

Climate Change and The Maritime Environment

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IMPORTANCE OF MARITIME ENVIRONMENT



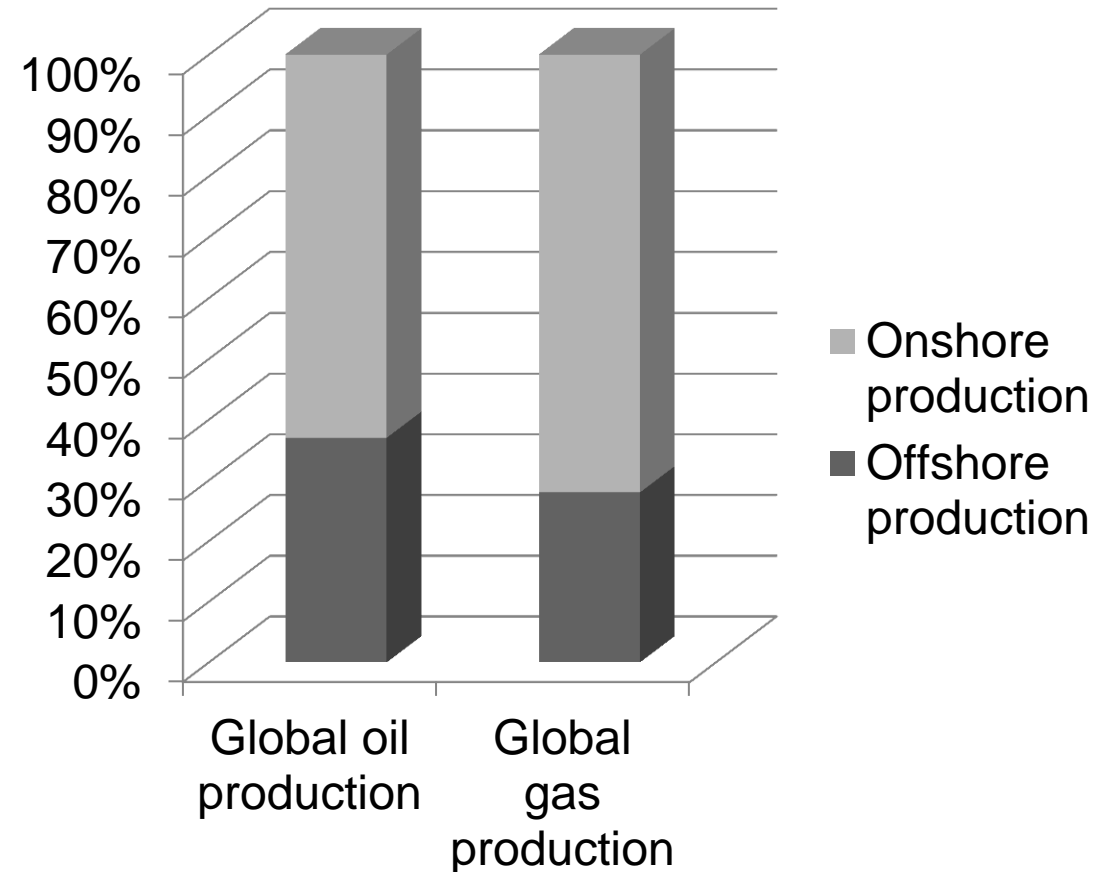
Trade and economy

- As of **2015**, about **80% of the international trade** (by volume) goes through **maritime routes**. (UNCTAD)
- Supports **linkage industries** like Shipping, Shipbuilding, Fisheries, Tourism etc.
- Total output of the maritime economy was **USD\$1.5 trillion**, or approximately **2.5% of the global GDP**. (OECD 2010)
- **Source of employment** for millions of people at different levels.



Energy resources

- **Offshore** extraction currently accounts for an estimated **37%** of the world's **oil production** and **28%** of **global gas production**. (World Ocean Review)
- Some **large parts** of the **marine areas** are **unexplored** which are expected to have **huge hydrocarbon reserves** i.e. **the Arctic**.
- Rise of **deepwater** and **ultra-deepwater exploration** has increased the **potentials** of marine energy resources, **accounting** for at least **50%** of the newly discovered offshore reserves. (World Ocean Review)



Cultural engagements



- Maritime routes, transportations and tourism are **major source of cultural engagements**.
- Enhances **people-to-people contacts** among countries from different regions.
- Used as a significant **confidence building measure** by several states to **improve bilateral and multilateral relations**.

Geopolitics and military



- **Emerging geopolitics** surrounding the **Indian Ocean**, involving the **USA, China, India**.
- **South China Sea crisis: Strategic** maritime route, **heavily militarized** area.
- Militarization in the **Pacific Ocean**: the **US Navy** will have about **60%** of its military assets in the Pacific, along with the massive militarization of **China, Japan, South** and **North Korea**. (CNN)

EFFECTS OF CLIMATE CHANGE



Melting of the ice caps



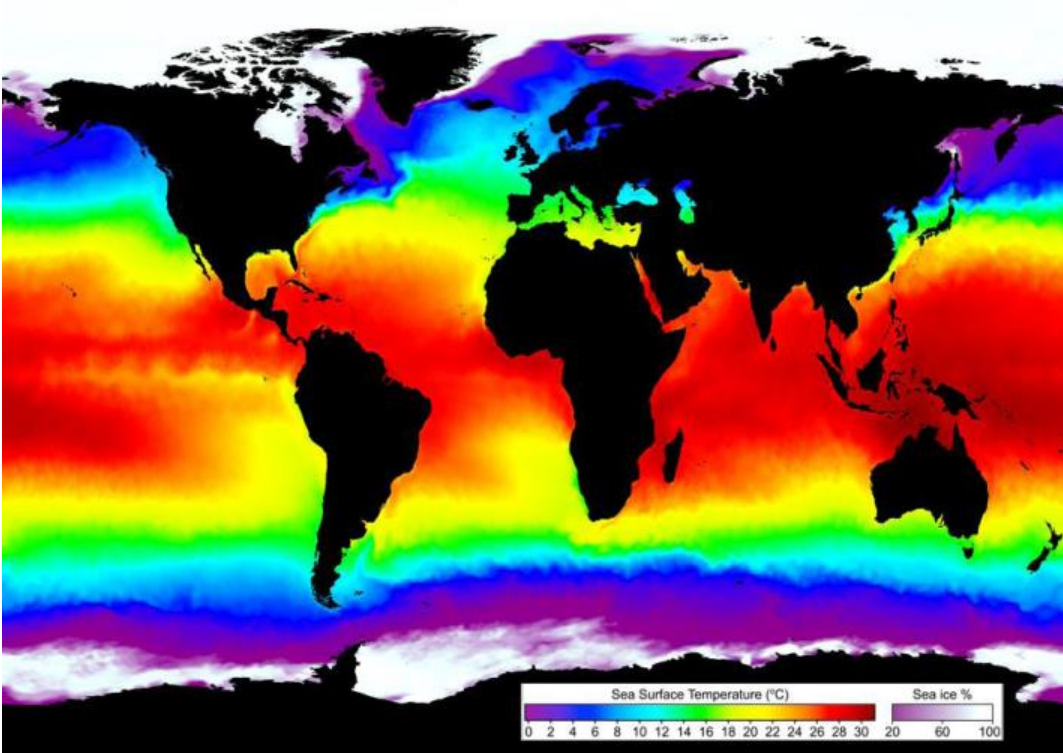
- The ice caps in the **North** and **South pole** have been melting in a **dramatic speed** in recent years.
- The **Arctic** is becoming increasingly **navigable** as the ice caps **continue to melt**.
- The melting has led to the **rise of sea level**
- It is also leading to the **extinction** of several **polar species**.

Rise of sea level

- The **melting of glaciers** and **polar ice sheets** are leading to increasing volume of sea water.
- The **global sea level** is expected to have a rise of about **1 meter** by **2050**. (IPCC)
- Vast **low lying coastal areas** and **small islands** are predicted to be **submerged into the sea** as a result of the rise of sea level.



Changes in ocean temperature



- Due to climate change, the **temperature of the ocean is rising.**
- Rise of **water temperature** can cause the **methane hydrate to melt**, leading to the **increase of methane gas**, contributing to **global warming.**
- Temperature changes can also **disrupt the marine ecosystems** through several **anomalies i.e coral bleaching.**

Coral bleaching

- **Causes:** changes in **ocean temperature, salinity; sedimentation** etc.
- **Mass coral bleaching** leads to the **starvation, reduction and death** of the corals, **affecting the thousands of marine species** living on coral reefs.
- There will be **frequent bleaching** of the coral reefs between **2012-2040**, which has been termed as “the **greatest threat** to the world’s reef systems”.
(IPCC)



Acidic oceans

- Due to **increased carbon dioxide** in the atmosphere, the world's oceans are **30% more acidic** now than before the **industrial revolution**. (WWF)
- By **2100**, the acidity will reach the **level** which existed **20 million years ago**, making it **inadaptable for the marine lives**.
- Acidic water **interferes** with the development of **coral reefs** and the **shells of oysters, crabs, snails** and **plankton**.



Weather severity

- Climate change will result in **growing incidents of weather severity.**
- There will be **increasing instances of extreme weather conditions** like cyclones, thunderstorms, tornados, tsunamis etc.
- Such situation will lead to **enormous casualties** of people as well as **damage of properties.**



Migration and extinction of species



- **Impacts** on the **ocean environment** due to climate change will induce several species to **lose** their **original habitat**.
- Many species will **migrate** to other places to **sustain**, taking a **toll** on the **marine ecosystems**.
- Several marine species i.e. **sea turtle, polar bears, seals** etc. are listed in the **IUCN Red list of endangered species**. Climate Change is said to be the **biggest threat** to these species.

Explosions and leaks of hydrocarbons

- The **melting of ice caps** could lead to the **leak or explosion** of hydrocarbons like **gas** and **oil**.
- **Oil spills** and **gas leaks** or shipping accidents, pose a **tremendous risk** to **marine ecosystems**, like the **Arctic**.
- There is **no proven effective method** for **containing** and **cleaning up** an oil spill in icy water.



IMPLICATIONS



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Loss of coastal infrastructures



- Due to **extreme weather conditions** and **rise of sea level**, the coastal infrastructures like **sea ports** will suffer huge damage.
- Loss of critical infrastructures will have an impact on the **trade** and **economy** of the world.
- This could lead to **increasing poverty** and **hostile bilateral** and **multilateral relations**.

Damage of offshore energy facilities



- Maritime energy facilities like **offshore oil and gas fields, floating gas terminals** are expected to face **substantial damages** during the **weather severity events**.
- Such damages will take a toll in the **global energy supply**.
- **Oil spills** or **gas leaks** as a result of these damages could further **degrade** the marine environment.

Shrinking living marine resources

- Living marine resources like **fisheries** will be **affected** by the **degradation** of the marine environment.
- Such decline of these resources will have an **economic impact** on the people living in the **coastal areas**.
- This will also **affect** the **food security** of the **several countries** which are **dependent** on **sea food** for their **diet**.



Effects on maritime tourism



- The deterioration of marine environment will have a **significant effect** on the **maritime tourism**.
- This will result in **declining employment** in the tourism sector.
- Economy of countries like **Maldives, Seychelles, Mauritius** are heavily dependent on maritime tourism.

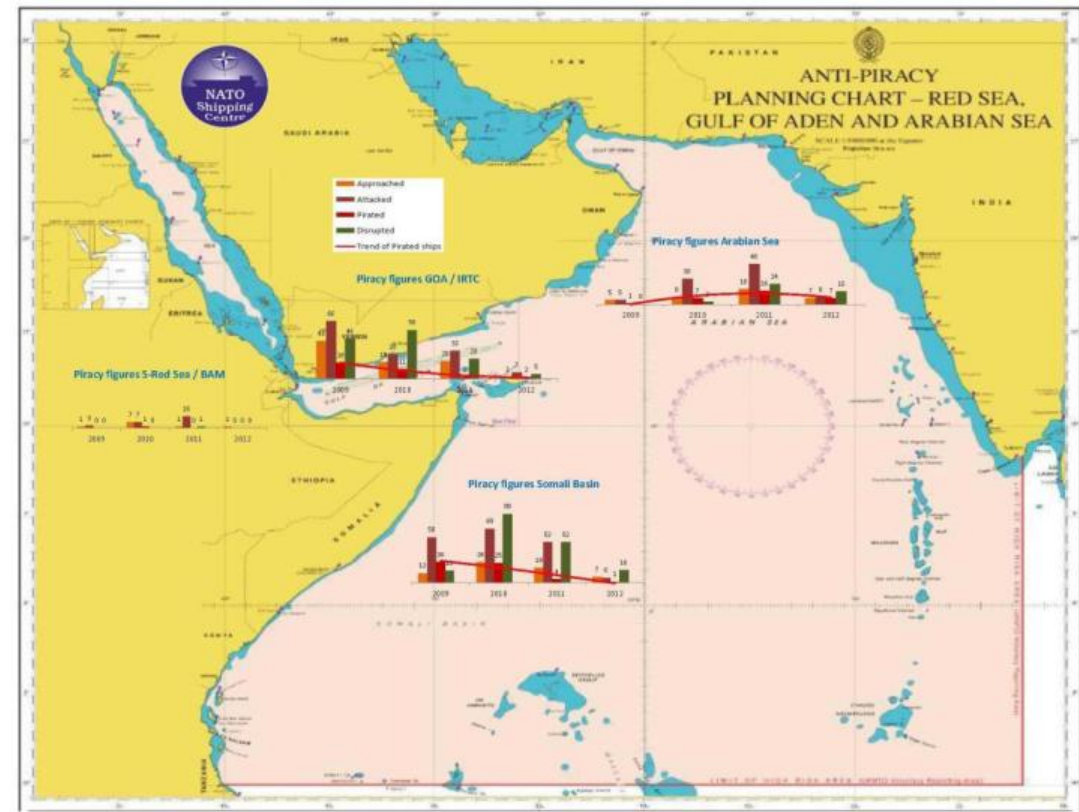
Economic impacts on the coastal regions



- There will be an **immense economic impact** on the coastal regions due to the **decaying maritime environment**.
- It will result in **increasing poverty** in those regions as well as **diminishing living standard** of the people.
- A number of people **employed** in the **maritime sector** will have to move to a **new profession**.

Maritime criminal activities

- As the **economic wellbeing** of the people is set to **decline** due to climate change, there will be **increasing criminal activities** in the maritime domain.
- **Maritime piracy** will be growing, especially along the **important trade routes**.
- **Illegal fishing, hunting and smuggling of endangered maritime species** will be swelling.



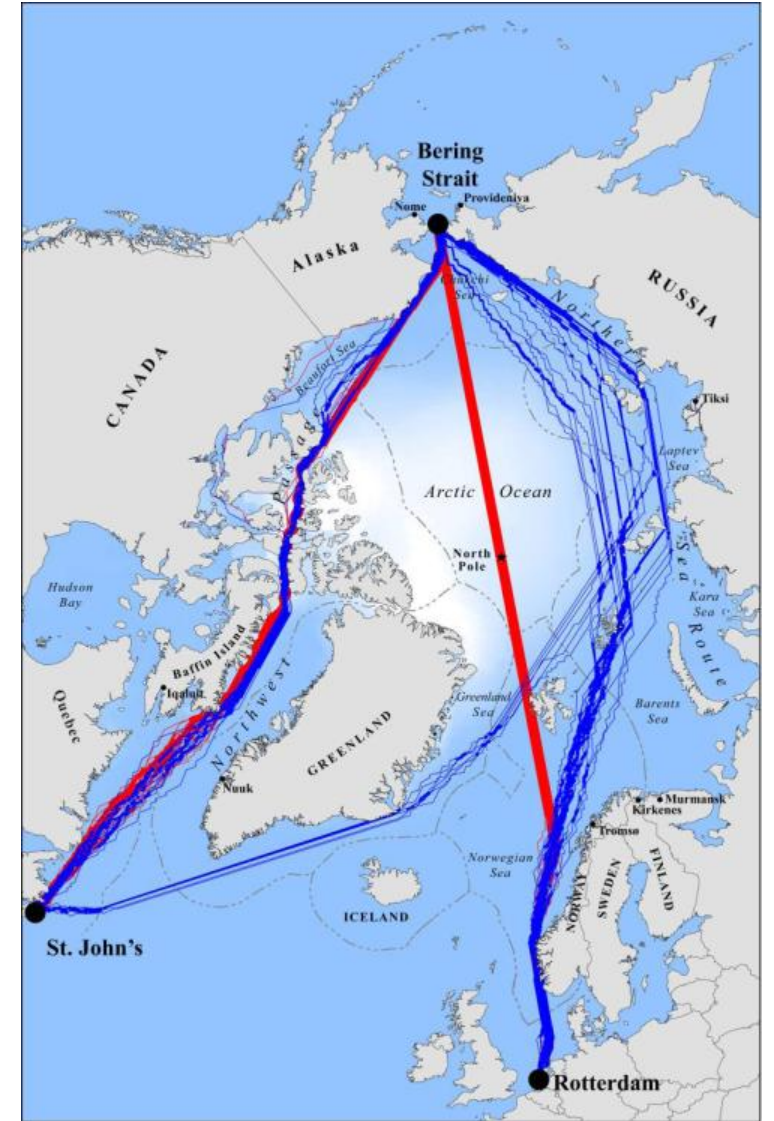
Spread of pandemics and epidemics

- **Migration and proliferation of marine pathogens** can affect the people living in the **coastal regions**.
- ***Gymnodinium catenatum***, a **pathogen**, which had been confined to only the **Alboran Sea**, was for the first time observed in the **Algerian and Italian coasts** in 2010. (UNEP)
- Some pathogens can cause **extreme consequences** on **human health** like irritation, cough, fever and respiratory problems.
- The **acidification of oceans** could also cause several health issues.



New maritime routes

- The melting of ice caps in the **North and South poles** could lead to the **emergence** of new trade routes.
- In the Arctic, the **Northwest Passage** from Canada would **save two weeks in travelling time** versus the Panama Canal.

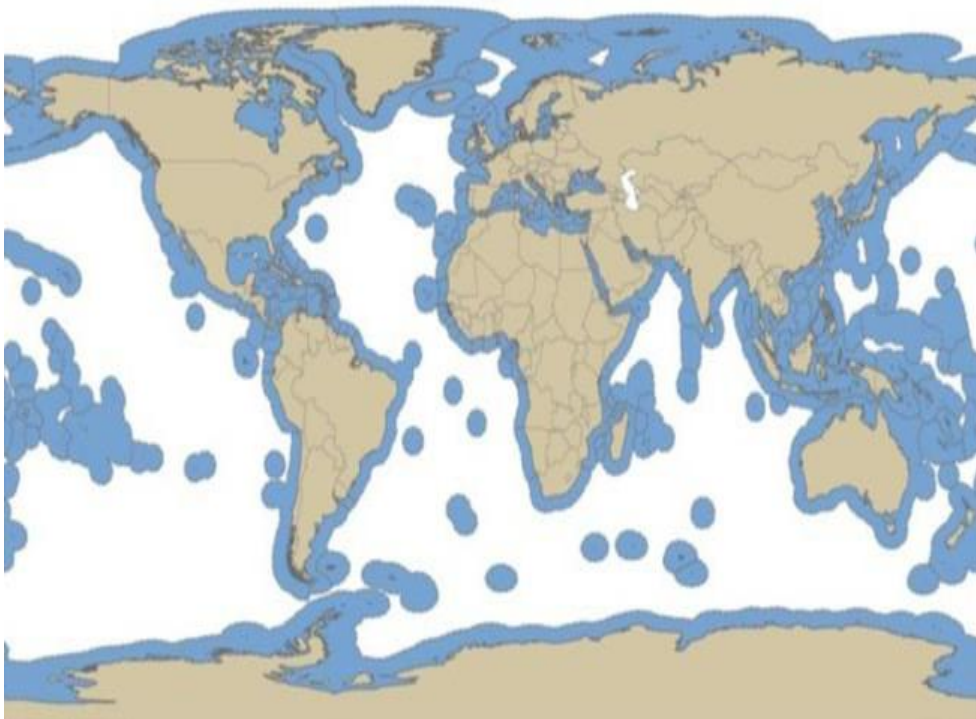


Effects on navigability



- **Changing movements of sediments** due to **extreme weather conditions** could significantly affect the navigability for ships.
- **Intense unsafe oceanic conditions** and **poor visibility** for navigation
- **Rise of temperature** would result in the **shortened lifespan of ships**, affecting their navigability.
- Major **changes in maritime routes**, triggering **new geopolitics**.

Changes in the maritime boundaries



- Effects of Climate Change like **Sea Level Rise** could lead to the **changes in the baseline** of coastal states.
- It could result in the **revisions of maritime boundaries**.
- **Vague clauses** in the **UNCLOS** to deal with the issue
- Such situation can lead to **potential conflicts** among **maritime neighboring states**.

Disappearance of states

- Due to **Sea Level Rise**, some **low lying small islands** and **coastal states** are facing the **threat of complete submergence** under the sea.
- **National identity crisis** of their inhabitants
- Dispute over the **authority of the territorial waters, EEZs** of those states.
- **Transfer of roles, responsibilities** and **debts** of those states within the global system.
- States like **Maldives, Seychelles** are predicted to disappear due to the effects of SLR.



Politics on disaster Management

- **Isolationist states** tend to **resist international response** during weather calamities.
- Under the UN framework of **Responsibility to Protect**, global community can have **any sort of intervention** in the affected state if it witnesses **major man-made fatalities** due to the calamity.
- Could be a **potential source of military intervention** influenced by regional and global geopolitics.
- During the **Cyclone Nargis** in 2008, **Myanmar** was on the verge of receiving forced intervention on humanitarian grounds.

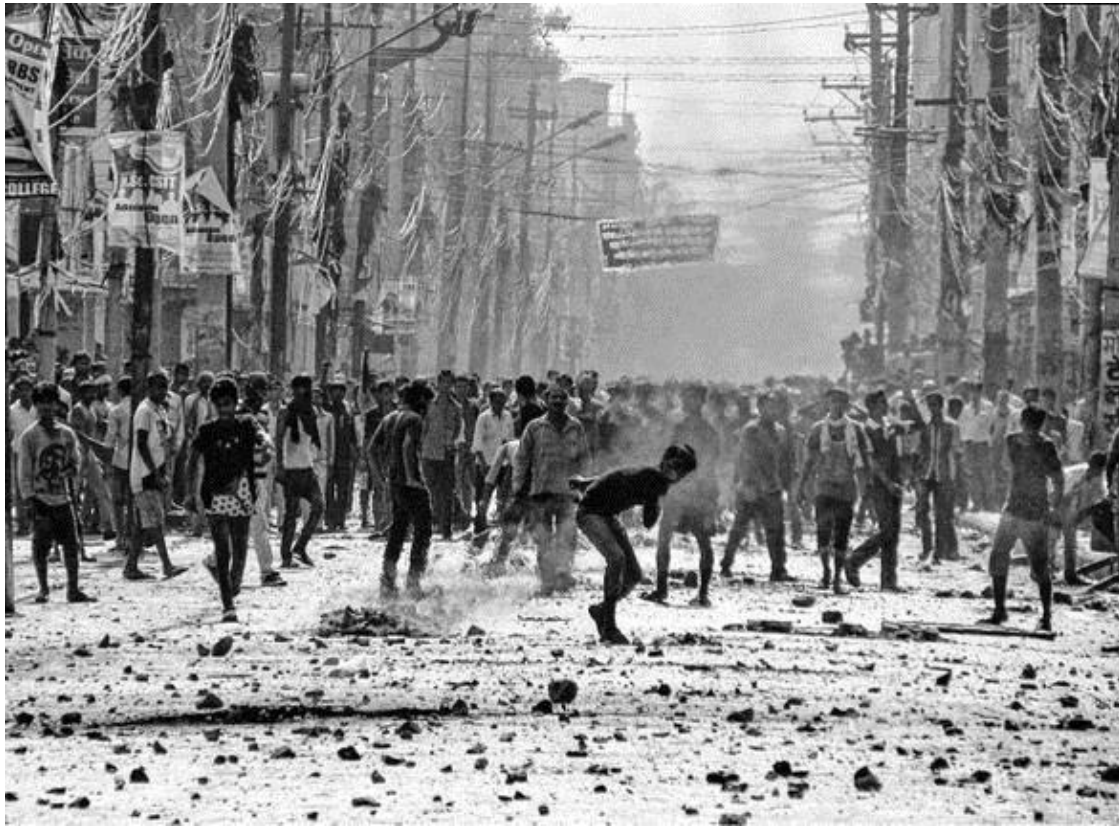


Dispute on marine resource management

- **Inefficient management** of the marine resources results in **oil spill, gas leaks, extinction of marine species** etc.
- **Environmental concerns** due to marine resource management could lead to **major disputes**.
- Such disputes could lead to **major conflicts**, affected by **regional geopolitics**.



Internal instabilities



- **Poor economic conditions** due to the effects of climate change could lead to increased **poverty**, **income inequality**, **discriminations** etc.
- Such situation can result in **ethnic** or **religious riots** and **political violence** which would ultimately lead to the **territorial disintegration** of a state.
- These tensions could **spill over** to **neighboring countries**, triggering **regional conflicts**.

FUTURE SCENARIO



Environment induced displacement

- Inundation of low lying lands, loss of employment, extreme weather conditions will result in the **displacement of millions of people.**
- By 2050, climate change could force about **150-200 million people** to become **refugees.** (IOM)
- **Tensions** between refugees and **host communities**
- Will have **major significance** over **bilateral** and **multilateral relations.**



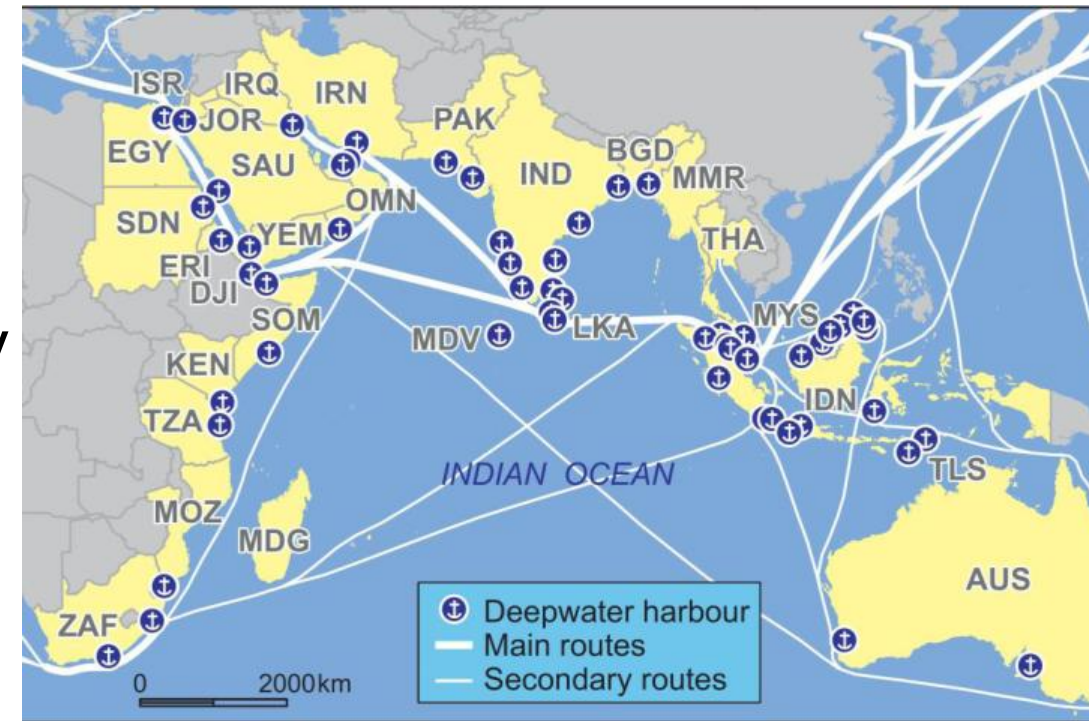
Changing geopolitics in the Arctic



- The **changing environment** in the Arctic Ocean, which is bordered by countries like the **United States, Russia** and several **European countries**, could lead to **new geopolitics** in the region.
- **Previously inaccessible** for the vessels, the **emergence of a new maritime route** through this ocean could **change the geopolitical climate** in the world.
- Emerging **security implications** for several countries, especially for **Russia**.

Possibilities of maritime conflicts

- **Wider implications** of climate change could lead to major **regional** and **global conflicts**.
- There will be **increasing militarization** in the Arctic ocean. The **US Navy** has already created a **road map** in 2010 to face the growing **geostrategic issues** in the region.
- In 2016, **China** began construction of its **first overseas naval base** in **Djibouti**.
- New power projections in the **Indian ocean** has lead **India** to **massively modernize** its **Navy**.



Recommendations

- **Revisiting** many of the **rules and conventions** of **international institutions** on **maritime and related issues** to meet the changed circumstances on climate induced conditions.
- Establishing **proper frameworks** on issues like **migration** and **extinction or disappearance** of **states** due to climate change.
- **Devoting national and international resources** for marine **protection** and **adaptation**.
- Building **resilience** and **capacity** for **HADR**
- **Maintaining balance of power** in **changing maritime geopolitical realities**.
- Building **new international regimes** for **marine resource management** under climate changed conditions.

QUESTION AND ANSWER



Thank you

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