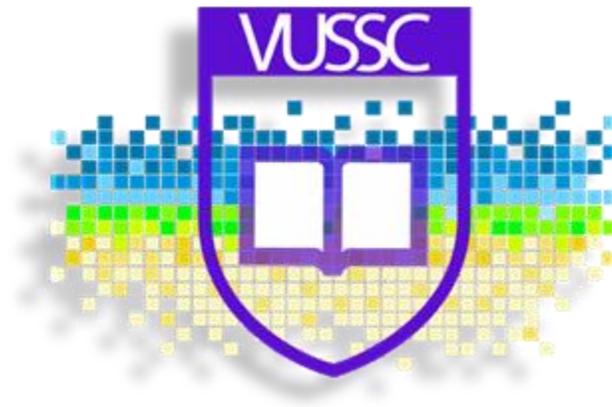


# INTRODUCTION TO THE BLUE ECONOMY

Mrs. Kelly Hoareau



Course Name: Introduction to the Blue Economy  
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## COURSE OVERVIEW

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### INTRODUCTION

Oceans are vital, not only to a wide array of biodiversity and ecosystems, but also to the food chains, livelihoods and climate regulation for a human population heading towards nine billion people. That is why this short course is essential because it introduces the concept of the blue economy and explore how countries can benefit from it thus the livelihoods and wellbeing of people living on coastal areas and islands.

The oceans cover almost three quarters of the Earth's surface and are home to more than half of all life forms, which often creates the false impression that they are a limitless resource. This leads to massive overexploitation and degradation, with an impact that reaches far beyond their shores. Indeed, ocean related issues are integral to most of the Sustainable Development Goals and to the transition towards the inclusive green economy on which their success depends.

The complimentary "blue" element of that transition – known as the blue economy – offers an innovative approach to conserving the oceans, while reaping their benefits in a more equitable and sustainable way. This report covers six case studies that reflect the diversity and flexibility of the blue economy concept. They demonstrate viable, practical applications that can be implemented on many different scales for regions, countries and communities.

It is increasingly obvious that without more sustainable management of the oceans, they, in turn, will be unable to sustain the population that depends on them. This is particularly true for the small island nations that are such a key part of the blue economy.

### COURSE GOALS

Upon completion of this course you should be able to:

1. Explain The Blue Economy concept.
2. Recognise the importance to sustainably manage the marine resources.
3. Identify ways in which entrepreneurs can create innovative business opportunities.
4. Describe the economic benefits of the Blue Economy.
5. Describe the relationship between the Blue Economy and sustainable development

### COURSE STRUCTURE

The course is divided into six topics:

Unit 1: Background to the Blue Economy

Unit 2: The Marine Environment

Unit 3: Fisheries and Aquaculture

Unit 4: Tourism

Unit 5: Ocean-based renewable sources of energy

Unit 6: Transportation and the Blue Economy

Each topic is further broken down into related sub-topics. Each topic and sub-topics include self-reflection questions to ponder, activities to complete and formal assignments to complete and send to your instructor.

The topics contain a number of references that learners are encouraged to review. This may require that you have access to a computer with Internet connection to download the reference. Each unit should take between two and three weeks to complete.

## UNIT ONE - THE BLUE ECONOMY: AN EMERGING CONCEPT

---

### INTRODUCTION

The idea of the Blue Economy was conceived at the Rio +20 United Nations Conference on Sustainable Development held in Rio de Janeiro in June 2012, and addressed two key themes: the further development and refinement of the Institutional Framework for Sustainable Development and the advancement of the Green Economy concept. The outcome of the meeting reaffirmed poverty eradication as its key challenge and focused on the green economy as a tool to achieve both poverty eradication and sustainable development.

The blue economy concept has been presented in many fora and has been seen as an alternative economic model for sustainable development that put the ocean at the centre of this approach.

### LEARNING OUTCOMES

Upon completion of this unit you will be able to:

1. Explain what is the Blue Economy.
2. Describe its origin and relationship to the Blue Growth.
3. Explain the difference between the Blue Economy and the Green Economy Concepts.

### ASSIGNMENTS AND ACTIVITIES

There is a number of learning activities and assignments throughout this unit. The major assignment for this unit involves the understanding of the Blue Economy Concept. You will also be asked to complete a self-assessment to help you identify your own strengths and weaknesses. This will help you identify areas that need improvement and strengths that you can build upon.

## TOPIC 1.1 – BACKGROUND TO THE BLUE ECONOMY

### ORIGIN OF THE BLUE ECONOMY

The emergence and the recent evolution of the concept of the Blue Economy in several fora bears testimony to its importance as an alternative economic model for sustainable development that acknowledges our dependency on the oceans. It also reflects a modern view that further development can also be feasible while maintaining sustainability and social justice, including intergenerational equity as main guiding principles.



### UNITED NATIONS CONFERENCE ON SUSTAINABLE DEVELOPMENT

The Rio+20 United Nations Conference on Sustainable Development (UNCSD), held in Rio de Janeiro, 20-22 June 2012, focused on two key themes: the further development and refinement of the Institutional Framework for Sustainable Development and the advancement of “Green Economy” concept. The meeting, in its outcome document, reaffirmed poverty eradication as its key challenge and focused on the green economy as a tool to achieve both poverty eradication and sustainable development.

Throughout the preparatory process for Rio+ 20, many coastal countries questioned the focus on the Green Economy and its applicability to them. Strong statements were made during the Rio+20 preparatory process in support of a “Blue Economy” approach to address their situation more appropriately. Institutional efforts were made to expand the Blue aspect of the Green Economy as embodied in the “Green Economy in a Blue World” report but international momentum has now moved beyond this.

The report “Green Economy in a Blue World” from UNEP and other institutions in preparation for the Rio+20 Conference, proposed three key principles in the sustainable use of the oceans: resources should be harvested, grown or traded in an efficient and sustainable manner; economic benefits should be equitably distributed and socially beneficial; and the carbon footprint of the sector should be reduced, while the potential for marine ecosystems to act as carbon sinks be protected.

**POST RIO+20 CONFERENCE**

Following the Rio+20 Conference, there has been a growing appreciation that the world’s oceans and seas require more in-depth attention and coordinated action. The outcome document of the Conference, “The Future We Want,” identifies three key dimensions for sustainable development: poverty eradication; promotion of sustainable patterns of consumption and production; and protection of the natural resource base for socio-economic development. The document devotes a long section to the contribution of oceans and seas to the delivery of sustainable development which starts with the following statements:

***Three key dimensions for sustainable development:***

*Poverty eradication; promotion of sustainable patterns of consumption and production; and protection of the natural resource base for socio-economic development.*

*“We stress the importance of the conservation and sustainable use of the oceans and seas and of their resources for sustainable development, including through the contributions to poverty eradication, sustained economic growth, food security, creation of sustainable livelihoods and decent work, while at the same time protecting biodiversity and the marine environment and addressing the impacts of climate change. We therefore commit to protect, and restore, the health, productivity and resilience of oceans and marine ecosystems, and to maintain their biodiversity and the, enabling their conservation and sustainable use for present and future generations, and to effectively apply an ecosystem approach and the precautionary approach in the management, in accordance with the international law, of activities impacting on the marine environment, to deliver on all three dimensions of sustainable development.”*

The conference also agreed to set up a process to develop Sustainable Development Goals to address and incorporate in a balanced way all three dimensions of sustainable development and their inter-linkages, in accordance with the United Nations Development Agenda beyond 2015.

The impetus of Rio+20 has been reflected in various initiatives, inter alia: the UN Secretary General’s Compact initiative; the work of the Global Ocean Commission; the Global Partnership for Oceans and the prominence given to oceans and seas in the UN five-year Action Agenda 2012-2016.

**POST RIO+20 CONFERENCE**

Therefore, the concept of the Blue Economy is at the core of many modern strategies for sustainable developments – a testimony to the recognition of the role and opportunities that a sound and sustainable utilization of oceans can contribute, and in recent times, a

number of similar initiatives have been announced, even if they have been identified by different names.

The EU has advanced the concept of ‘Blue Growth’ as its long-term strategy to support sustainable growth in the European marine and maritime sectors as a whole. The initiative, unanimously endorsed in October 2012 by European Ministers for Maritime Affairs through the Limassol Declaration, recognises that seas and oceans are drivers of the European economy with great potential for innovation and growth, in areas such as aquaculture, coastal tourism, marine biotechnology, ocean energy and seabed mining.

The Food and Agriculture Organization of the United Nations (FAO) has also introduced an Initiative on Blue Growth in Support of Food Security, Poverty Alleviation and Sustainable Management of Aquatic Resources. In the medium to long-term, the expected results would be: improved fisheries management; reduced fishing capacity and proportion of overfished stocks reduced discards and improved bycatch management; improved status of aquatic ecosystems and habitats; increased fish production and income from fisheries and aquaculture; also, improved socio-economic status of fisheries and aquaculture communities.

The Blue Economy concept also became the motif of the Expo 2012 in Yeosu, Korea, and also of an International Symposium co-hosted by the OECD, which emphasized coastal development and preservation, new resource utilization and creative marine activities in the context of sustainable development. Early 2014, the Government of the Netherlands, World Bank and FAO are organizing a Global Oceans Action Summit for Food Security and Blue Growth to showcase global commitment to healthy oceans and mobilize significant action at appropriate scales.

The principles of the Blue Economy have been embraced by the states around the world. Several countries have adopted national strategies in the line with the Blue Economy. These include:

Indonesia	Tanzania	Namibia	Mauritius
Morocco	Peru	Ghana	Gabon
Algeria	Seychelles	Equatorial Guinea	Bangladesh
Libya	Mozambique	Vietnam	Maldives
Oman	Columbia		

However, it is for small Island Developing States (SIDS) that the concept of Blue Economy more accurately reflects their circumstances, constraints and challenges. Ocean and Seas

was also theme in the Third Conference on Small Island Developing States that was held in 2014 in Apia, Samoa. The conference again recognised the need to conserve and to sustainably use the marine resources.

***Test your knowledge***

*In your own words describe the difference between the Blue Economy and the Green Economy*

*Sample*

**1. Choose the right answer.**

1.1 The abbreviation OER stands for

- (a) open education resources.
- (b) open educational resources.
- (c) open education roundtable.
- (d) open educational restrictions.

This is just a sample and not the actual questions but I want it to simple like these and using the same format.

1.2 OER is a subset of the term

- (a) open education.
- (b) open courseware.
- (c) open access.
- (d) open software.

**2. True or false?**

2.1 The term “free” means the same as “open.”

2.2 The Internet was one of the factors that made OER possible.

**UNIT ONE – SUMMARY**

Sustainability in the context of a Blue Economy is all about our ability to use our oceanic space as opportunities for development, new energy possibilities, protected areas that improve biodiversity conservation, climate change adaptation, and provide increased food security. It is about the sustainable use of our potential mineral wealth on the ocean floor. It is about offsetting our own emissions and those of our planet in the fight against climate change. It is about building sustainable trade that can connect all markets, large and small, and which creates opportunities and benefits for all, more multi-nationals to small community enterprises. It is about a sustainable space for tourism. As a consequence, achieving sustainable management of this oceanic space will provide for the sustainability of our planet.

## UNIT TWO - THE MARINE ENVIRONMENT

---

### INTRODUCTION

Small island nations are surrounded by it is the custodian large areas of seas and ocean that are unexploited. This marine environment can be viewed as a pathway to sustainable development. It is unsurprising, therefore, that the marine environment would support the pillars of the economy: namely coastal tourism and fisheries.

The concept of and emerging strategies for a Blue Economy will require renewed focus on policies for conservation, marine spatial management and risk assessment to promote the productivity and resilience of marine ecosystems. These efforts can work with conservation efforts, but most importantly countries must be innovative to ensure they fulfill their obligations under the Convention on Biological Diversity (CBD).

Countries making the transition to a blue Economy while maintain ecosystem functionality, promoting resilience and conserving biodiversity.

### LEARNING OUTCOMES

Upon completion of this unit you will be able to:

1. List the key threat that could endanger marine ecosystem.
2. Explain how countries can benefit from the Marine Environment.

## TOPIC 2.1 – THE SEAS AND THE OCEAN

The oceans can contain untapped rich marine resources, if harvested sustainably can provide livelihoods to those living in coastal areas. Some small island states have pristine, diverse and productive ecosystems. However, the goods and services that the marine environment provides extend beyond the provisioning and recreational services like fisheries and tourism.



These could provide strong incentives for a sustainable and equitable path to blue growth.

Key threats to the marine environment and challenges when developing a Blue Economy include climate change, overfishing, alien invasive species, environmental degradation, land use changes and pollution. Strategies based on innovative financial mechanisms, risk management, conservation and planning are being implemented to prevent and control some of these threats. For example, in some countries, in the fishing industry, an eco-labelling scheme has been introduced to promote traditional, non-destructive and fuel-efficient fishing techniques.

Countries can benefit from a proactive and effective community of environmental NGOs and a private sector aware of environmental issues. Consequently, there is great potentials for civil society and private sector to contribute to conservation. Strategic partnerships between state and non-state actors may require to meet the Blue Economy goals and equitability and efficient financing mechanisms for conservation and sustain use of marine ecosystem goods and services.

Innovative awareness programmes by NGO's has placed concepts of sustainability at the forefront of education and community action initiatives. Further awareness programmes on marine ecosystems, their value and fragility will serve to support the transition to blue growth, but build on a strong foundation.

There are potentials for countries venture into hydrocarbon exploration and mariculture to further realise the opportunities provided for by our ocean heritage, the challenges of maintaining a pristine marine environment should remain paramount. Development of these sectors must meet the highest international standards for impact assessment risk management if countries are to continue to be recognised of having pristine marine environment. The economic growth afforded by these sectors can be used to advance

sustainable development while meeting environmental challenges created through such activities.

Partnerships for ensuring that the marine environment takes centre stage in the Blue economy must be regional as well as national in scope. Shared responsibility for the management of marine ecosystems and utilization of shared resources can be met through strategic bi- and multi-lateral partnerships. Marine trans-frontier conservation is a means of adapting to and mitigating climate change impacts on the marine environment.

## TOPIC TITLE

<Insert course script content.>

Examples and instructions should also be highlighted to make them stand out on the page. This can be done using the text box tool and inserting it as a text box.

The example to the left illustrates how the benefits of XYZ can be maximized.

### ***Example – Insert Title***

*This is an example of a textbox that should be used for examples, instructions, and other key learning events that require emphasis. Use italics and a background colour*

**SUMMARY**

SIDS must be recognised that the preservation of the marine environment is core to the transition to a Blue Economy. It must be recognised that this is not merely a matter of policy, but must be turned into objectives that are met through effective action by state and no-state actors, supported by and environmentally-educated and aware public.

The role and the value of a high-quality environment should be of paramount importance to the general, and this could be reflected in the international and domestic commitments to protect that environment

***Self-Reflection Question***

*This is an example of how to insert a self-reflection question or other assignment activity/instructions in a topic or lesson summary. Use italics and a box across the entire page so that individuals know they must stop and react.*

## UNIT THREE – FISHERIES AND AQUACULTURE

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### INTRODUCTION

Marine fisheries are a key contributor to the social, economic and cultural fabric of Small Island Developing States. The fisheries sector often takes central role in the country's development agenda, from National Development Plans to strategies for economic growth. However, countries must ensure that they rationalise international agenda for sustainable fisheries such as the Code of Conduct for Responsible Fisheries. However, turning the concept of the Blue Economy into an operational policy offers a holistic approach for development which recognises the potential for fisheries to contribute even further to society, while also reducing the ecological and carbon footprint of this sector within and beyond our boundaries. In the preparatory document for Rio+20 "Concepts for a Green Economy in a Blue World", three key dimensions are identified to serve as guides for policy and investment in fisheries. These dimensions set out the need to ensure that resources are harvested, grown or traded in an efficient and sustainable manner, that economic benefits from the sector are equitably distributed and socially; that the carbon footprint of the sector is reduced and the potential for marine ecosystems to act as carbon sinks pursued.

In this unit we identify objectives and actions that are commensurate with the dimensions of a Blue Economy: sustainability, equitability and efficiency are identified. We place our discourse on the Blue Economy within the subsectors of artisanal and industrial marine capture fisheries and aquaculture.

### LEARNING OUTCOMES

Upon completion of this unit you will be able to:

1. Explain the potential of the Blue Economy for fishing industry.
2. Insert Objective.

### TOPIC 3.1 – ARTISANAL FISHERIES

Artisanal Fisheries must meet many of the criteria for a Blue Economy activity. The rights of access to this sector should be defined in law, and the distribution of rights within society is equitable and not structured by ethnicity, religion, gender or political affiliation. Importantly, most fisheries production is achieved by energy-efficient fleets and passive gears such as hook-and-line and traps. Countries must develop a policy to prohibit destructive and energy-intensive fishing gears, such as trawls, in order to protect traditional ways of fishing and reduce our carbon footprint.



The major challenges to sustainability in this sector are fleet overcapacity, particularly the inshore fleet, and overfishing. Overcoming these challenges require governance reform and enabling policy to align fishing fleet capacity to the productivity of resources harvested by artisanal fishers. The provisions of the legislation are commensurate with international best practise on fisheries management and are explicit in the adoption of an Ecosystem Approach to Fisheries.

An objective for governance reform is the formation of state-community partnership arrangements for fisheries management (termed 'co-management') that decentralise decision-making and define user rights to promote transparency and local stewardship of natural resources. It is envisaged that rebuilding fish stocks will be a necessary management objective for some fisheries, with the ancillary benefit of mitigating the carbon footprint of artisanal fisheries by reducing fuel consumption in searching for and reaching productive areas.

Globally, eco-labelling schemes are providing a strong economic incentive for governance reform. Supporting Fishing Boat Owners Association adopt a local labelling scheme can result in a positive response for local tourism markets. This brings up the possibility of adding value to fishery products destined to an environmentally aware customer base. The planned replication of co-management regimes to further fleet segments coupled with the integration of best standards for preventing overfishing will enable countries to certify fisheries according to international eco-labelling schemes, with the potential to further access local and export markets.

***Test your knowledge***

*This is an example of how to insert a self-reflection question or other assignment activity/instructions in a topic or lesson summary. Use italics and a box across the entire page so that individuals know they must stop and react.*

### TOPIC 3.2 – INDUSTRIAL FISHING

Industrial fisheries harvest tuna and tuna-like species in the exclusive economic zone and beyond. Activities from industrial fishing can bring benefits to local communities. The role of national fishing ports can be central element in the implementation of the Blue Economy. Resource rents from the fishery, including fees for access of distant water fishing nations can be reinvested in a new infrastructure and facilities to improve port capacity and efficiency, with much of the direct and indirect revenue from the fishery achieved through expenditure of the fleets and canning factory on local goods and services, this expansion will serve to widen the distribution of socioeconomic benefits, a basic tenet of the Blue Economy.



This strategy is dependent on the sustainable utilisation of tuna resources and countries must continue to be an effective member regional bodies in promoting good regional governance through effective conservation and management measures.

Globally, the perception of fisheries that target tuna around fish aggregating devices (FADs) is negative. However, FAD fishing can be more efficient than fishing on free schools, reducing search time and fuel consumption and thereby lowering the carbon footprint of the fishery. The efficient use and benefit sharing of resources taken by tuna fisheries is a key component of the Blue Economy. Countries can promote the landing of by-catch to provide opportunity for local investment in processing our export industries and access to affordable raw materials.

### TOPIC 3.3 – AQUACULTURE

Aquaculture has the potential to achieve a similar importance to the Blue Economy as capture fisheries. While small-scale aquaculture contributes significantly to food security and employment in less developed nations, economies of scale and the high operating costs necessitate the culture of high-value products targeted at local tourism and export markets. The need to minimise the ecological impact of aquaculture is paramount given SIDS' reputation as tourist destinations. Therefore, the sector plan will dictate the technologies and the innovations required to maintain ocean health and ensure that aquaculture products can compete globally on the same basis as does our tourism industry-namely fish grown in a pristine, well-managed environment.



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#### NOTE

*We need to highlight environmental concerns here with regard to aquaculture. FAO may have some literatures.*

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### **UNIT THREE – SUMMARY**

The fisheries sector has considerable potential for growth in terms of aquaculture and local opportunities in post-harvesting and service provision subsectors. Governance reform is a priority that must be achieved to ensure that these opportunities can be realised and maintained. This requires continued efforts at forming effective local partnerships in management, improved enforcement and the adoption of market-based incentives for sustainable fishing. Significant financial support to research and development will be required to improve the ecological knowledge base and efficiency of fishing technologies. This highlights the need for enhanced capacity building in natural resource economics and social science, as well as fisheries and aquaculture sciences.

## UNIT FOUR - TOURISM

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### UNIT INTRODUCTION

When developing for the future it is hardly surprising that SIDS' tourism industry should look to the principles of the Blue Economy to chart its way forward. SIDS have spectacular sun, sea and sand vacation potentials combined with a near-perfect climate and a unique island-style way of life that allows travellers to 'get away from it all.' These ingredients are, in a nutshell, the very foundation of a holiday which we must expand, embellish and build upon to achieve a prosperous and sustainable Blue Economy. Many small states are very well known and already leading in this sector. Many SIDS need to be making greater use of the economic potential of its Blue Economy, not only in terms of growing and existing base sustainably, but also by constantly improving and upgrading it so that it consistently meets the expectations of today's discerning traveller. In any case, and in spite of the unfavourable conditions created by the global financial crisis post-2008, the number of tourists arriving into Seychelles has been increasing in the past few years.

The yachting and cruising sector can employ locals and consumes goods and services such as fuel, food, landing & docking fees, maintenance and repair services, harbour fees, souvenirs and land-based tourism services such as accommodation, taxis, car hire, restaurants and diving. Accommodation afloat can bring additional revenues and many tourists spend their holiday, or part of their holiday aboard a boat.

### LEARNING OUTCOMES

Upon completion of this unit you will be able to:

1. Insert Objective.
2. Insert Objective.

**TOPIC 4.1 – MARINE TOURISM**

Tourism is one of the sectors that can benefit the most from the Blue Economy because of its diversification.



The marine environment has long been one of the most attractive settings for tourism. Marine tourism, as defined by Orams (*Marine tourism: Development, impacts and management*. Routledge; 1999, p. 9) includes ‘those recreational activities that involve travel away from one’s place of residence and which have as their host or focus the marine environment (where the marine environment is defined as those waters which are saline and tide-affected)’. Thus, it includes a wide spectrum of activities, such as scuba diving and snorkeling, wind surfing, fishing, observing marine mammals and birds, the cruise ship and ferry industry, all beach activities, sea kayaking, visits to fishing villages and lighthouses, maritime museums, sailing and motor yachting, maritime events, Arctic and

Antarctic tourism, and many more.



*Tourism in Marine Environments* aims to contribute to the process of theory building, and to be the leading source for research reports and analysis related to all forms of marine tourism. It is governed by an international editorial board consisting of experts in marine tourism, marine science, and related fields. This board conducts most of the manuscript reviews and

therefore plays a large role in setting the standards for research and publication in the field. The Editor-In-Chief receives and processes all manuscripts, from time to time modifies the editorial board, and works to ensure a continuous improvement in quality.

**TOPIC TITLE**

<Insert course script content.>

Examples and instructions should also be highlighted to make them stand out on the page. This can be done using the text box tool and inserting it as a text box.

The example to the left illustrates how the benefits of XYZ can be maximized.

***Example – Insert Title***

*This is an example of a textbox that should be used for examples, instructions, and other key learning events that require emphasis. Use italics and a background colour*

**TOPIC SUMMARY**

<Insert course script lesson summary>.

*Test your knowledge*

**UNIT FOUR – SUMMARY**

In a world that is becoming grimmer by the day, the iconic image of having the opportunity to relax on a tropical holiday continues to be a primary driver of the tourism industry. And yet, in the highly competitive arena of global tourism where every country on earth is busy selling its product, the traditional sun, sea and sand vacation is no longer enough. This is a time when the travel industry is looking for more than just the basics. Travellers are becoming more sophisticated, more discerning and with greater expectations than simply to languish on a beach during their vacation. Time and again, research shows that today's travellers are seeking experiences that allow them to get beneath the skin of the particular country they are visiting and take indelible memories of that experience home with them. In SIDS case, they only have to look at their surrounding waters to provide the answer because that ocean is rich in possibilities, many of which have still not been exploited.

## UNIT FIVE - OCEAN-BASED RENEWABLE SOURCES OF ENERGY

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### INTRODUCTION

Most SIDS are without hydrocarbon resources, most countries depends highly on imported oil to meet its energy needs including electricity generation, which is based on both heavy fuel oil and light fuel oil. As part of their commitment to a Blue Economy, SIDS must look for alternative sources of energy; in particular, those that take advantage of their unique relationship with oceans, and for innovative ways for developing that energy base. However, SIDS are also endowed with quite abundant renewable energy sources such as solar, biomass, wind and the ocean-based renewable energy.

### LEARNING OUTCOMES

Upon completion of this unit you will be able to:

1. Insert Objective.
2. Insert Objective.

### TOPIC 5.1 – OFFSHORE WIND POWER

Offshore wind power refers to the construction of wind farms in bodies of water to generate electricity from wind. Higher wind speeds are available offshore compared to on land, so offshore wind power generation is expected to be higher than that of onshore. However, offshore wind farms are relatively expensive.



***Test your knowledge***

*This is an example of how to insert a self-reflection question or other assignment activity/instructions in a topic or lesson summary. Use italics and a box across the entire page so that individuals know they must stop and react.*

## TOPIC 5.2 – WAVE POWER

Wave energy is the transport of energy by ocean surface waves, and the capture of that energy to do useful work. Machinery able to exploit wave power is known as a wave energy converter. There are generally two types of wave energy converter: the stationary converter, which is installed on shore, and floating converter, which is offshore. Stationary plants would be appropriate in rocky sea borders with frequent, high strong waves. Floating plants have the advantage of not requiring land, a limited resource in SIDS. Among all the ocean-based renewable energy technologies, wave energy would be relatively less costly.

Wave power is distinct from the diurnal flux of tidal power and the steady gyre of oceans currents. Wave power generation is still not currently widely employed commercial technology, although there have been attempts to use it since at least 1890. In 2008, the first experimental wave farm was opened in Portugal, at the Aguçadoura Wave Farm.



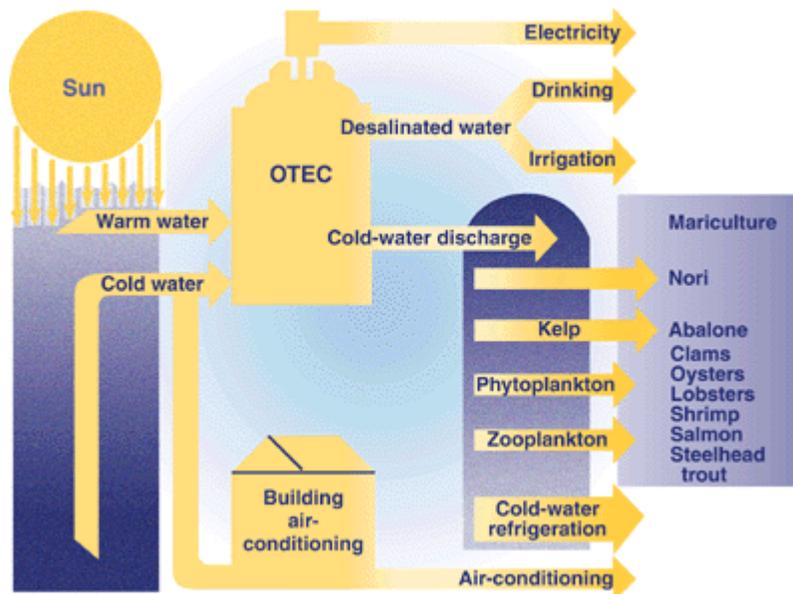
## TOPIC 5.3 – OCEAN THERMAL ENERGY CONVERSION (OTEC)

In mid-2013, a project based on the OTEC technology was proposed in the framework of SIDS DOCK, Island Energy for Island Life. OTEC is a technology that works on the temperature difference between the warmer shallow waters and the deep cooler waters of the ocean. Surface water temperature depends on the amount of solar energy available and in areas near the equator can reach temperatures as high as 29° C. The water temperature at a depth of 1,000m can be as low as 4 to 6°C. The temperature difference allows to run a heat engine such as an Organic Rankine Cycle (ORC), which is a stream

turbine using an organic fluid. The turbine in turn drives an alternator to generate electricity. With the enormous heat capacity of the ocean, the surface temperature does not vary between day and night, allowing OTEC to operate 24 hours a day making it suitable base-load electricity generation technology. This phenomenon practically constitutes an unlimited and quasi-stable source of energy that can be exploited in the future.

In the future, OTEC might be one of the most promising, renewable energy technologies for power generation in tropical islands and tropical countries having a border with the ocean. Presently, high capital investment is the main obstacle to the viability of an OTEC project. Nevertheless, some actions can already be undertaken as from now, with respect to OTEC, such as identification of potential sites or areas in the Seychelles maritime economic exclusive zone and the measurement of temperature profile in the identified areas during the twelve months of the year. The existence of a steep slope in the sea floor to a depth of about 1000 metres would also be an additional advantage for an OTEC project.

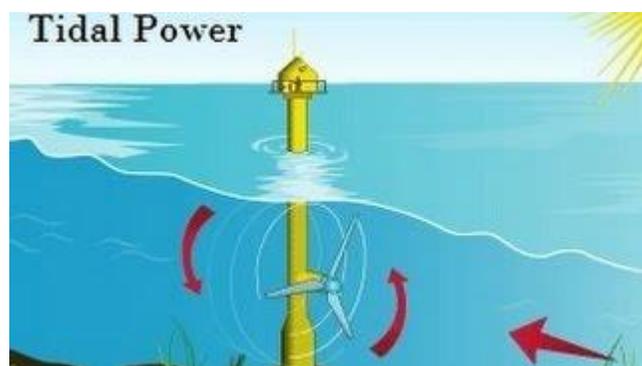
There are several other advantages such as use of the cold water for air-conditioning of buildings, chilling or refrigeration plants, and aquaculture, potable water and mineral water because, after the TOEC process, the deep seawater retains all its natural nutrients. Other systems can also be incorporated to the OTEC plant such as desalination of seawater for various usages (potable to industrial); hydrogen & oxygen gas production, and lithium recovery from seawater.



## TOPIC 5.4 – TIDAL ENERGY

Tidal energy is the energy derived from the difference between high tide and low tide levels. It is a renewable energy similar to hydropower except that the height between the higher basin and lower basin is just a few metres. In Seychelles, the maximum difference between the high and low tides is less than two metres indicating the potential of tidal energy would be relatively small. However, some sites may be potentially suitable for tidal power plant such as lagoons, which could be used as a basin to retain high tide waters.

Tides are more predictable than wind energy and solar power. In the past, tide mills have been used to mill grain but today they are replaced by tide power plants for electricity generation. Among sources of renewable energy, tidal power has traditionally suffered from relatively high costs and limited availability of sites with sufficiently high tidal ranges or flow velocities, thus constricting its total availability. However, recent technological developments indicate that the total energy output of tidal power can be higher than previously estimated, at that's it costs may be brought down to lower levels. There are a few tidal power plants in the world until to date and one of them is the La Rance tidal power plant in France, operational since 1966.



## TOPIC 5.5 – MARINE CURRENT

Marine current power is a form of marine energy obtained from harnessing of the kinetic energy of marine currents, such as the Gulf Stream. Although not widely used at present, marine current power has an important potential for future electricity generation. Marine currents are more predictable than wind and solar power.

Marine currents are caused mainly by the rise and fall of the tides resulting from the gravitational interactions between earth, moon, and sun, causing the whole sea to flow.

Other effects such as regional differences in temperature and salinity and the Coriolis effect due to the rotation of the earth are also major influences.

The kinetic energy of marine currents can be converted in much the same way that a wind turbine extracts energy from the wind, using various types of open-flow rotors. The potential of electric power generation from marine tidal currents is enormous. There are several factors that make electricity generation from marine currents very appealing when compared to other renewables:

- The high load factors resulting from the fluid properties. Also, the predictability of the resource, so that, unlike most of other renewables, the future availability of energy can be known and planned for.
- The potentially large resource that can be exploited with little environmental impact, thereby offering one of the least damaging methods for large-scale electricity generation.

## **UNIT FIVE– SUMMARY**

SIDS can explore possibilities for integrating ocean-based technologies into its energy generation, following the same basic strategy:

- Evaluating carefully the feasibility of any particular project before proceeding to its implementation.
- Following closely the research and development on new and existing technologies, cooperating with institutions on offshore wind power.
- Identifying potential sites for the deployment of alternatives technologies, evaluating the suitability of environmental conditions at potential sites.
- Encouraging private investments in the new technologies.

**UNIT SIX - TRANSPORTATION**

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**INTRODUCTION**

Shipping is governed internationally by a suite of regulations that promote safety, security and efficiency. Collectively, this regulatory framework provides a strong foundation for the Blue Economy. Moreover, in comparison to other forms of bulk transportation, shipping is relatively energy efficient in terms of CO<sub>2</sub> emissions.

As a mid-oceanic islands with a high dependency on importation of goods, SIDS relies on long-range shipping for its economic development. Shipping will therefore serve a vital function in achieving blue growth across all sectors of the economy.

**LEARNING OUTCOMES**

Upon completion of this unit you will be able to:

1. Insert Objective.
2. Insert Objective.

## TOPIC 6.1 – INDUSTRIAL AND FISHING PORTS

Many ports in small states are considered by the major shipping lines as being the most efficient, especially in terms of stevedoring and cargo handling. However, this remains an undeveloped sector of the economy in some small states. These countries can develop strategies to facilitate the transformation of ports into a dynamic shipping hub and consolidate this reputation. These include the establishment of a logistical “one stop shop”, a review of the SPA business model, and the amendments to the SPA Act to allow the authority to engage in more diverse commercial activities.

To further respond to the challenge of supporting a Blue economy, authorities responsible for ports can commission a value chain analysis to ascertain the contributions that all sectors are making to the port, as well as assessing the comparative advantage of the port in the context of regional commercial and fishing ports. In addition, a strategy for partnership between the public and private sectors can be developed to encourage private sector investment in the ports sector. This strategy can be elaborated to meet a core dimension of the Blue Economy, namely the equitable access to benefits.

To facilitate blue growth, port authorities can review its functions in key supply chains. In collaboration with stakeholders and partners of the port community, a common strategy can be charted to ensure that maximum economic benefits are obtained from shipping services. This can include provisions for the development of infrastructure and human resource capacity, as well as mechanisms to ensure that ports remain competitive.

The industrial fishing sector is a principal contributor to the Blue Economy and is a primary business activity in most ports in small islands states. To improve efficiency of service provision to the industrial fishing fleets, such as ship chandlery and stevedoring, port authorities provide special spaces and facilities to help centralise service providers in close proximity to the port. Fishing ports can also provide more efficient facilities for commercial fishing loading and unloading space to cater for the increased transshipment of fish. New quays for a new industrial fishing port can be built to complement old facilities.

**TOPIC SUMMARY**

<Insert course script lesson summary>.

*Test your knowledge*

**UNIT SIX – SUMMARY****SUMMARY**

Ports can provide an integral component of existing and newly developing supply chains that will underpin the development of a Blue Economy. As supply chains strengthen and diversify in parallel with improved efficiency and service provision, ports will increase turnover and its competitiveness in the region and globally. This vision stems from the fact that the competitive position of a port is determined not only by its internal strengths, such as efficient cargo handling and hinterland connections, but also by its integration in global supply chains. Integration in global supply chains has to be strengthened in a systematic manner and will enable countries to achieve optimum benefits from the Blue Economy.