IIT MADRAS

Lecture 6

Managerial implications of sustainable development in the Oceans

28 January 2022

Recent Developments

- Convention on Climate Change
- Convention on Biological Diversity
- Commission on Sustainable Development

Home work for next class
everyone of you should say about this report in one minute on salient findings Global, National

IPCC

Special Report on the Ocean and Cryosphere in a Changing Climate

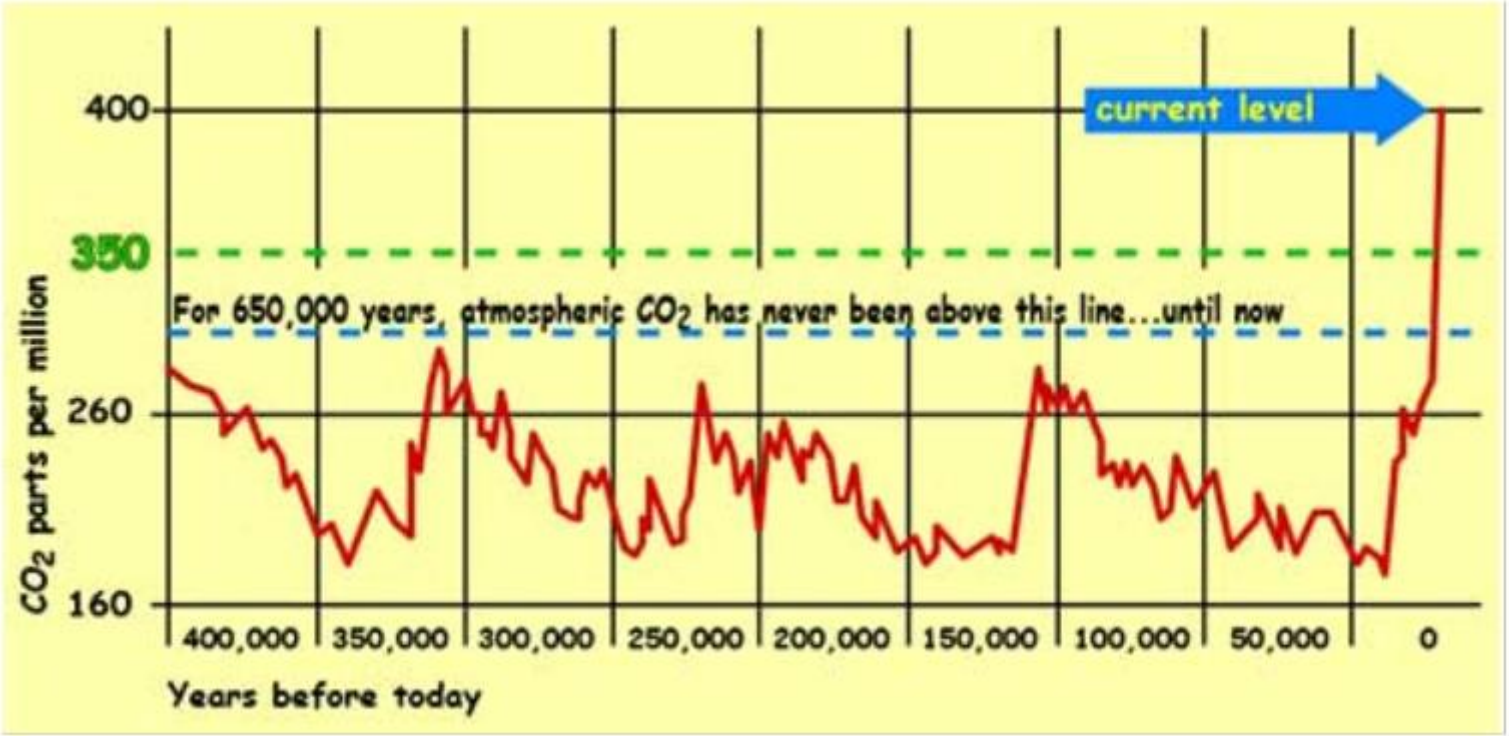
Chapter 4: Sea Level Rise and Implications for Low-Lying Islands, Coasts and Communities
Chapter 5: Changing Ocean, Marine Ecosystems, and Dependent Communities
Cross-Chapter Box 9: Integrative Cross-Chapter Box on Low-lying Islands and Coasts

https://www.ipcc.ch/srocc/

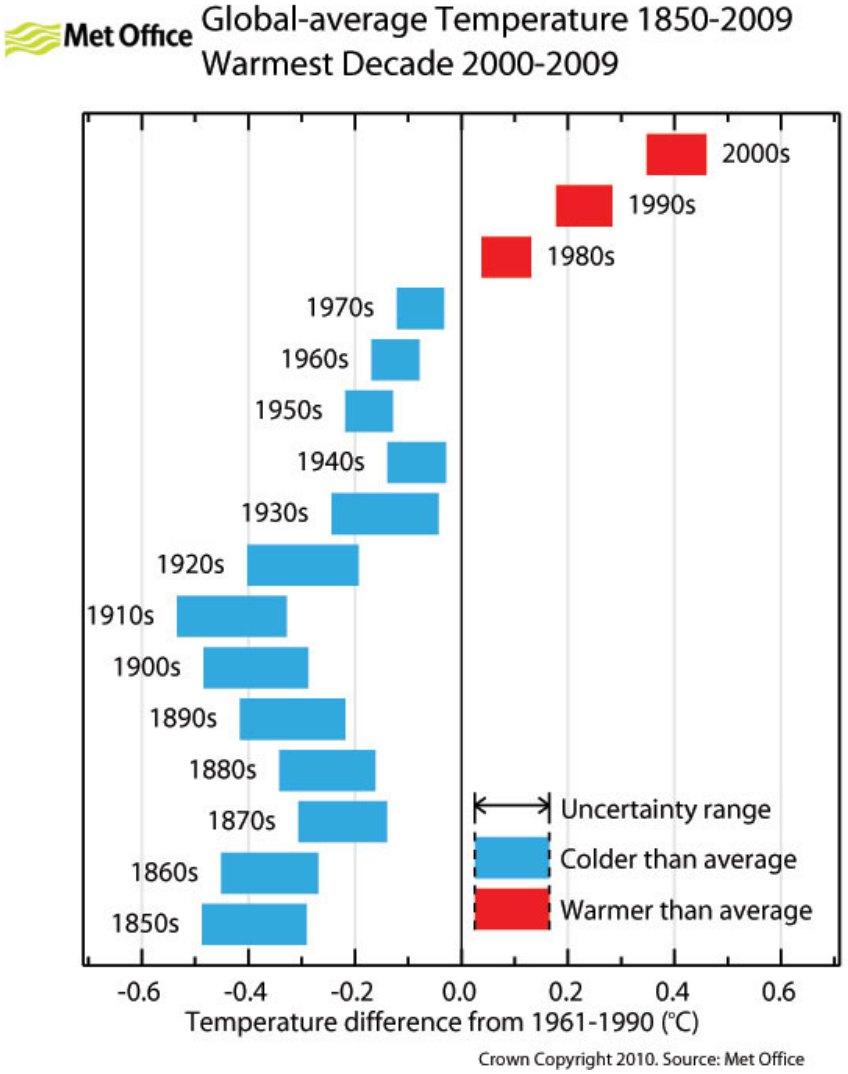
Convention on Climate Change

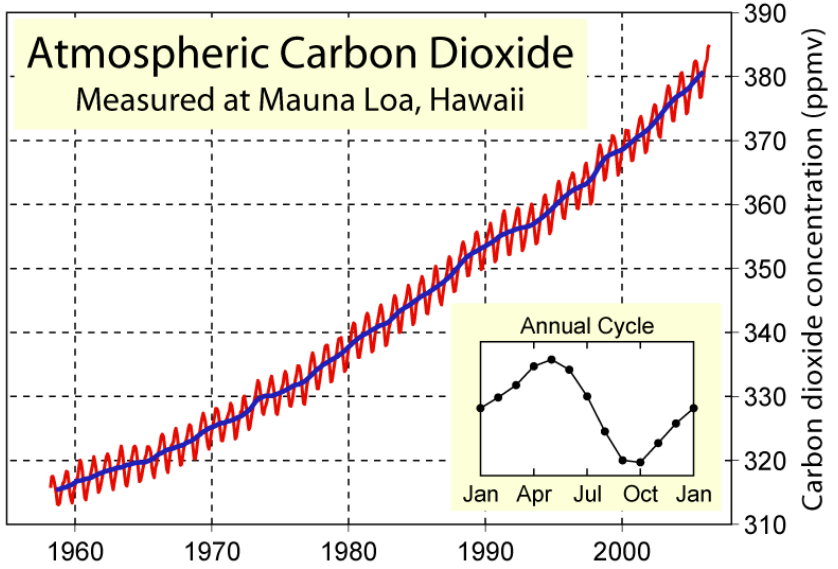
What is climate change?

- **Climate change is a large-scale, long-term shift in the planet's weather patterns or average temperatures. Earth has had tropical climates and ice ages many times in its 4.5 billion years. So what's happening now?**
- Earth's climate has been relatively stable at about 14 °C. However, in recent years, the average temperature has been increasing


400
350
260
160
current level
For 650,000 years, atmospheric CO_2 has never been above this line...until now
CO_2 parts per million
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
Years before today

The evidence for climate change: global temperatures





UN Framework Convention on Climate Change UNFCC

- The implication of the Framework Convention on Climate Change will depend largely on study of ocean/atmosphere interactions which as yet very poorly understood
- The capacity of the oceans to absorb CO_2, on the one hand and on the other, the ocean's contribution of CO_2, caused by underwater volcanic activities
- Equally important is the impact of the evaporation on the greenhouse effect
- Integrated coastal management , including the study of the ocean/land interface constitutes another link between the law of the sea and the Climate Convention

Seven main sources of evidence for climate change.

Source UK metoffice

1 **Higher temperatures**

- Scientific research shows that the climate - that is, the average temperature of the planet's surface - has risen by 0.89 °C from 1901 to 2012

2 **Changing rainfall**

3 **Changes in nature**

4 **Sea level rises**

- Since 1900, sea levels have risen by about 10 cm around the UK and about 19 cm globally, on average. The rate of sea-level rise has increased in recent decades.

5 **Retreating glaciers**

- Glaciers all over the world - in the Alps, Rockies, Andes, Himalayas, Africa and Alaska - are melting and the rate of shrinkage has increased in recent decades.

6 **Sea ice**

- Arctic sea-ice has been declining since the late 1970s, reducing by about 4%, or 0.6 million square kilometres (an area about the size of Madagascar) per decade. At the same time Antarctic sea-ice has increased, but at a slower rate of about 1.5% per decade.

7 **Ice sheets**

The Greenland and Antarctic ice sheets, which between them store the majority of the world's fresh water, are both shrinking at an accelerating rate.

- **The Intergovernmental Panel on Climate Change (IPCC, 2007)**
- **Kyoto Protocol**
- **Doha Agreement**

Paris Agreement

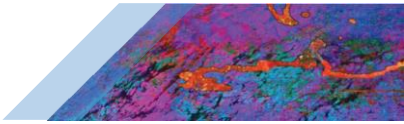
The **Paris Agreement** is an **agreement** within

the United Nations
Framework **Convention** on **Climate** Change
(UNFCCC),

dealing with greenhouse-gas-emissions
mitigation, adaptation, and finance, starting in the
year 2020.

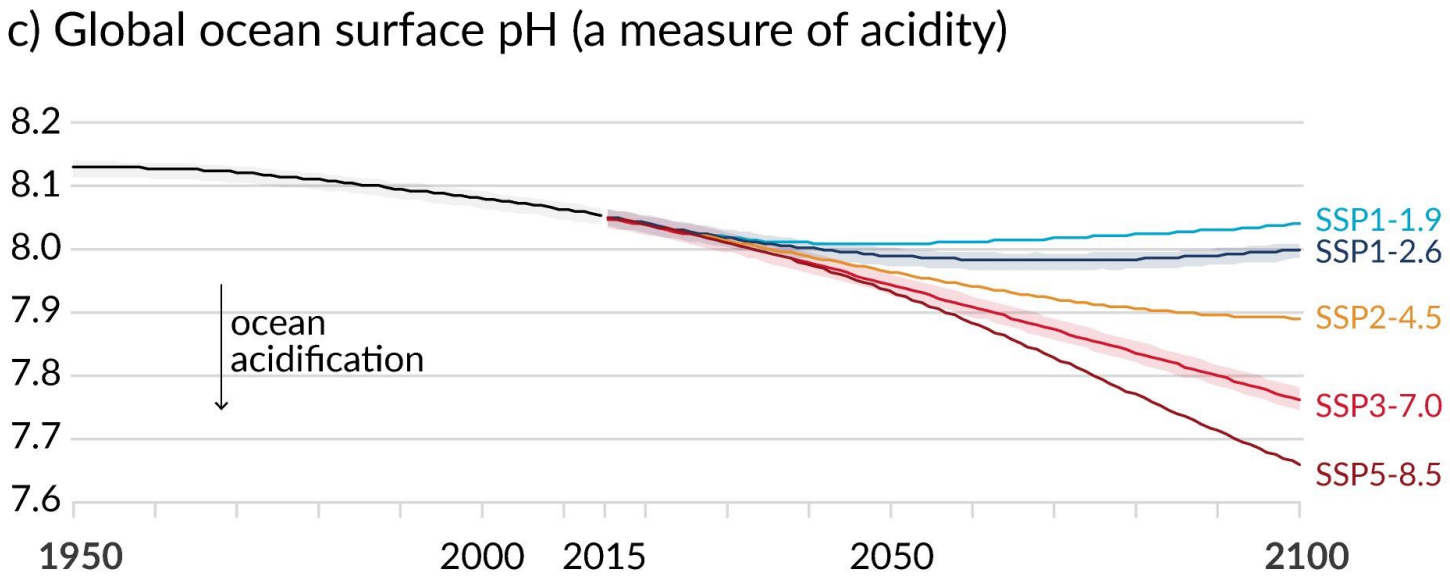
The aim of the agreement is to decrease global warming described in its Article 2, "enhancing the implementation" of the UNFCCC through:
(a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
(c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.

- This Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC) was prepared following an IPCC Panel decision in 2016 to prepare three Special Reports during the Sixth Assessment Cycle .
- By assessing new scientific literature , the SROCC4 responds to government and observer organization proposals.
- The SROCC follows the other two Special Reports on Global Warming of 1.5ºC (SR1.5) and on Climate Change and Land (SRCCL)5 and the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment Report on Biodiversity and Ecosystem Services.



Human activities affect all the major climate system components, with some responding over decades and others over centuries

Figure SPM.8



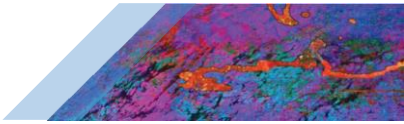
[Credit: NASA]

“ Recent changes in the climate

are widespread, rapid, and intensifying, and unprecedented in thousands of years.

ipcc
INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP



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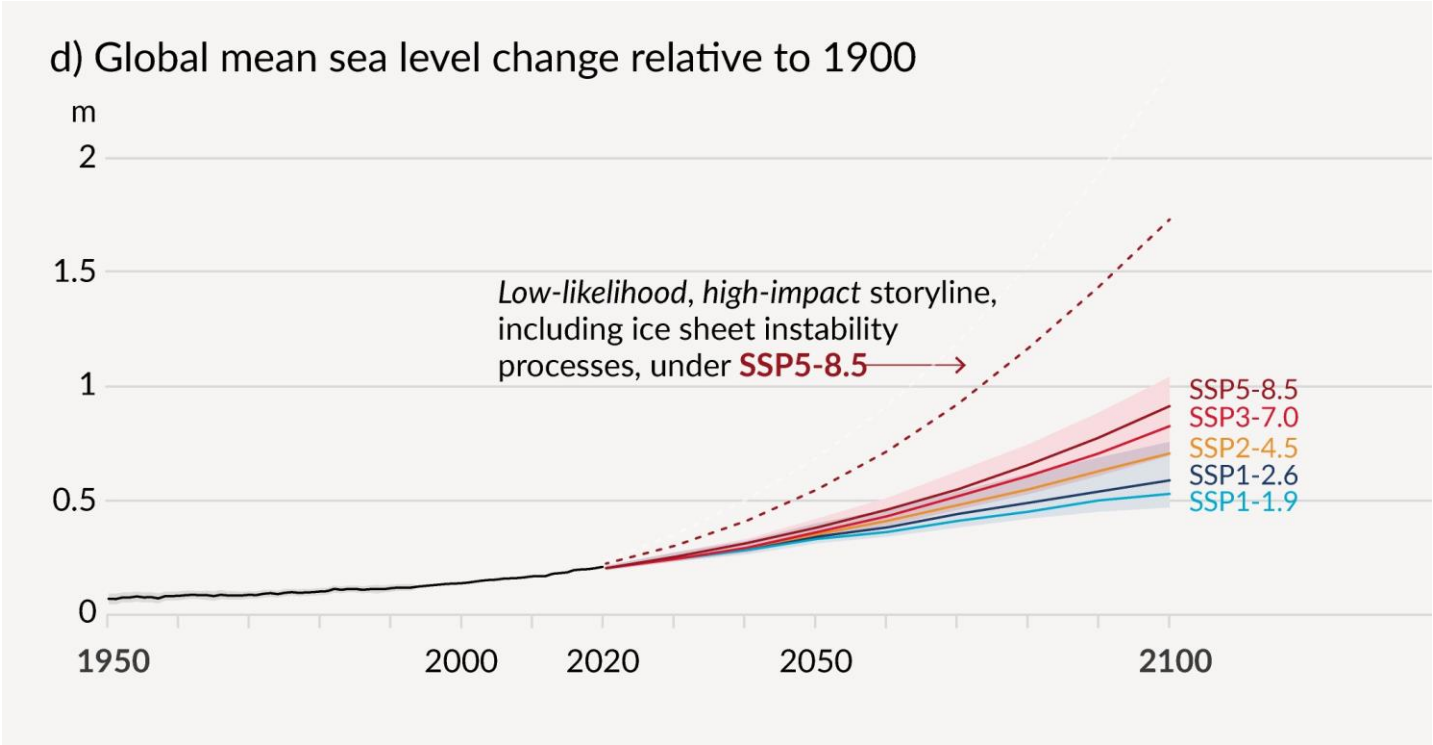


Convention on Biological Diversity

Convention on Biological Diversity

- The Global Convention on Biological Diversity is equally related to the implementation of the Sea Convention
- Marine flora and fauna constitute an integral part of biodiversity
- Similar components of biodiversity are coral reefs and tropical forests
- Biodiversity in the seas and oceans is just as seriously threatened as land by
  - ✓ water pollution
  - ✓ Overfishing
  - ✓ coastal development and
  - ✓ destruction

Convention on Biological Diversity

Signed by 150 government leaders at the 1992 Rio Earth Summit, the Convention on Biological Diversity is dedicated to promoting sustainable development.

Conceived as a practical tool for translating the principles of Agenda 21 into reality, the Convention recognizes that biological diversity is about more than plants, animals and micro organisms and their ecosystems

– it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live.

The Convention was opened for signature on 5 June 1992 at the United Nations Conference on Environment and Development (the Rio "Earth Summit").

It remained open for signature until 4 June 1993, by which time it had received 168 signatures.

The Convention entered into force on 29 December 1993, which was 90 days after the 30th ratification.

The first session of the Conference of the Parties was scheduled for 28 November – 9 December 1994 in the Bahamas.
https://www.cbd.int/history/default.shtml

Global Biodiversity Outlook

Convention on Biological Diversity

Global Biodiversity Outlook (GBO) is the flagship publication of the Convention on Biological Diversity.

It is a periodic report that summarizes the latest data on the status and trends of biodiversity and draws conclusions relevant to the further implementation of the Convention.

The fourth edition of the Global Biodiversity Outlook was officially launched on the opening day of the Twelfth Meeting of the Conference of the Parties to the Convention on Biological Diversity (COP 12) in Pyeongchang, Korea.

The report draws on various sources of information to provide a mid-term assessment of progress towards the implementation of the Strategic Plan for Biodiversity, an issue which will be discussed during COP-12.

Commission on Sustainable Development

Commission on Sustainable Development

- 47th General Assembly
- Institutional arrangement
- Commission
- Started with 53 states are members
- funding from GEF Global Environment Facility
- Interesting part of commission is “high level segment” – a meeting of Ministers

Sustainable Development of Small Island Developing States

- A global conference on Small Island Developing States(SIDS) was held in Barbados
- The conference adopted a ‘Barbados Declaration’ as well as an Action Programme for the Sustainable Development for SIDS

The Action Programme listed 14 priorities

The Action Programme listed 14 priorities

1. Climate change and sea level rise
2. Natural and environmental disasters
3. Management of wastes
4. Coastal and marine resources
5. Freshwater resources
6. Land resources
7. Energy resources
8. Tourism resources
9. Biodiversity resources
10. National institutions and administrative capacity
11. Regional institutions and technical cooperation
12. Transport and communication
13. Science and technology
14. Human resource development

2002 World Summit on Sustainable Development

The major outcome of the WSSD was the **Johannesburg Plan of Implementation (JPOI)** designed as a framework for action to implement the commitments originally agreed at UNCED.

The JPOI includes eleven chapters: an introduction; poverty eradication; consumption and production; *the natural resource base*; health; *small island developing States (SIDS)*; Africa; other regional initiatives; means of implementation; and institutional framework.

Regarding ocean and coastal issues, the JPOI emphasized issues related to:

- the ecosystem approach and integrated management;
- protection of the marine environment from land-based activities;
- integrated water resource management;
- biodiversity and marine protected areas;
- small island developing states;
- fisheries and aquaculture;
- global marine assessment;
- coordination of UN activities on oceans;
- capacity development.

Millennium Development Goals

In 2000, the Millennium Declaration was adopted but did not contain the MDGs in their present form.

In 2001, a team of UN experts created the MDGs with indicators, without any inter-governmental process.

MDGs

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Develop a global partnership for development

UNITED NATIONS

SUSTAINABLE DEVELOPMENT SUMMIT 2015

25-27 SEPTEMBER

- the **UN Sustainable Development Summit** in New York from 25-27 September 2015 for the adoption of an ambitious, bold and universal sustainable development agenda that will end poverty and promote prosperity by 2030, while addressing the environment.

- The summit outcome document, entitled ***"Transforming our World: The 2030 Agenda for Sustainable Development,"*** was agreed on by the 193 Member States of the United Nations, and includes 17 Sustainable Development Goals.
- This momentous agenda will serve as the launch pad for action by the international community and by national governments to promote shared prosperity and well-being for all over the next 15 years**.**
- the negotiations on a new meaningful and universal climate agreement in Paris this December **(21st Session of the Conference of Parties (COP**).

WHAT ARE THE ELEMENTS UNDERPINING THE SUSTAINABLE DEVELOPMENT GOALS (SDGs)?

The Goals will stimulate action over the next 15 years in 5 areas of critical importance: **People, Planet, Prosperity, Peace & Partnership.**

THE 17 SUSTAINABLE DEVELOPMENT GOALS

SDGs

1. **End poverty** in all its forms everywhere
2. **End hunger**, achieve food security and improved nutrition, and promote sustainable agriculture
3. Ensure **healthy lives** and promote well-being for all at all ages
4. Ensure **inclusive and equitable quality education** and promote life-long learning opportunities for all
5. Achieve **gender equality** and empower all women and girls
6. Ensure availability and sustainable management of **water and sanitation** for all
7. Ensure access to **affordable, reliable, sustainable, and modern energy** for all
8. Promote **sustained, inclusive and sustainable economic growth**, **full and productive employment** and decent work for all
9. Build **resilient infrastructure**, promote inclusive and sustainable **industrialization** and foster **innovation**

SDGs

10. Reduce inequality within and among countries
11. Make **cities** and human **settlements** inclusive, **safe**, resilient and sustainable
12. Ensure **sustainable consumption** and production patterns
13. Take urgent action to **combat climate change** and its impacts*
14. Conserve and **sustainably use the oceans**, seas and marine resources for sustainable development
15. Protect, restore and promote **sustainable use of terrestrial ecosystems**, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
16. Promote peaceful and inclusive societies for **sustainable development**, provide access to **justice** for all and build effective, **accountable** and inclusive **institutions** at all levels
17. Strengthen the means of **implementation** and revitalize the **global partnership** for sustainable development

HOW ARE THE SUSTAINABLE DEVELOPMENT GOALS DIFFERENT FROM THE MILLENNIUM DEVELOPMT GOALS?

- The 17 Sustainable Development Goals with 169 targets are broader in scope and will go further than the MDGs by addressing the root causes of poverty and the universal need for development that works for all people.
- Building on the success and momentum of the MDGs, the new global goals will cover more ground with ambitions to address inequalities, economic growth, decent jobs, cities and human settlements, industrialization, energy, climate change, sustainable consumption and production, peace and justice.
- The new goals are universal and apply to all countries, whereas the MDGs were intended for action in developing countries only.
- A core feature of the SDGs has been the means of implementation – the mobilization of financial resources – as well as capacity–building and the transfer of environmentally sound technologies.
- The new goals recognize that tackling climate change is essential for sustainable development and poverty eradication.

SUSTAINABLE DEVELOPMENT GOALS
17 GOALS TO TRANSFORM OUR WORLD

Goal 14: Conserve and sustainably use the oceans, seas and marine resources

UNESCO IOC Decade of Oceans 2020-30

Goal 14

"Conserve and sustainably use the oceans, seas and marine resources for sustainable development"

- **Five Focus Areas**
  - **Unstable extraction of marine resources**
  - **Marine Pollution**
  - **Alien invasive species**
  - **Ocean acidification**
  - **Physical alteration and destruction of marine habitats**

Assessment of Assessment

- http://www.unep.org/regionalseas/globalmeetings/12/wp04-assessment-of-assessments.pdf

- This was endorsed by the United Nations General Assembly (UNGA) later in 2002 (Resolution 57/141). In 2005, the UN General Assembly launched the "Assessment of Assessments" (AoA) as a preparatory stage towards the establishment of the "Regular Process."
- Resolution 60/30 called for the establishment of an Ad Hoc Steering Group (AHSG) to oversee the execution of the AoA and a Group of Experts to undertake the actual work.
- It invited the United Nations Environment Programme (UNEP) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO to serve as lead agencies for the process to provide secretariat services and coordinate the work.1

Assessment of Assessments

- The mandate given the Assessment of Assessments was to:

a. Assemble information about marine assessments relevant to the Regular Process

b. Undertake a critical appraisal of the assessments in order to evaluate their scientific credibility, policy relevance, legitimacy and usefulness. The appraisal should, in particular, identify:

(i) best practices and approaches (including assessment methodologies);

(ii) thematic and geographic assessment gaps and needs;

(iii) uncertainties in scientific knowledge, data gaps and research needs; and

(iv) networking and capacity-building needs in developing countries and countries with economies in transition;

(See Chapter 2 for the analytical framework, Chapter 3 for the evaluation of gaps and needs and Chapter 4 for the best practices.); and

c. Identify a framework and options to build the Regular Process, including potential costs, based upon current relevant assessment processes and practices (see Chapter 5)

MSR

- Marine scientific research (MSR) plays a critical role in sustainable development as consistently recognized by the UN General Assembly in its annual resolutions on oceans and the law of the sea. Research, and the tools required to conduct it, are essential for the sustainable development of the oceans and the seas and their resources, including by supporting informed decisions on the conservation and sustainable use of the marine environment and its resources, and by helping to understand, predict and respond to natural disasters and climate change.
- Increased MSR through capacity--development strengthening the capacity of States, in particular Small Island Developing States (SIDS), to implement the relevant MSR provisions of the UNCLOS

Technology to the Society

- Case study
- Empowering Coastal communities
- Co-management has become more widely recognized as an alternative fisheries management strategy to the centralized government management approach. It is, however, not an easy task for many coastal fishermen to take part in co-management of coastal resources. In order to do this, empowerment or “a process through which people become strong enough to participate within, share in the control of and influence, events and institutions affecting their lives” is needed.

Societal activity

Transfer of technology of sea cage culture at Tharuvaikulam, Tamil Nadu

Concept to involve fishers to work along with Government for their betterment and to conservation of marine biota

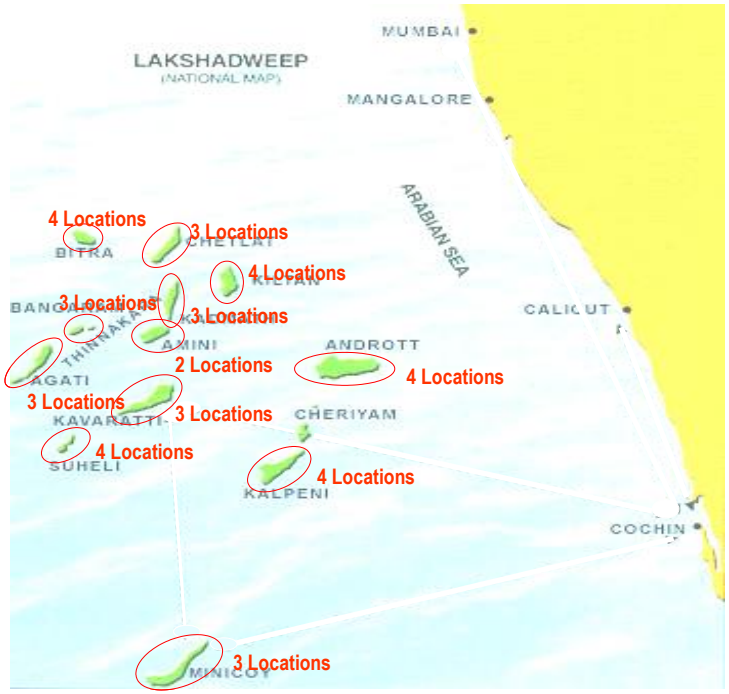
Salient features

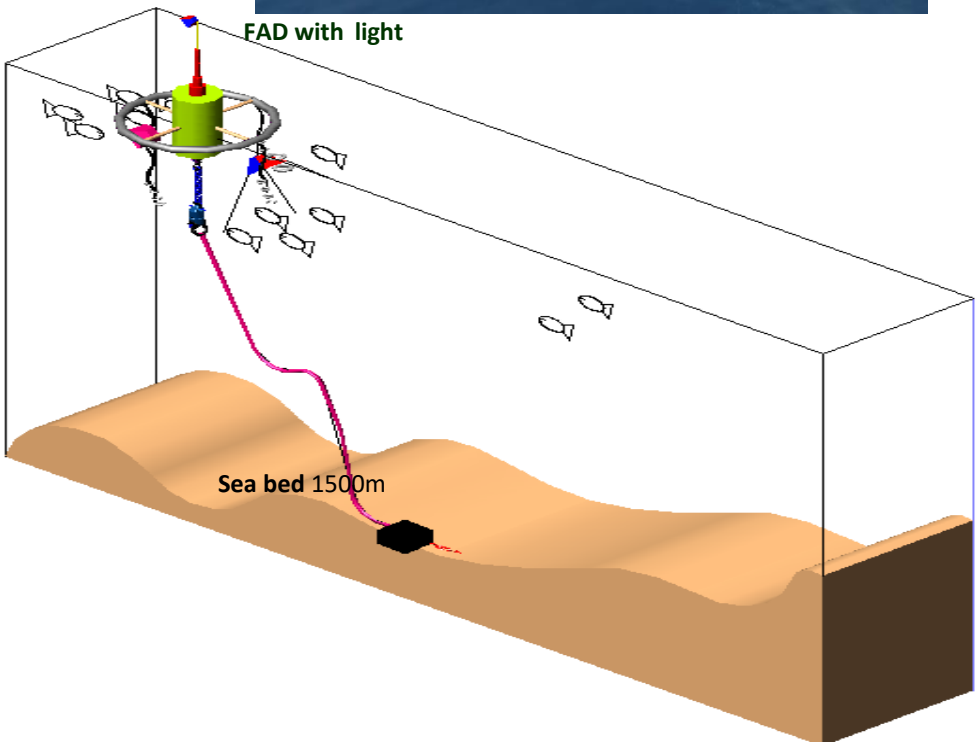
- Designed for sea wave loading
- Eco-friendly surface coating
- Suitable for communities (not for Industry)
- Less labour intensive
- Trained women Self Help Group
- Example of lab technology reaching society

Fish Aggregating Device (FAD) for Lakshadweep islands

Funded by Lak admn Rs 160 lakhs + NIOT's expertise

Deployed 28 FADS
For the first time in the world
Underwater light and net appendages to attract marine growth - Tuna fish gets attracted
Fishermen are getting promising results





Technology for society

- Bring the blend of engineering and marine biology for the benefit of society in particular island community
- lab based scientific work for the societal programmes
- EIA study - Tsunami infrastructure development projects in Andaman
- Involved in State Development Report preparation for Andaman and Nicobar islands

Support industry

Through knowledge on fouling and mitigation measures – seawater in take system,

THE HINDU

INDIA'S NATIONAL NEWSPAPER SINCE 1878

CHENNAI, TUESDAY, APRIL 5, 2005

Crab culture betters their lives

By P. Oppili

CHENNAI, APRIL 4. A few years ago, Ravi Das, a fisherman settled in an island in the Andamans, was earning a paltry sum of Rs. 3,000. But, today his bank balance is more than Rs. 10 lakhs.

Thanks to the support and training provided by the National Institute of Ocean Technology (NIOT), Chennai, along with the Andaman administration, he is able to earn more today.

Under the Ocean Science and Technology for Islands programme of the NIOT, crab culture activity was initiated at Kadamtala, one of the islands in Andaman. A self-help group (SHG) was formed, consisting of five beneficiaries. Scientists from the NIOT trained them.

After training, a farmland measuring 200 sq m was modified with locally available material for water crab fattening programme.

The scientists helped the group in designing the pond, and prepared the feeding schedule for the crabs.

The scientists monitored the health conditions of the breeding crabs and they helped the SHG members in harvesting procedures and post-harvest techniques.

Harvesting process

uously monitored the water quality and other microbiological parameters. The important requirement for a farm is good flushing of water, which is naturally available, where the farm is located.

Last October, the first set of crabs was stocked by the group and by the end of the month, the crabs were harvested and sold in the local market.

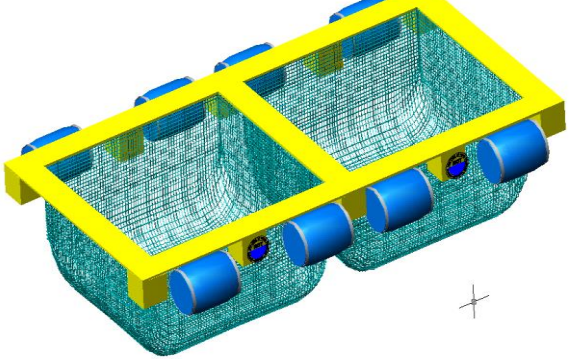
An exporter was also identified in Chennai, through whom the marine life was exported to Southeast Asian countries.

At present, the group is selling crabs under three different categories — small ones, gm) at Rs. 230 per kg and excel (above 750 gm) at Rs. 360 per kg. Every month the group is sending one tonne of crabs, says A.L. Sageer, Sulu Exports, who exports the crabs to Singapore and Taiwan.

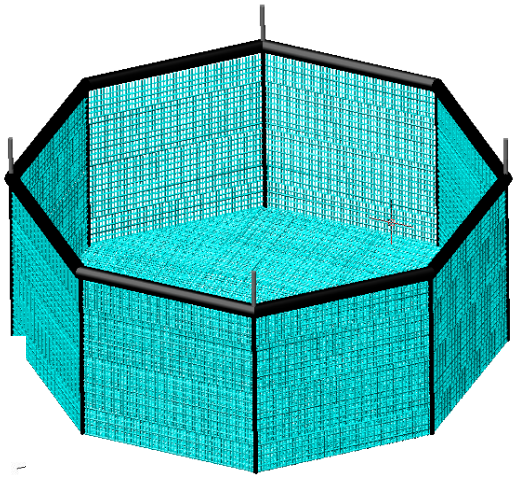
The SHG is not only self-sufficient, but also provides employment opportunities to local fishermen. About 50 fishermen were employed by the group to collect crabs from the sea. No juvenile/young ones are collected and the breeding or egg bearing crabs are released back into the waters, says an official from NIOT.

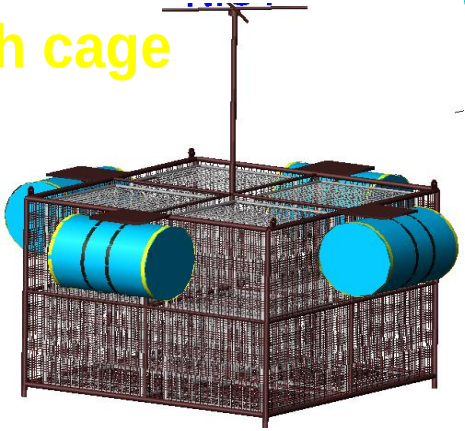
NIOT officials can be contact-

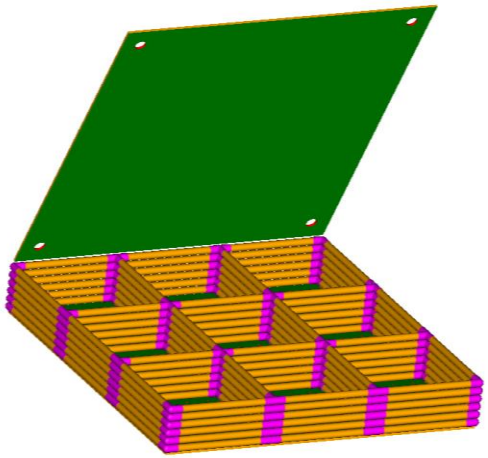
A mud crab caught on an Andaman island. — Photo: S. Thanthoni



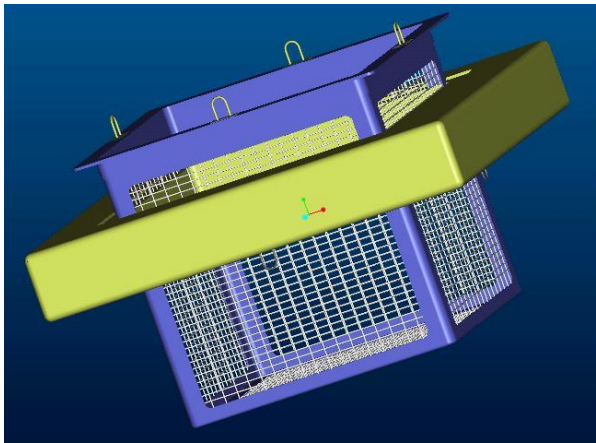
Fish cage







Types of cages designed



Lobster and mud crab fattening programme for the benefit of coastal beneficiaries at Pulicat lake

Mussel culture raft

Floating Lobster cages
32 cages (each 1 m3)

1.2m

0.6m





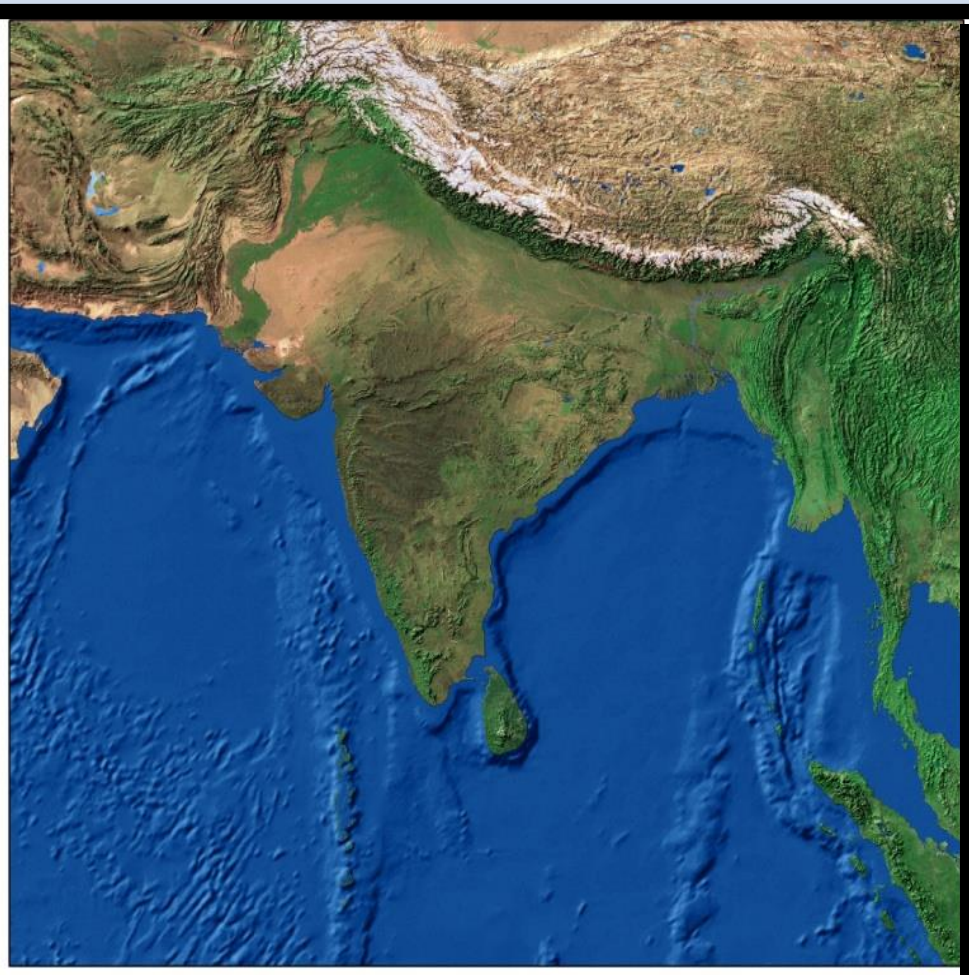
South Asian Seas Programme

South Asia Co-operative Environment Programme

SACEP

Bangladesh India Maldives Pakistan Sri Lanka

FOCUS ON SOUTH ASIA



Bangladesh
India
Maldives
Pakistan
Sri Lanka

1/5 of world population

50 % living along the coast

6 Mega Coastal cities

Unique Coral reef, mangroves, Sea Gras ecosystem

Climate Change* *Bangladesh, Maldives
Himalayan Glaciers
Tsunami, Cyclones, Delayed Monsoons, Unprecedented Rain Flash Floods, Sea Level Rise

Sewage Discharge into Sea

60 % Oil Tanker Traffic

Fishing: Artesian, Mechanized

Coastal Population and Marine Environment

1. Region is characterized by very low per capita income
2. High population growth rates.
3. 1.3 billion people approx which is 22 per cent (more than one-fifth) of the world's total population.
4. Nearly half of the world's **poorest** people live in this region.
5. Land area is **3.5 per cent** of the world total and it generates only 2 per cent of the world's GNP Ie., $ 430 .

The excessive population burden puts serious pressures on the limited natural resources causing adverse impacts on the environment

MARINE PROTECTED AREAS

- It is important to consider and develop transboundary MCPAs.
- To protect highly migratory marine species such as turtles, whales, dolphins and sharks as well as various other fish and bird species of South Asia

- **These include:**
  - **The Chagos** – Maldivian and Lakshadweep archipelago
  - Andaman and Nicobar islands
  - Seasonal marshes, mudflats and brackish water lagoons of **Runn of Kuchchh**
  - **Gulf of Mannar**
  - The **Sundarban** mangrove

To mention a few ……








MCPAs in South Asia

UNEP - EU funded project

- South Asia Coal Reef Task Force
- Monitoring mechanism, Institutional linkages, Capacity building, awareness, Science, participatory approach , Eco-development
- National task Force
- Managers training programme
- Small funded projects to 5 countries on education
- Regional communication strategy
- International Year of Coral Reef

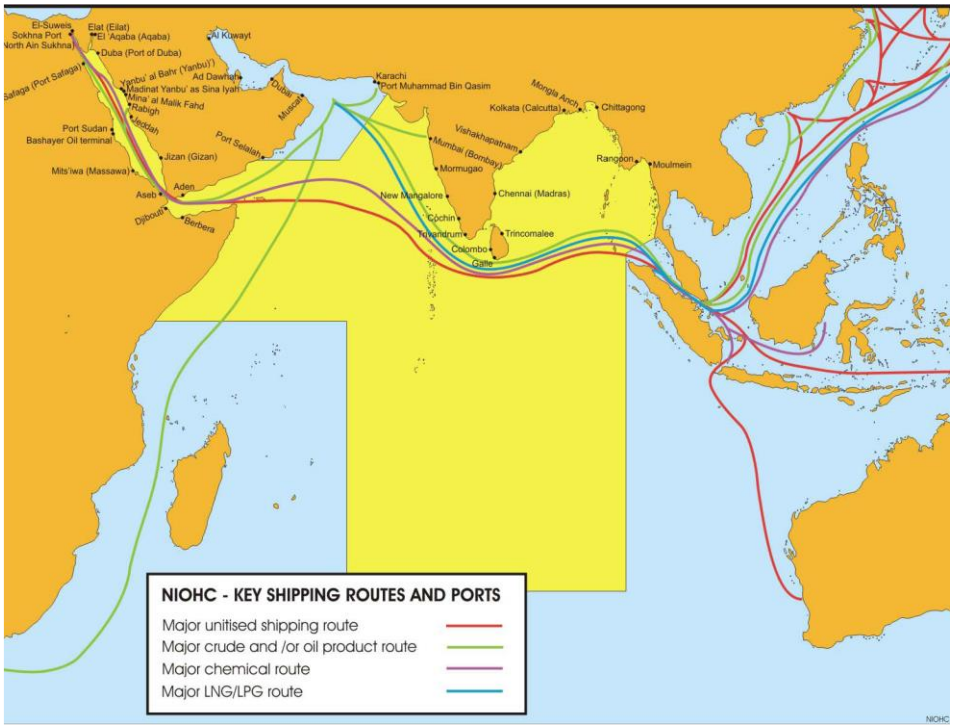
THE BLUE FLAG PROGRAMME

SACEP UNEP UNWTO

- Involvement of tourism and environmental sectors at local, regional national.
- Strives to promote sustainable development in the coastal areas
- Enthusiastic response from SAS member countries
- National workshop involving tourism environment fisheries ministry

South Asian Seas Regional Oil & Chemical Spill Contingency Plan

- Status of MoU Maldives has signed
- other 4 countries – in advanced stage with cabinet



Regional Plan

1. INTRODUCTION
2. POLICY AND RESPONSIBILITY
3. RESPONSE ELEMENTS AND PLANNING
4. RESPONSE OPERATIONS
5. REPORTING
6. ADMINISTRATION, LOGISTICS AND FUNDING
7. PUBLIC INFORMATION

MoU

- **Joint Training and Exercises**
- **Meetings of the Parties**
- **Secretariat**
- **Relation to Other Conventions and International Agreements**
- **Amendments**
- **Signature, Ratification, Acceptance**
- **Depository**
- **Entry into Force and Withdrawal**

- **2.4 Joint training and exercises**

- 2.4.1 The Parties may~~shall~~ conduct **joint training exercise *(The joint and training courses need not involve all parties in the - Bay of Bengal it might involve Bangladesh and India, Arabian Sea India and Pakistan, whereas in the southern part of the region only India, Sri Lanka and Maldives). However participation in such exercise shall not be mandatory. The option for not participating in the exercises shall be intimated well in advance}***

- ~~periodically (preferably once a year) joint training courses and joint exercises~~.

- 2.4.2 The Parties may ~~shall~~ successively host such training courses and exercises. The host country shall organise the training courses or exercises and provide necessary logistic support; however, the expenses for the participants and means deployed in joint exercises shall be borne by their respective Parties. Scheduling programmes, duration and other relevant details concerning such training and exercises shall be decided at regular annual meetings of the Parties. The Parties may seek assistance from IMO or other sources in the planning and conduct of joint training and exercises.

- **Joint Training and Exercises**
- 7.1 ~~The Parties agree to conduct periodically joint training courses and joint exercises as planned under the Regional Plan~~***The Parties may conduct and participate in Joint Training Courses and Joint Exercises)***

Blue Economy

Blue Economy

- Movement from green economy to Blue economy
- Concept involves more investments in harnessing the resources of the sea
- “Blue economy” : 2012 UN Conference on Sustainable Development (Rio +20) and refers to food, jobs and opportunities for development from ocean and coastal assets.
- Several aspects include, food from the sea, fisheries, aquaculture, shipping and port facilities, renewable ocean energy; marine technology development and research, recovery of minerals from the sea floor, drugs from the sea etc.

- **New UNEP Report Outlines Blue-Green Economy and Island Innovation Opportunities in Small Island Developing States**
- **With almost 30 per cent of SIDS populations living in areas less than 5 metres above sea level and the size of storms in some cases exceeding the size of whole islands, estimated losses to SIDS economies could become overwhelming**
- http://www.unep.org/newscentre/default.aspx?DocumentID=2796&ArticleID=10969#sthash.CYWgXK9b.dpufhttp://www.unep.org/newscentre/default.aspx?DocumentID=2796&ArticleID=10969

Multilateral Roundtable on Innovation and Research Collaboration in Marine and Ocean Technology

Canada, Israel, China, India and Brazil

Multilateral Roundtable on Innovation and Research Collaboration in Marine and Ocean Technology

Canada, Israel, China, India and Brazil

March 21 - 23, 2011

St. John's, Newfoundland and Labrador, Canada

The overall ocean economy was estimated to be to be worth more than $1.5 trillion CAD2 in 2009 with the marine and ocean technology industry contributing a significant portion of this.

Many countries recognize the economic as well as social and environmental benefits offered by the marine and ocean technology industry and vigorously work to build their capacity and market share.

The industry is highly competitive and bringing innovations to market generally become leaders in their areas of focus.

Science

First Signs of **Seahorses and Pipefishes** Decline in the Mediterranean

Posted by Ocean News

Published: 23 January 2017

Syngnathids are unique fish species that exhibit male pregnancy and give birth to live young

.

Sea Horse

Hippocampinae

Pipefish

Hippocampus guttulatus

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora)