



Climate Change

Blue Economy: What does it holds for India in the long run?

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Publication History

Received: 19 February 2017

Accepted: 22 March 2017

Published: April-June 2017

Citation

Shyam S Salim, Athira P Ratnakaran. Blue Economy: What does it holds for India in the long run?. *Climate Change*, 2017, 3(10), 739-752

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General Note



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ABSTRACT

Ocean and inland waters provide immense benefits for the humanity mainly it helps in the social and economic development, ensures food security and provide ecosystem services. But the resources and its gains mainly from oceans are eroded rapidly due to

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climate change, pollution, overfishing, and ocean acidification and also due to increased deforestation. So it is necessary to determine the full potential of ocean's food and resources in order to meet the needs of the growing population also it is necessary to develop an approach which is environmentally and economically stable to make sustainable use of ocean resources. Blue economy could provide a panacea in fulfilling this approach. There are several economic sectors which is using ocean and inland waters including fisheries and aquaculture, mining, renewable energy, biotechnologies, shipping. All these sectors and their carbon foot print imparts direct effect on the ecosystem. The major role of blue economy is to determine the impact of these sectors on the biodiversity, ecosystem services and also on the aquatic resources. Blue economy is providing immense opportunities for adapting to the increasing global issues through appropriate policies to support research and development and by better strategies delivered through market mechanisms. There is an urgent need for a locally precise and spatially explicit quantification of all things relative to ocean wealth in metrics that are comprehensible and practically feasible by decision makers at varying scales these metrics will support us to make out and determine which industries fall in to the new notion of blue economy. By enabling better policies, by creating innovative technologies the idea of obtaining economic gain from seas could be possible through blue economy. The major goal of blue economy is to create as much as economic value from marine environment but to do it in a sustainable manner without harming the ecosystem services and its resources.

Key words: Blue economy, Fisheries, IORA, Role of oceans in economic development

Abbreviations: IORA – Indian Ocean rim association, SWOL – strength, weakness, opportunities and limitations, SIDS –Small Island developing states, OTEC- Ocean thermal energy conversion

1. INTRODUCTION

Status of Fisheries

The total marine fish landings from the mainland of India during the year 2015 were estimated as 3.40 million tonnes registering 5.3 percent decline compared to 3.59 million tonnes in 2014 (CMFRI annual report 2015-16) . Through the development of blue economy we obtain more integrated and corporative approach and would enhance the increased corporation in trade, tourism, infrastructure development, environment and sustainable fish production. Leading countries in fish capture and production are China, Peru, India and Indonesia. The fisheries sector contributes 0.83 per cent of India's GDP and 5.4 per cent of the agricultural GDP. Apart from that fisheries sector provides immense employment opportunities both direct and indirect ways from which fisheries operation provide around 30 lakhs and fishing contributes around 20 lakhs direct and indirect job opportunities. Fisheries and aquaculture supply mainly 17 percent of the global animal proteins and also support more than 660-820 million livelihoods.

More than 3 billion people depend on fish and 90 percent of the livelihoods in developing countries are directly depended on fisheries and aquaculture (Ababouch., 2015). About 700 million live in low lying coastal areas less than 10 meters above the sea level. Marine ecosystem services provide immense opportunity for the social and economic development, provide employment opportunities and meet the need of the people in a sustainable mannerFAO (2010).

2. EVOLUTION OF BLUE ECONOMY

The innovative philosophy of Blue economy was proposed by Prof. Gunter Pauli in 1994 when asked by the United Nations to replicate on the business models of the future in preparation for COP3 in Japan and its concept was a model which allows the producers to offer the best at the lowest prices and by introducing innovations that produces multiple benefits. The first suggestion for a "Blue Economy" is often ascribed in the book "The Blue Economy 10 years, 100 innovations, 100 million jobs" Pauli (2010) by Gunter Pauli. Earlier the blue economy concept was not related to ocean and inland waters rather it was considered as a modification and evolution of the green economy concept. Blue economy concept was also referred to as "Blue green economy" or "Blue growth, the new maritime green economy "Green economy in a blue world (UNEP, 2012)", "Blue growth or "Green growth in fisheries and aquaculture" and this has been developing for ensuring a sustainable marine and fresh water resources.

The terminology blue growth was preferred more than the blue economy due to the criticisms faced in the green economy where there was more importance for the conservation and preservation of the environment at the cost of economic growth and social development. The blue economy concept was featured during the Rio +20, 2012 and it ensures better implementation and

efforts to promote the sustainable growth of ocean and inland waters. There were arguments during the Rio+20 preparatory meetings and most of the small developing states they observed that the Green economy have only less relevance for them but the green economy in a blue world is highly relevant and suitable for sustainable development and management of ocean resources (Veitch et al., 2012)

The concept have become an integral part for oceanic development strategies of the international organizations and both developed and developing countries also many coastal states like SIDS are relying on the concept for the economic growth and conservation of the marine resources. FAO is also promoting blue economy for promoting sustainable growth, to ensure food security and poverty alleviation. It is expanding to other marine and maritime sectors like shipping, tourism or mining. Blue economy has developed as a national strategy to enhance the growth of marine sectors China has already initiated Five Year development plans on National Marine Economy and Europe have integrated the blue strategy with the Europe 2020 to enhance the growth and sustainable development of the marine sectors apart from that other ocean bound countries like Mauritius and Seychelles are also looking forward to adopt blue economy for their national development strategy.

3. GREEN ECONOMY VIS -A -VISBLUE ECONOMY

The green economy is defined as an economy that aims at reducing environmental risks and ecological scarcities, and that aims for sustainable development without degrading the environment. It is closely related with ecological economics, but has a more politically applied focus. The 2011 UNEP Green Economy Report argues "that to be green, an economy must not only be efficient, but also fair. Fairness implies recognising global and country level equity dimensions, particularly in assuring a just transition to an economy that is low-carbon, resource efficient and socially inclusive.

A feature distinguishing it from prior economic regimes is the direct valuation of natural capital and ecological services as having economic value and a full cost accounting regime in which costs externalized onto society via ecosystems are reliably traced back to, and accounted for as liabilities of, the entity that does the harm or neglects an asset. Green Sticker and eco-label practices have emerged as consumer facing measurements of friendliness to the environment and sustainable development. Many industries are starting to adopt these standards as a viable way to promote their greening practices in a globalizing economy. For the conservation of our earth we have to choose healthy and natural products like organic food, solar energy and biodegradable products but all these cost more which comes up within the green economy which is not affordable for most of the developing countries but also sometimes harmful to the nature, bio-soaps use palm oil from plantation which destroys the rain forest similarly solar energy depend on subsidies for decades which must be paid through taxes, organic foods are transported to other countries so this is not only expensive but also it is not smart enough.

Blue economy provides a panacea for better energy production, better food, clean water, job opportunities. Blue business models will use local resources, be extremely efficient and build on participation of all stakeholders thus moving from scarcity to abundance. Thus we need to focus for a better and sustainable way to provide a better future.

"Blue Economy" is marine-based economic development that leads to improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. It includes: Reframing the oceans as "Development Spaces" that are subject to spatial planning. Blue economy provides solutions through incorporating ocean knowledge, fisheries and aquaculture, Seaports and shipping, Tourism, Ocean energy, Research & development, Sea bed exploration and minerals, Marine biotechnology we could achieve this (UNEP, FAO, IMO, UNDP, IUCN, World Fish Center, GRID Arendal, 2012).

4. ROLE OF OCEAN IN ECONOMIC DEVELOPMENT

We live in a blue planet and more than two-third of the earth is covered in water yet the underwater world remains the earth's last truly unexplored frontier. Oceans harbours people and has been living in the sea and feeding themselves by fishing and making their livelihoods on the coast for 1000 of years. We need to harness the potential of blue economy that of the oceans and of the coast to boost economic activity and to improve living standards in a rapidly changing world. The earth's population is expected to rise from 7 to 9 billion over the next four decades. Fisheries will be crucial as we are trying to feed an extra two billion people. Fisheries and aquaculture are having great economic importance and it is the responsibility of the fisheries management to ensure sustainable fishing stocks and community. Most of the people live in cities one in three people of the planet live near the coast and the percentage are moving up were eight of the planets ten biggest cities are nearby the sea. Coastal cities play crucial role in building blue economy.

Ocean stores 50 times more carbon than the atmosphere and it is an excellent reservoir of inorganic carbon. CO₂ is sequestered in the form of blue carbon sinks. Mangroves, inland waters and sea grass are considered as the most efficient ecosystem in sequestering carbon. It could sequester more than 5 times the amount of carbon absorbed by the tropical forest and mangroves in addition provide protection against erosion and storms. More than 80 percent of the global trade in goods is transported by means of sea and coastal tourism is one of the major areas which are providing economic growth of the coastal countries. Still there are lot of prospects available in the ocean energy and could meet the worlds energy demand.

Rising trade flows means the shipping will grow dramatically over the coming decades, container traffic could rise fivefold in the coming decades this will require massive new investment in the both ships and infrastructure. More than 80 percent of our tourism takes place on the coast and cruise ship vacations are the fastest growing sector of the leisure travel industry all these economic activities requires energy (UNCTAD 2012). New forms of offshore energy which are renewable and low pollution alternatives are crucial for our future needs. Maritime wind power is growing fast and could provide up to a third of all wind power tidal and wave power that are also promising. The oceans have an extremely crucial part to play in providing the economic growth and improving human well-being and equality while reducing the environmental impacts and creating sustainable jobs. Blue economy means using local resources to strengthen and circulate economy to take responsibility and decision making and to implement innovative technologies by transitioning to smart energy. By preserving and healthy and coastal marine ecosystems and increasing the value of our resources we can ensure continuous growth of our ecosystem resources for present and future generations (Ebarvia, 2016). (Figure 1) represents the role of ocean in various economic developments.

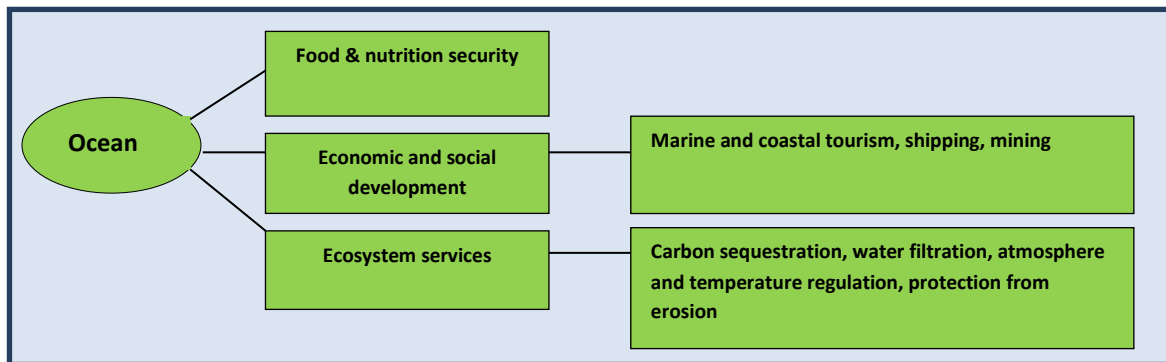


Figure 1 Oceans role in economic development

5. MOVING TOWARDS BLUE ECONOMY

The main aim of blue economy is to shift from "scarcity to abundance". *Blue economy generally refers to the sustainable use and preservation of the oceans in order to ensure the continued survival of the earth.* There is always a way that introduction of new and better innovative technologies in the market based on the blue economy concept can create new cash flow, better job and also can built social capital. Blue economy is the main stream of national development and can integrate socio-economic development based on land and sea in a sustainable manner. We have to establish an integrated spatial planning for upland-coastal-ocean areas of any given region. There are public processes of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process. Spatial planning (Zoning) is also required in order to attract investors. Wider societal roles are necessary for greening the fisheries and aquaculture sectors.

Reduced fossil fuel use and there by reduced carbon foot print from the fisheries sector result in improved economic performance as well as help to mitigate climate change. Strengthening regional fisheries bodies, national fisheries management agencies, fishing community and fish workers organizations and private sector associations are important part for sustainable and equitable use of marine resources. Reduced fishing effort as well as non-destructive fishing techniques would help to prevent environmental consequences.

The Blue Economy is envisaged as the integration of ocean economic development with the principles of social inclusion, environmental sustainability and innovative, dynamic business models. It is founded upon a systems approach, wherein renewable and organic inputs are fed into sustainably designed systems to fuel "blue growth". Such "blue growth" addresses the problems of resource scarcity and waste disposal, while delivering sustainable development that enhances human welfare in a holistic manner. It generally refers to a healthy ocean which generally leads to higher productivity and this concept is considered to be broader and includes much of the maritime activities like the shipping services (Mohanty et al., 2015).

It is believed that life originated in ocean and it covers more than 70 per cent of the entire globe. Oceans are having abundant resources and it has the ability to support life on earth. One of its major strength is that it can provide better opportunities for the development and blue economy will create a new horizon of hopes and aspirations to turn India into a developed country in near future. In most of the new national ocean strategies and policies the idea of blue economy came up, with government signals and intentions to enhance a more sustainable balance between economic growth and ocean health. We need to incorporate human, nature and economy back into balance, green economy is quite expensive like, renewable energy and transportation of organic foods so even green is bad due to its unintended consequences.

6. SWOL ANALYSIS OF BLUE ECONOMY

In the context of blue economy it is important to assess the strength, weakness, opportunities and limitations in the planning and implementation of the numerous areas which could be impacted by the blue economy parameters and is listed below in the following (Table 1)

Table 1

SWOL analysis of blue economy

Strength	Weakness	Opportunities	Limitations
1. Knowledge base	1. Holistic definition	1. Improved ocean and ecosystem health	1. Environment stress
2. Sound marine and maritime policies	2. Issues in spatial planning	2. Socio economic development	2. Non- compliance and lack of will in Implementation
3. Prioritised and maritime policies	3. Slow private sector initiatives	3. Investment opportunities	3. Lack of proper R & D
4. Committed Financial support	4. Anthropogenic activities and its resultant environmental stress		4. Technological, social and site specific challenges

Strength:

1. With increasing research and development in this sector we all have high quality knowledge and information about the sea and what is needed to restore it to health this is one of the key strength of blue economy.
2. One of the major strength of blue economy is that it could achieve economic growth without compromising on the environment and natural resources.
3. There is good suite of public marine and maritime policies already in force we only need to properly implement it with proper tools for valuating ecosystem products and services. Even though these policies are quite promising with greater potential timely
4. Action and implementation is still lagging behind. By understanding and solving it we could simply turn these weaknesses in to greater strength.

5. Public sectors, corporations and private sector are all concerned about environment safety and there is an urgent need among the society to curb the environmental issues so as more people are concerned about this issue more support can be achieved for blue economy
6. There are lots of financially strong economies who are ready to invest and innovate in this sector.
7. Other major benefits and strengths are it boosts the coastal and national economies, provide employment, promotes entrepreneurship, facilitates interconnectedness of regional economy, utilizes untapped potential of Indian Ocean, ensures sustainable development, help to mitigate climate change
8. We have the capacity, knowledge, corporation and financial support to achieve sustainable blue economy. If properly implemented and acted together we could overcome the existing weakness and turn these strengths to achieve a truly sustainable blue economy.

Weakness:

1. The major weakness of blue economy is the lack of a proper and scientifically agreed clear definition for sustainable blue economy that could guide the marine and maritime sectors policies and decision making in both public and private sector. It is still not clear whether or not our policies and actions will lead to long term sustainability. Sustainable blue economy in general is an economy that provides social and economic benefits for current and future generations that protects, maintain the productivity based on clean technologies and renewable energy.
2. Another major drawback is the lack of holistic, cross - sectorial and long term management of the sea. The decision in most our region is taken mostly by sector by sector and country by country due to lack of proper integrated approach, and inefficient policy implementation and the fact is that no country is having a comprehensive policy that could lead to a sustainable blue economy.
3. Sustainability it mostly depends on the private sector's active engagement and leadership lack of private sector leadership and lack of accountability on policy implementation are some of the major weakness of blue economy.
4. The blue economy is under performing mainly due to environmental stress from both lands based and sea based human activities. Several environmental stresses like pollution, eutrophication all these reduces the potential benefits which we could obtain from the sea and this could lose the benefits which can be brought out through blue economy. These environmental problems can harm even the tourism and recreation sector which could create economic loss.
5. In order to turn this weakness in to strength we require economic actors in this region to be more proactive and to take on a leadership role for change (WWF, 2015)

Opportunities:

1. Blue economy provides opportunities to restore our ocean and seas health and maintaining the ecosystem
2. By properly implementing the existing policies could provide better job and better income. Many jobs which are expected to appear are those in the tourism sector. "Green tourism" concept can be achieved by serving sustainably harvested food, by encouraging the visitors to conserve resources and use of renewable sources of energy. Better and healthy ocean can provide better job and income.
3. It could provide business and investment opportunities. The products and services produced in an environment friendly manner have more demand in the market so the companies will have greater pressure and they will adopt more innovative, environment friendly methods for making products

Blue economy guarantees a green perspective to maritime economy which is presently seen as a means of free resource extraction and waste dumping. It seeks to take into cognizance the cost of all negative externalities including environmental degradation and ecological imbalance. In short, it postulates a complementary apparatus to the existing brown model of ocean economy. (WWF, 2015)

There is greater scope for the development of the Indian fishery sector especially such as technological novelties, infrastructure projects, and research& development options with established academic institutions, effective governance in solving issues such as pollution, illegal trade and sea-bed mining. Blue economy opens up new opportunities for the new generation entrepreneurs. This

will require the changes proposed in the policy framework of UNEP's Green Economy Initiative. Combined with the Blue Economy inspiring entrepreneurs to change the economic framework through bottom-up shifts in business models this provides hope and inspiration (Pauli, 2010). The important sectors which are likely to be impacted and benefitted by the effect of blue economy are especially the employment sector, transport sector, energy sector. The major opportunities of blue economy in different sectors is listed in the (Figure 2).

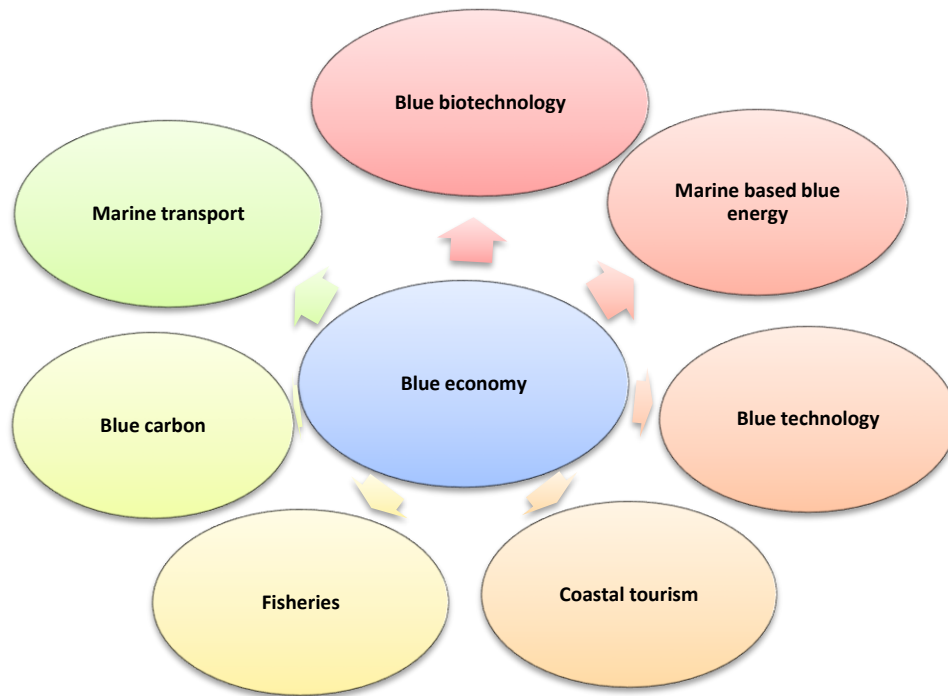


Figure 2 Major avenues within blue economy

Employment opportunities: It was estimated that blue economy can provide immense employment opportunities in the near future because now most of the people are relying on renewable sources and so most of them are employed in this sector rather than on oil and gas industries, also the investment on renewable energy sources like solar, wind etc. have far exceeded than that of the new fossil fuels power plants. (Gunter Pauli Founder of ZERI (Zero Emissions Research and Initiatives) and author of the forthcoming book *The Blue Economy*). Even though several grant steps and movements were taken place like green movements in order to attain sustainability still we need to find solutions to the rising global issues and we require new and better economic models.

Maritime transport: Shipping is considered as the most eco-friendly, efficient and effective means of transportation. International shipping is considered to be the major tool for sustainable development. Greening of this sector is possible and can be achieved by effective management and planning techniques. Shipping is also subjected to be major worldwide and officially binding CO₂ regulations for an entire economic or industrial sector. More than 80 percent of global trade by volume and 70 percent of trade by value is mostly being carried by sea and ports. The developing and the coastal countries need to focus and improve on their facilities and capacity for trade. Even though there are many challenges the maritime trade is set fair for economic development and benefits while decreasing the effects and also enhancing the blue employment openings in the near future. Even though shipping is considered to be the most carbon efficient means of transportation still it emits considerable amount of greenhouse gases, oil spills and also other means of pollution (Spadling, 2016)

According to the international maritime organization they estimated that CO₂ emissions from shipping are about 3 per cent of the global human caused emissions. In the cruise ships we could find immense improvement in the usage of fuels, propulsion

system, wastewater management, solid waste handling and emissions. There is greater opportunity to make the shipping much cleaner and eco-friendly. Another area for likely improvement is the end of life of ships. Ship breaking is considered as the practice of recycling iron copper and other components from the ruined ships. Unfortunately, as practiced in certain countries, it is a poorly regulated industry with chronic labour abuses and minimal environmental mitigation.

Fisheries: More than 350 million jobs are provided by the marine fisheries across the globe, and among them 90 per cent of them are living in developing countries (UNCTAD 2012). The implementation of an integrated, ecosystem approach and the removal of fisheries subsidies that initiates overexploitation bid the prospect of restoring key stocks and increasing catches. The execution of good management methods increase the sustainable catches, reduce the energy utilization and costs as well as enhance food security. Green fishing with minimal carbon emission while fishing and standardised post-harvest technologies would provide incentives for the subsistence fishers in realising remunerative prices and augmented income.

Coastal tourism: The international tourist arrival rose to 4 per cent despite the global economic crisis in 2012 and constituted 9 per cent of global GDP (UNWTO 2013). It also provides greater job opportunities and supported 9 per cent of global jobs in 2012. Global tourism mostly focused on marine and coastal environment. The tourism consumer, however, is motivating the change of the sector with a 20 per cent annual progress rate in ecotourism. Blue Economy approach where ecosystem services are properly valued and combined into development planning will further spread this transition, guiding tourism development and promoting lower impact activities, such as ecotourism and nature-based tourism, where the natural capital is maintained as an integral part of the process.

Coastal tourism is the most prominent and developing market across the globe but it is less sustainable. Sustainable tourism is the effective way through which we can mitigate climate change, alleviate poverty as well as helps to support the local economy. Spending more on green tourism can cut the cost and augment the value of ecosystem. Especially the private sector must be trained and should capitalize more on greening practices in order to attain sustainability (Kathijotes, 2012). For sustainable tourism, Cross-sectorial consultation and Integrated Coastal Zone Management (ICZM) are essential. Government investment and policies can clamp on private sector activities on sustainable tourism. There is an immense potential for blue economy to flourish with right actions as the coastal districts of Kerala attained 81.5 per cent of overall tourists (both domestic and foreign) in 2014 (Kerala Tourism, 2013).

Marine based blue energy: It is important to reduce the fossil fuel energy and also use renewable energy like solar, wind, OTEC, wave and tidal energy, bio fuel from marine algae and sea grasses. It can be observed that marine energies are having the potential to enhance the efficiency of energy resources, and also to reduce the greenhouse gas emissions. These include: Wind-driven marine waves; Gravitation induced marine tidal (tidal-range barrage); Tidal stream (marine currents); Marine salinity gradients; and Thermal gradients between warm surface water and deep (>1000 m) cold water (also called ocean thermal energy conversion, OTEC). While considering the exploitation of any resources like oil gas and other mining and mineral resources it should be carried out in an environment friendly manner as well their economic returns must be utilized for the capacity and well-being of the coastal communities in order to achieve sustainable development.

Blue biotechnology: The capacity of the marine organisms in the underwater world has yet to be studied and explored in order to provide inputs to the blue economy. The anti-viral drugs were obtained from nucleosides isolated from Caribbean sponges. Other companies developed from small soft-bodied marine animals the first drug of marine origin to fight cancer. Exploration of the sea biodiversity is now helping us understand for example how organisms that can withstand extremes of temperature and pressure and grow without light could be used to develop new (Spadling, 2016)

Industrial enzymes or pharmaceuticals. At the same time, concerns about the land-use impact and the thirst for water of terrestrial crops grown for bio fuel are driving efforts to explore the use of algae as a source of bio fuels, along with high added-value chemicals and bioactive compounds. Switching to blue economy can improve the potential of marine based economy and also can reduce the ocean degradation and environmental consequences.

Remediation and restoration: Ecosystem services and restoration of the ecosystem services are considered as the major important business to make money. The large scale coastal and marine restoration projects can create better employment opportunities and can improve the coastal livelihoods. Effective management, operation and monitoring of these could benefit the people and could provide better job openings as well.

Blue carbon: A new mode of business is being formed were to sell credits for carbon storage and sequestration in coastal and ocean living biomass. There were huge concern regarding the commodification of the ocean, but other benefits such as improving the productivity in coastal areas and protecting the habitats could reduce its effects. Generally blue carbon is the amount of carbon

captured by the oceans and the coastal ecosystem. The carbon captured by living organisms in oceans is stored in the form of biomass and sediments from mangroves, salt marshes, sea grasses and potentially algae. There is a lot of carbon which is released in to the atmosphere oceans and coast provides immense benefit to store and capture this carbon and thereby help to reduce the climate change. Sea grasses, mangroves, and salt marshes along our coast "capture and hold" carbon, acting as something called a carbon sink (Spadling, 2016).

These coastal systems, though much smaller in size than the planet's forests, sequester this carbon at a much faster rate, and can continue to do so for millions of years. The bigger picture of blue carbon is one of coastal habitat conservation. When these systems are damaged, an enormous amount of carbon is emitted back into the atmosphere, where it can then contribute to climate change. So protecting and restoring coastal habitats is a good way to reduce climate change. When we protect the carbon in coastal systems, we protect healthy coastal environments that provide many other benefits to people, such as recreational opportunities, storm protection, and nursery habitat for commercial and recreational fisheries (Nellemann et al., 2009)

Blue technology: The blue technology sector comprises of providers of infrastructure, including manufacturers of sensors, instruments, and platforms; those building, deploying, and operating observing systems; providers of the data infrastructure that bring about and connects ocean data; organizations that develop and sustain data management systems, software tools and models; environmental safety and marine robotics; and desalination.

Limitations:

1. Environmental stress: Blue economy would face greater challenges due to pollution, climate change, loss of biodiversity and habitat.
2. Lack of good policies and its implementation
3. Technological, operational and site specific challenges
4. Lack of better research and development

The greatest challenge that we are going to face in the near future is food and nutrition security with the likely challenges of overfishing, climate change, ocean acidification and pollution the ocean and inland waters are eroded rapidly so there is an urgent need to transfer world's economy towards a more sustainable and resource efficient path. Apart from other geopolitical issues blue economy would face greater challenges due to pollution, climate change, loss of biodiversity and habitat. We know that green economy had an impact on specific producers in the niche market it has yet to be developed to shape our entire system and the major challenges which is being faced is that it requires more consumers to pay and also better companies to invest. In the current sustainable movement the substitution of one product by the other is having unintended consequences on the other. Instead of substituting one product by the other improve the system and use what is available sustainably to meet the needs of the earth and its citizens. Even though blue economy has immense opportunities it faces technological, operational, site specific and societal challenges.

One of the likely challenges is rethinking feed for aquaculture this is to create highly nutritious aquaculture feeds that reduce the impact on environment as well as cost. The other is to create better ocean products which has low environmental impact and helps to improve the sustainability, productivity and profitability of the aquaculture products. Improved methodologies, design, products and innovations that are sustainable and eco- friendly must be developed. (WWF, 2015)

7. BLUE ECONOMY PERSPECTIVES FOR INDIA

Many countries have included blue economy as a part of national strategy. China has initiated a five year development plan on national marine economy which keeps track of progress in marine sector. Similarly EU has integrated its blue growth strategy with Europe 2020 strategy for smart, inclusive and sustainable development of its maritime sectors. Ocean bound countries like Mauritius and Seychelles want to adapt blue economy as their national development strategy but they lack necessary technologies and investment so they require the support of other countries for their development. Blue economy has also come up in the UN sustainable development goals where it says to 'conserve and sustainably use the oceans seas and marine resources for sustainable development'. India is working with the other states in the Indian Ocean region to strengthen security and economic cooperation mainly to create new pillars of economic activity in the coastal areas through sustainable tapping of ocean resources (Vijay, 2016). The major opportunities envisaged are as follows:

1. Sustainable exploitation of living and non- living marine resources
2. Environment friendly infrastructure in the ocean
3. Generating better employment by providing a support to national and coastal economies
4. By contributing to climate change mitigation and sustainable development
5. By promoting entrepreneurship in new areas of economic activity
6. Integrate on-going programmes like make in India, smart city skill development etc.

Blue economy as suggested by Gunter Pauli has immense potential for India in the future. It not only provides a healthy ocean with higher productivity but also have great implications at foreign policy level. Blue economy in general means exploiting the ocean by including the social intrusion, environmental sustainability with dynamic and innovative business models. India is yet to have a sound policy on blue economy including organic, renewable sources and greening the ocean economy.

India have to focus on blue economy mainly because the country have more innovative and sustainable approach it would offer better livelihood security for the fisher communities as well as food security for the citizens. The presence of polymetallic nodules such as iron, manganese and zinc along with the untapped oil and natural gas reserves promise a sufficient constituent for foreign exchange earnings. Sea borne trade, port led development, offshore infrastructure can bring sustainable port and shipping regime and Trans loading mechanism can reduce the marine pollution. When considering as green oriented effort blue economy generally provides more employment, no pollution and no waste. Marine industries like boats and ship building and also sea product processing unit and marine biotechnology can join the blue agenda.

8. INDIAN OCEAN RIM ASSOCIATION (IORA)

Indian Ocean one of the world's third largest oceans it is the life line of international trade and transport. Indian Ocean rim (IOR) consisting of coastal states bordering the Indian Ocean. Along these countries having wide diversity, population and economy and all these depend on Indian Ocean. Around the world all the coastal nations depend on the oceans for fishing, minerals, oil and gas and for other living and non- living resources. In this context blue economy which aims at optimum and sustainable use of ocean resources for their growth and development is critical for the coastal dependent nations especially the small island developing states. The blue economy can provide vast job opportunities as well as enhanced economic growth. The whole development paradigm in small island developing states (SIDS) such as Seychelles and Mauritius is greatly inspired by the principles of blue economy (Vijay, 2016)

The blue economy initiatives are important for the small developing states and the major small developing states such as Seychelles and Mauritius who are members of the Indian Ocean Rim Association (IORA) have introduced certain measures to implement blue economy. Since most of the IORA member states are located near the coastal regions they exploit the ocean resources optimally for the benefit of the people member countries like Africa, Australia and India is also trying explore the opportunities of blue economy. Indian Ocean region is rich in fish species In addition, the IORA Women's Economic Empowerment event held in Seychelles highlighted the good practices and solutions related to women's empowerment and entrepreneurship. Such events created awareness of blue economy in the Indian Ocean region and this created interests among the academics and policy makers for including this subject in the future. The scope of blue economy in the future is vast because blue economy generally covers all the ocean related activities which includes both direct and indirect supporting activities which is necessary for the functioning of the economic sectors, but mean while it also manages the exploitation or environmental damage which is caused due to the over exploitation of ocean resources. More sustainable and novel approach in fisheries sector can enhance the livelihood security for the fishing communities as well as ensure food security (Mohantyet al., 2015).

The biggest economies of the world like United States as well as China have recognized the importance of marine resources for their economic growth, environmental protection and restoration, also for the conservation of marine resources. The contribution of blue economy to the economic growth of several countries has been impressive and it is expected to contribute much in the future. The Indian Ocean region serves as the major areas for trade, cultural exchange, tourism and pilgrimage the region is the major sea route for India, China, Far East and East Africa, South Asia and Middle East and given the vast endowment of oceanic resources, the littoral states representing the Indian Ocean Rim Association (IORA) countries consider the importance of harnessing blue economy for economic and social development in the region.

Blue economy plays a greater role in attaining food security for the people. The fisheries sector including aquaculture and aquatic plants, fats and calories supply all these are backing food security situation in a country. It could also address the demand

for protein. In order to meet the average protein requirements need there should be adequate supply of high quality of fish and the blue economy policies of the aquatic sector would enhance the production, trade, food security and also address the protein requirements of the people in the IORA region (Mohanty et al., 2015)

One of the major sectors of blue economy is the coastal tourism which provides immense potential for the growth of economy as well as job creation. There is always an increasing demand for energy in India and use of alternative sources of energy like renewable energy can be an effective method. Blue economy is a major source of clean energy. Apart from that blue economy could enhance the ocean technologies, provide marine governance, helps to improve ocean health and manage coastal urbanization especially in developing country like India.

1. Providing a boost to coastal and national economies
2. Generating new employment, skill-sets and capacities
3. Promoting entrepreneurship in new areas of economic activity
4. Facilitating the interconnectedness of the regional economy
5. Utilising the vast, untapped potential of the Indian Ocean
6. Contributing to sustainable development and climate change mitigation

With the growing requirement to identify problems of environmental and social sustainability, several economists have in recent decades inspected the question of how national accounting and macroeconomic study can be developed. Blue economy could result in the growth our marine and maritime economy, offer better employment, development of improved and efficient technologies and better export. Aquaculture under the Blue Economy will incorporate the value of the natural capital in its development, respecting ecological parameters throughout the cycle of production, creating sustainable, decent employment and offering high value commodities for export. The majority of our trade travels by sea; vast offshore oil and gas resources earn vital export income and provide a long term, cleaner and efficient energy source than coal.

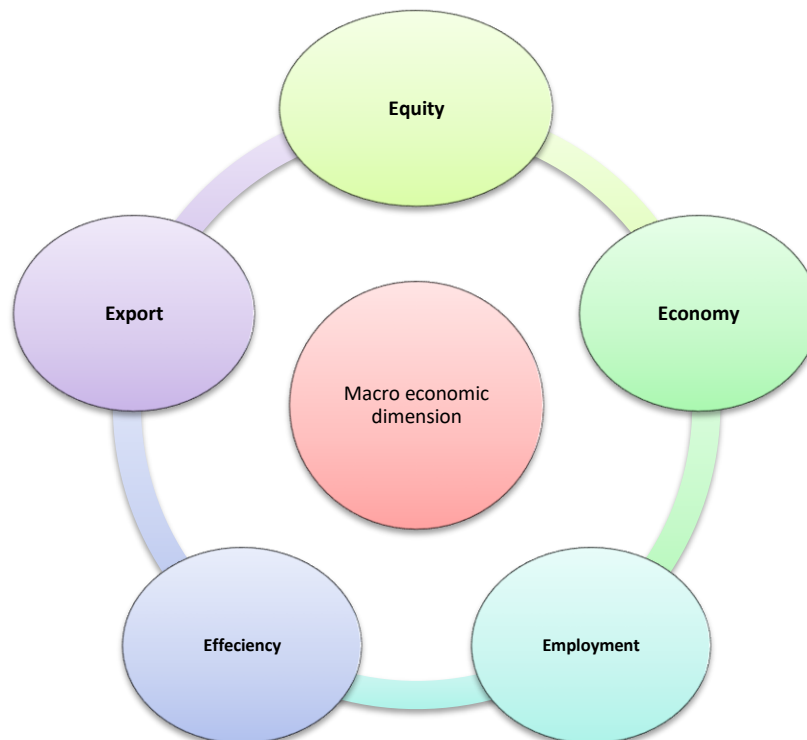


Figure 3 Macroeconomic dimensions

It theorizes oceans as development spaces, where the spatial planning incorporates sustainable use and energy production, bio prospecting, oil and mineral wealth extraction and marine transport. It also incorporates oceans values and services into economic modelling and decision making process. Blue economy is considered as one of the best example for sustainable development framework for the developing countries addressing equity in access to, development and distribution of the profits of marine resources, contributing scope for re-investment in human development. It encompasses improved human well-being and social equity while significantly controlling the environmental effects and ecological impacts (UNEP 2013) it also includes the concept of low carbon, resources efficiency and social inclusion but grounded in a developing world and it is significant for the countries whose future is mostly relied on marine resources.

The mainstreaming of equity at international and national levels bids opportunity for developing countries to comprehend better income from their resources and reinvest in their public, management of environment, cut national debt levels and add to the eradication of poverty. Blue economy benefits all the coastal communities where there is optimum utilization of resources beyond national jurisdiction. The concept of Blue Economy is the de-coupling of socioeconomic development from environmental deprivation. For its succeed Blue Economy approach is founded upon the valuation and integration of the actual value of the natural capital into all aspects of economic activity.

9. PLAN OF ACTION

1. There should be a consistent definition for blue economy in order to formulate appropriate policies
2. Suitable method to determine the contribution of blue economy to the overall economy
3. For developing sustainable and eco-friendly aquaculture production fish farming techniques based on species diversification and polyculture techniques should be encouraged
4. More focus should be given to regional tourism development rather than stand-alone country specific tourism packages. For promoting the coastal tourism proper urban planning and efficient packaging of tourism related activities can be done.
5. Focus on low carbon, sustainable and eco- friendly methods and technologies that can be used in coastal urbanisation
6. Better Corporation with other states in sharing of expertise in building energy infrastructure which can be beneficial for promotion and development of renewable energy.
7. Monitor investment and net returns from ocean economic activities, promote growth potential in strategic industries
8. Discovering and sustainable use of marine living organisms can lead to formation of new drugs. Better regional and national funds for research and development in the marine biotechnology should be developed and explored.
9. For promoting shipping and cruise industry better policy measures should be developed in ship building and port modernisation.
10. Better mechanisms and technology should be developed for deep sea exploration and resource management
11. Strategy should be developed for blue economy and to integrate the policies with the overall economic programmes
12. Blue economy could be achieved through integrated marine management, through better protection and management of the marine ecosystem, coordination with the marine environmental protection and land based pollution control (Potts et al., 2016)

10. BENEFITS ENVISAGED

The benefits envisaged consequent to the proper planning and implementation of the blue economy parameter with its potential will provide huge range of benefits across all fronts (Table. 2)

Table 2

Benefits anticipated on account of blue economy

Blue economy parameters	Indian Potential	Benefits that can be achieved through blue economy
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1. Blue energy

(i) Tidal power	12.4 GW	Green, predictable, renewable, long life spans, effective at low speeds
(ii) OTEC	180 GW	Continuous , pollution free, clean energy
(iii) Offshore wind	1 GW	Create jobs, no pollution, provide domestic energy source, no water consumption
(iv) Wave energy	40 GW	Green, reliable, enormous energy potential, area efficient
2. Blue biotechnology		Improved productivity in aquaculture, new pharmaceuticals, new industrial enzymes
3. Blue carbon	Nearly 26 % of CO ₂ can be captured by oceans	Bio energy, reduces carbon emissions to atmosphere
4. Coastal tourism	Account 5 per cent job	Economic support for hotels, transportation services, entertainment venues and attractions government spending on related infrastructure, plus the domestic spending of Indians employed in the tourism sector.
5. Fisheries	Incentives with premium prices for green fishing	Improves food security, sophisticated technologies for fish farming, conservation and processing of species, fisheries sector will be more organised by enabling policies on pricing, certification, labelling and marketing.
6. Maritime transport	Added employment, Augmented income , Better terms of trade	Job creation, Reduced GHG , Better trade

11. WAY FORWARD

The scope of blue economy in the future is vast because blue economy generally covers all the ocean related activities which includes both direct and indirect supporting activities which is necessary for the functioning of the economic sectors, but mean while it also manages the exploitation or environmental damage which is caused due to the over exploitation of ocean resources. More sustainable and novel approach in fisheries sector can enhance the livelihood security for the fishing communities as well as ensure food security. Blue economy plays a greater role in attaining food security for the people. The fisheries sector including aquaculture and aquatic plants, fats and calories supply all these are backing food security situation in a country. It could also address the demand for protein. In order to meet the average protein requirements need there should be adequate supply of high quality of fish and the blue economy policies of the aquatic sector would enhance the production, trade, food security and also address the protein requirements of the people in the IORA region. One of the major sectors of blue economy is the coastal tourism which provides immense potential for the growth of economy as well as job creation. There is rising demand for energy in the near future and use of alternative sources of energy like blue energy is one of the efficient ways by which we can rely on for future energy demands. Blue economy could enhance the ocean technologies, provide marine governance, improve ocean health and manage coastal urbanization. The major principle of blue economy is the idea of cascading nutrients and energy the way ecosystems do. Cascading energy and nutrients leads to sustainability by reducing or eliminating inputs, such as energy, and eliminating waste and its cost, not just as pollution, but also as an efficient use of materials.

DISCLOSURE STATEMENT

The research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

ACKNOWLEDGMENT

This paper on blue economy and its future perspectives in India was supported by the central marine fisheries research institute, Ernakulam and we are grateful to Dr. A. Gopalakrishnan, Director, CMFRI for his huge support. We are also thankful to all the members of SEETD for their valuable support and criticisms.

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