



# IAS MAINS 2019-GS1

## Q4- Answer

- By

*Munish Bansal*

IIT Delhi

**GRACE IAS- Vijaynagar, Bengaluru-7899678279, 9886800910**



# Coral Reefs

**GRACE IAS- Vijaynagar, Bengaluru-7899678279, 9886800910**



**GRACE IAS- Vijaynagar, Bengaluru-7899678279, 9886800910**

- **Assess the impact of global warming on coral life system with examples.**



# Introduction

**GRACE IAS- Vijaynagar, Bengaluru-7899678279, 9886800910**

- **How acute is the situation?**
- **What are coral reefs?**
- **What is the importance of Coral reefs?**

- **According to UNESCO, Corals of all 29 reef containing World Heritage Site will perish by 2100 if Global Warming continues at same rate**

- ▶ According to IUCN, over the last 3 years , reef around the world have suffered from mass coral bleaching events.



- **According to WWF, Corals occupy less than 0.1% of marine surface area, but they support 25% of all marine species of the planet. Still due to unabated Global warming, they are under extreme threat.**

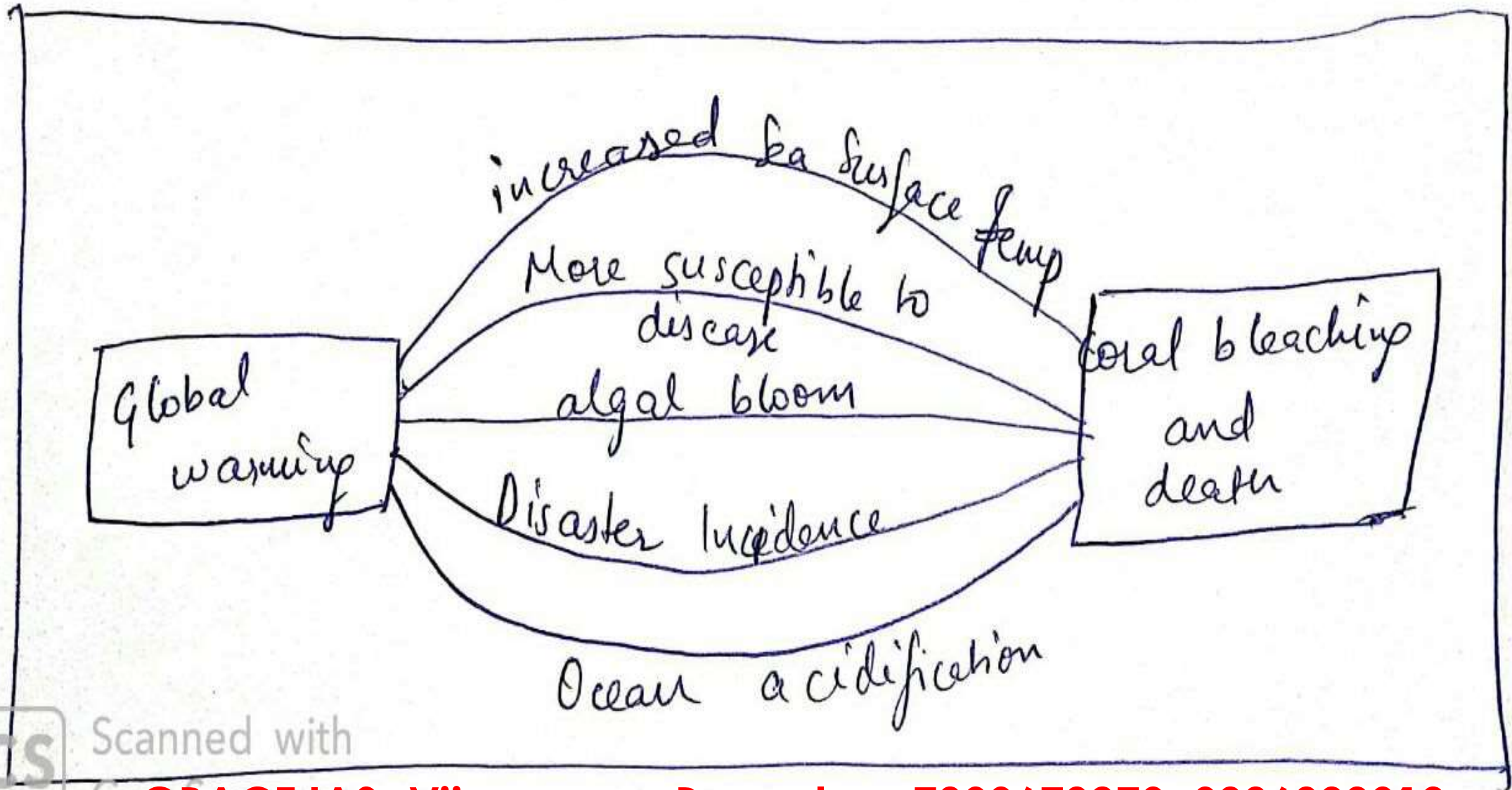
- **According to Global coral reef monitoring network, 19% of world corals are already dead. The main cause behind it is Global warming.**

- **Coral reefs are large underwater structures composed of the skeletons of corals, which are marine invertebrate animals. These essential marine life system are under extreme threat from Global warming.**



**BODY**

**GRACE IAS- Vijaynagar, Bengaluru-7899678279, 9886800910**



Scanned with

Ca... **GRACE IAS - Vijaynagar, Bengaluru-7899678279, 9886800910**

# CORAL BLEACHING

Have you ever wondered how a coral becomes bleached?

## HEALTHY CORAL

1 Coral and algae depend on each other to survive.



Corals have a symbiotic relationship with microscopic algae called zooxanthellae that live in their tissues. These algae are the coral's primary food source and give them their color.

## STRESSED CORAL

2 If stressed, algae leaves the coral.



When the symbiotic relationship becomes stressed due to increased ocean temperature or pollution, the algae leave the coral's tissue.

## BLEACHED CORAL

3 Coral is left bleached and vulnerable.



Without the algae, the coral loses its major source of food, turns white or very pale, and is more susceptible to disease.

## WHAT CAUSES CORAL BLEACHING?



### Change in ocean temperature

Increased ocean temperature caused by climate change is the leading cause of coral bleaching.



### Runoff and pollution

Storm generated precipitation can rapidly dilute ocean water and runoff can carry pollutants — these can bleach near-shore corals.



### Overexposure to sunlight

When temperatures are high, high solar irradiance contributes to bleaching in shallow-water corals.



### Extreme low tides

Exposure to the air during extreme low tides can cause bleaching in shallow corals.



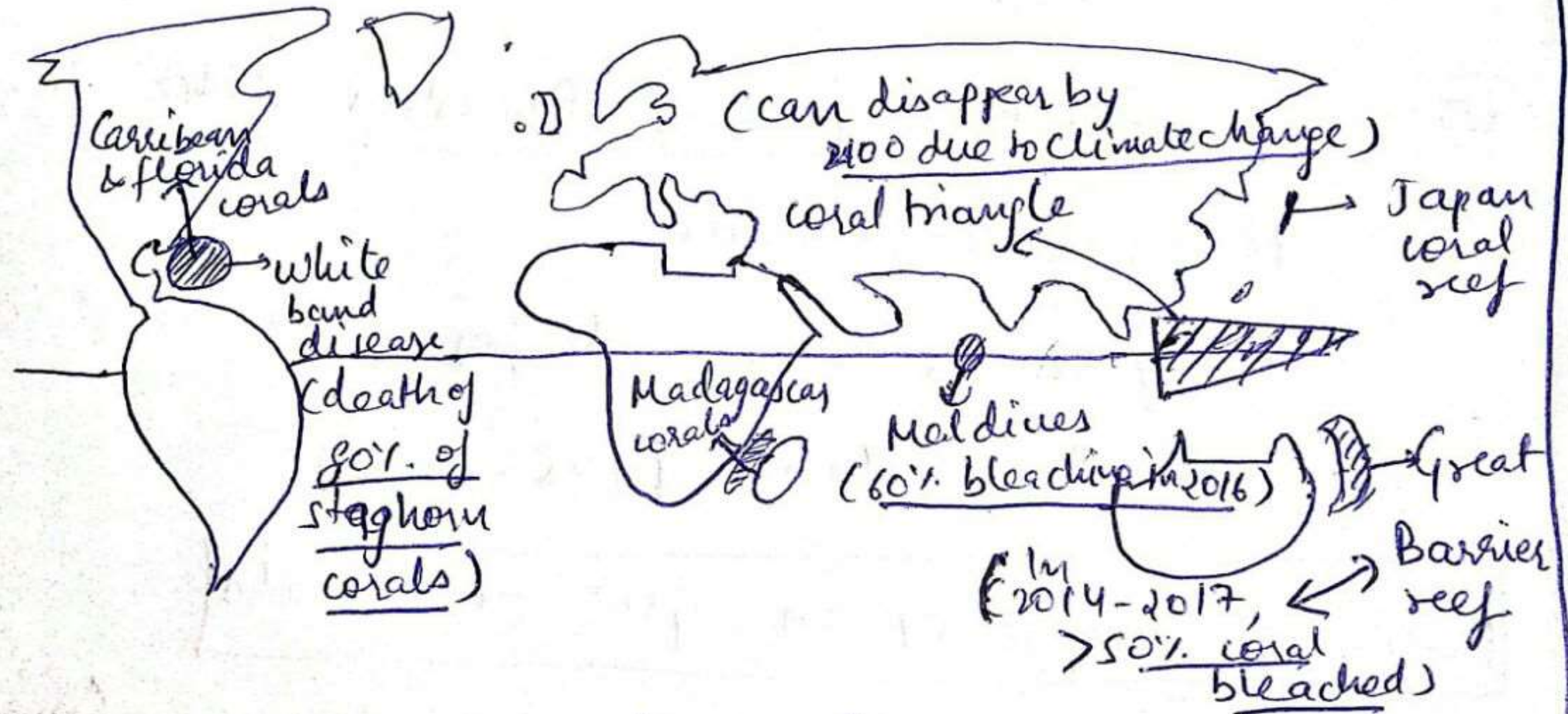


Fig: Impact of Global warming on corals

## Specific examples

- Between 2014-17, 50% of Great Barrier reef bleached
- Cyclones responsible for 48% of coral loss in Australia between 1985-2012
- Marine Heat wave was major cause of bleaching in GBR in 2017



- Without action on climate change, coral reef in Coral triangle will disappear by 2100
- Massive bleaching in Carribean Islands due to virus
- White band disease was responsible for death of 80% death of staghorn corals in Carribean

- Japan's largest reef Okinawa witnessed death of 75% corals due to bleaching
- In Maldives, 60% corals suffered bleaching in 2016.

- **Negative Impact**
- **Positive Impact**

**GRACE IAS- Vijaynagar, Bengaluru-7899678279, 9886800910**

# Negative Impact

- Increase in Sea Surface temperature - Corals are very sensitive to temperature rise and fall.
- Ideal temp is 26-27 celcius, Temp higher than 30 degree induces bleaching

- **Invasive species- More competition**
- **Algal bloom- usually bloom in warmer water**
- **It cuts sunlight and depletes oxygen**

- **Reduced growth rate**
- **Lack of food and dispersal of larvae because of altered ocean current**

- **Disaster incidence increase**
- **Cyclones, Dust storm, Marine heat wave**
- **GBR example**

- Ocean Acidification- Coral erosion
- GW makes corals more susceptible to disease



# Positive impact

- ▶ **Temperate regions**
- ▶ **Algae's productivity increases with increase in CO<sub>2</sub> level**



# Conclusion

**GRACE IAS- Vijaynagar, Bengaluru-7899678279, 9886800910**

- Steps taken to solve the situation
- SDG goals(13 & 14)

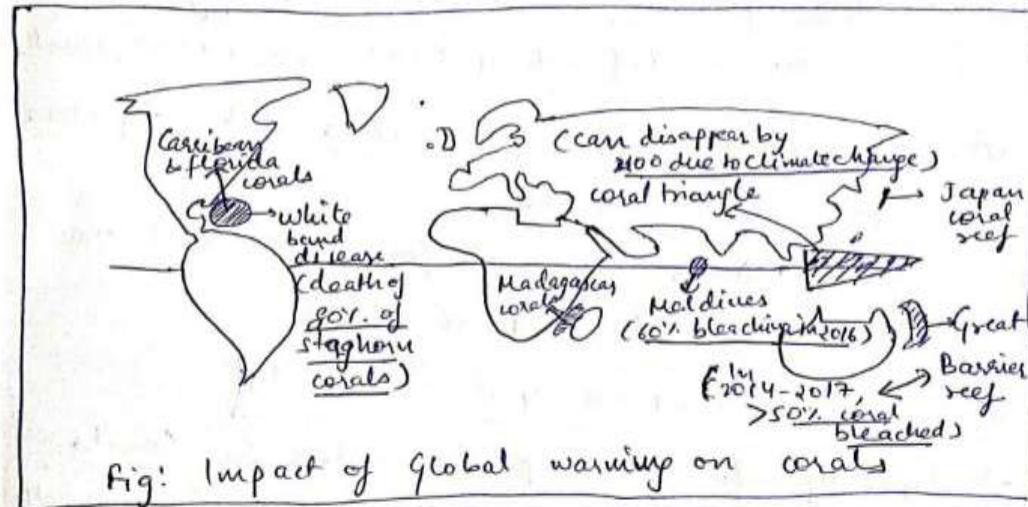
- It is clear that negative impacts far outweigh the negative impacts. Only by following SDG goals-13&14 and Paris deal to limit temp rise below 1.5 C, we can ensure survival of Coral life system

- To safeguard the corals, Organisation such as Coral restoration foundation and Global coral reef Alliance are playing exemplary role. Now the Governments and Citizens should join hands to protect this vital marine resource.

**GRACE IAS- Vijaynagar, Bengaluru-7899678279, 9886800910**

Q. Assess the impact of global warming on coral life system with examples.

According to UNESCO, corals of all 29 reef containing world heritage site will perish by 2100 if global warming<sup>(GW)</sup> continues at same rate.



Negative Impact of GW on corals →

- ① Increased Sea Surface temperature → Corals have narrow range of temperature where they can survive. GW ~~lead~~ <sup>led</sup> to severe (60%) bleaching in Maldives in 2016.

- (II) Higher susceptibility to diseases → Diseases include white band disease, black band disease.
- (III) Reduced growth rates → due to increased stress induced by rising sea level and sea surface temperature
- (IV) Algal bloom induced by GW cut sunlight available to corals.
- (V) Coral reef erosion - is induced by increased ocean acidification (increase in  $\text{CO}_2$  level)
- (VI) Increased impact of Disasters like Cyclones, Marine heat wave  
→ Cyclones responsible for 48% coral loss in Australia (1985-2012)

#### Positive Impacts on GW on corals

- Opening up of temperate waters for corals.
- Increase in  $\text{CO}_2$  level support algae growth which provide energy to corals.

It is quite clear that the negative impacts far outweigh the positive impact. Only by following Sustainable development goal 13 & 14 & Paris deal (limiting temp rise to  $2^\circ\text{C}$ ) can ensure survival of coral