote area, totally far from the destroying effects of the portal construction.

- Preparing a sanctuary protected condition in the new area of the colonies based on the latest scientific methods of healthcare for the colonies.

I deeply hope that we could achieve the above mission by means of the Almighty God's supports, and a determined cooperation from the people's and authorities' side, in order to protect and honor these beautiful creatures gifted by the God and save them for our future generations.

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