

# CHAPTER THREE

## **AGRICULTURE AND FOOD SUPPLY**

### **SUB – STRANDS:**

- ☒ *Discuss the significance of the agricultures sector in providing food supply and source of income and analyze its importance in food security.*
- ☒ *Study the factors affecting agricultural systems and practices and how it influences environment protection.*
- ☒ *Evaluate the importance of selecting sustainable agricultural practices in order to have a secured food supply.*

### **1.1.1 DEFINITION AND TYPES OF AGRICULTURE**

Agriculture in layman's terms means the cultivation of plants and animals for human use and purposes. According to the Oxford Dictionary, agriculture means "the science and practice of cultivating for food and keeping or breeding animals for food". This infers that there are many ideas and practices in agriculture, which will be discussed further in this chapter.

Man's socio-economic problems continue to increase every day. That is:

- Increase in population
- Depletion or limitation of food resources
- Increased poverty
- Exploitation of resources for economic growth
- Economic competitiveness

The focus is on agriculture as the solution to most, if not all, of these problems. On the mention of the term agriculture, the simple mind tends to focus only the planting vegetables and crops. However, agriculture today would be linked to almost everything that we call food. Hence, more funds, technical assistance and scientific research are now channeled towards agriculture to ensure food security and also if possible to alleviate poverty and progress towards economic prosperity.

Thus, there would be a need to achieve the following:

- ☒ Use of modern technical assistance to increase agricultural production – quantity.



<https://www.google.com.fj/url?sa=i&rct=j&q=&esrc=s&source=image>

The use of machines and computerization has contributed greatly to mass production of agricultural products such as to cater for the increasing population and bring about food security and economic growth for the people and the country as a whole

- ☒ Use of agricultural science technology to improve yields or products – quality.



<https://www.sp.int/our-work/information-communication-and-extension/training>

The introduction of scientific technology has had great influence in modifying agricultural products to the perfect state which meets the demands of the consumers. This is essential to retain your market.

- ☒ Diversification to meet the demands of the consumers.



The demands of the consumers continue to vary with time. This leads to the creation of a variety of market niches. This is a blessing to the agricultural sector for it means expansion for the sector leading the establishments a variety of investments to cater for the diverse needs of the consumers. Hence, the initiation and motivation of diversification, for the existing and new investors. That is, not to concentrate on only one produce but to diversify into the production of other agricultural products. Eg.

- |             |          |
|-------------|----------|
| - Poultry   | - cattle |
| - Piggery   | - dairy  |
| - Vegetable | - fruits |
| - Crops     | - bee    |
| - Wheat     | - etc.   |

<https://www.google.com.fj/search?q=images+of+agriculture+in+fiji>

### ☒ Intensive Agriculture



<https://www.google.com.fj/search?q=images+of+agriculture+in+fiji>

This type of agriculture requires a lot of capital and labour input such as to increase production per unit area. Usually the piece of land is not given much time to fallow and there is great use of fertilizers, pesticides and weedicides. Eg. Sugarcane farming.

### ☒ Extensive agriculture



<https://www.google.com/search?q=images+of+extensive+farming>

Extensive agriculture, as opposed to intensive agriculture, is a type of agriculture where there is little input of capital, labour, fertilizers and pesticides or weedicides. There is very little production per unit area (as compared with intensive agriculture). Hence, it would require a large area of land for production to increase. This type of agriculture is carried out on low cost land or land that is owned by an individual or entity. It is also carried out in areas where population is low and usually the location is at a distance from its markets.

The above objectives must be carried out in view of the environmental capacity. Environment preservation and conservation must take precedence for all of the above.

Modern ideas and demands have contributed to the existence of many forms and /or types of agriculture.

Moreover, the types of agriculture would better be described if we group it into different categories.

The table below intends to classify the *common types* of agriculture.

**Table 1.1.1a      Classification of Agriculture**

| Category                     | Type        | Example                              |
|------------------------------|-------------|--------------------------------------|
| Common Agriculture of plants | Botany      | All flowers, Shrubs, Grasses         |
|                              | Crops       | Dalo, Sugarcane. Yaqona, Ginger      |
|                              | Vegetable   | Cabbage, Lettuce                     |
|                              | Fruits      | Pineapple, Pawpaw, Banana, Orchards  |
|                              | Cereal      | Rice, Wheat, Maize                   |
|                              | Peas        | Long bean, French bean               |
| Biotechnology                | Aquaculture | Prawn, Crab, Pearl, Seaweed          |
|                              | Hydroponics | Most types of vegetables             |
| Livestock                    | Grazing     | Dairy, Horses, Camels, Donkeys, etc. |
|                              | Meat        | Cattle, Sheep, Goat, Piggery, etc    |
|                              | Poultry     | Chicken, Geese.                      |

There are other specific classifications and types of farming that is practiced in the world today with the aid of modern technology and ideas.

 **ACTIVITIES**    - **NOTES REVISION WRITTEN WORK– DISCUSS IN PAIRS**

1. *With reference to specific theme countries, discuss four importance of agriculture.*
2. *Differentiate between intensive farming and extensive farming. Give examples from your theme countries.*
3. *Research on four different types of agriculture. (Group work – groups of four).NB. All the types of agriculture to be researched on – to serve as resource for the class.*

### 1.1.2 **LAND TENURE SYSTEMS**

Land tenure systems differ for different countries in the world. The most common land tenure system in the world today is two-fold in that there is land that is owned by the governing body which is known as “State or Crown “ land and a landholder landowner unit which could either be traditionally claimed and known as native land; or legally claimed and known as estates or private properties. Some countries still practice the feudal system in place of the latter part.

In other instances, land tenure is three-fold in that there is State land, Native land and Freehold land. Freehold land can be sold and bought and is privately owned. State land and Native land cannot be sold and bought but either used by the landowning unit or is available on leasehold basis within a confined number of years; which would then be known as State lease or Native lease.

Agriculture can be practiced in either of the land tenure systems. However, for leasehold basis the land could be utilized for agriculture through an Agriculture Lease. If land is not leased then tenants could practice agriculture on these lands through a mutual contract or special agreement with the landowning unit.

#### **ACTIVITIES - RESEARCH - INTERNET**

***Research on the land tenure systems of your theme countries or in your community. Briefly describe how it has originated and its significance to the people and the host country. Compile a short report.***

### 1.1.3 **SUBSISTENCE AND COMMERCIAL AGRICULTURE**

#### **A. Subsistence Agriculture**



<https://www.google.com/fj/imgres?imgurl=http://devpolicy.org>

Subsistence agriculture is a small scale production of crops or animal husbandary for self-sufficiency or simply farming for your own use. ie. for household diet and social obligations. However, for most developing countries, with the change of time and demands of modern lifestyles, this concept has broadened to serve multiple other purposes. These include:

- Meeting the local consumption demands in local markets
- Supplying local cooperatives for export markets and special markets

Usually, traditional farming methods are used for this type of farming. Hence, agricultural sectors tend to encourage this type of farming to ensure food security and to preserve traditional farming techniques and /or ideas. In fact, these traditional concepts in farming serve as the basis for all modern technologies and developments.

This common form of agriculture is practiced by

- ☐ Peasants
- ☐ Nomads in herding
- ☐ Villagers in village farms
- ☐ Individuals in farming settlements
- ☐ Families as backyard farms

## B. Commercial Agriculture

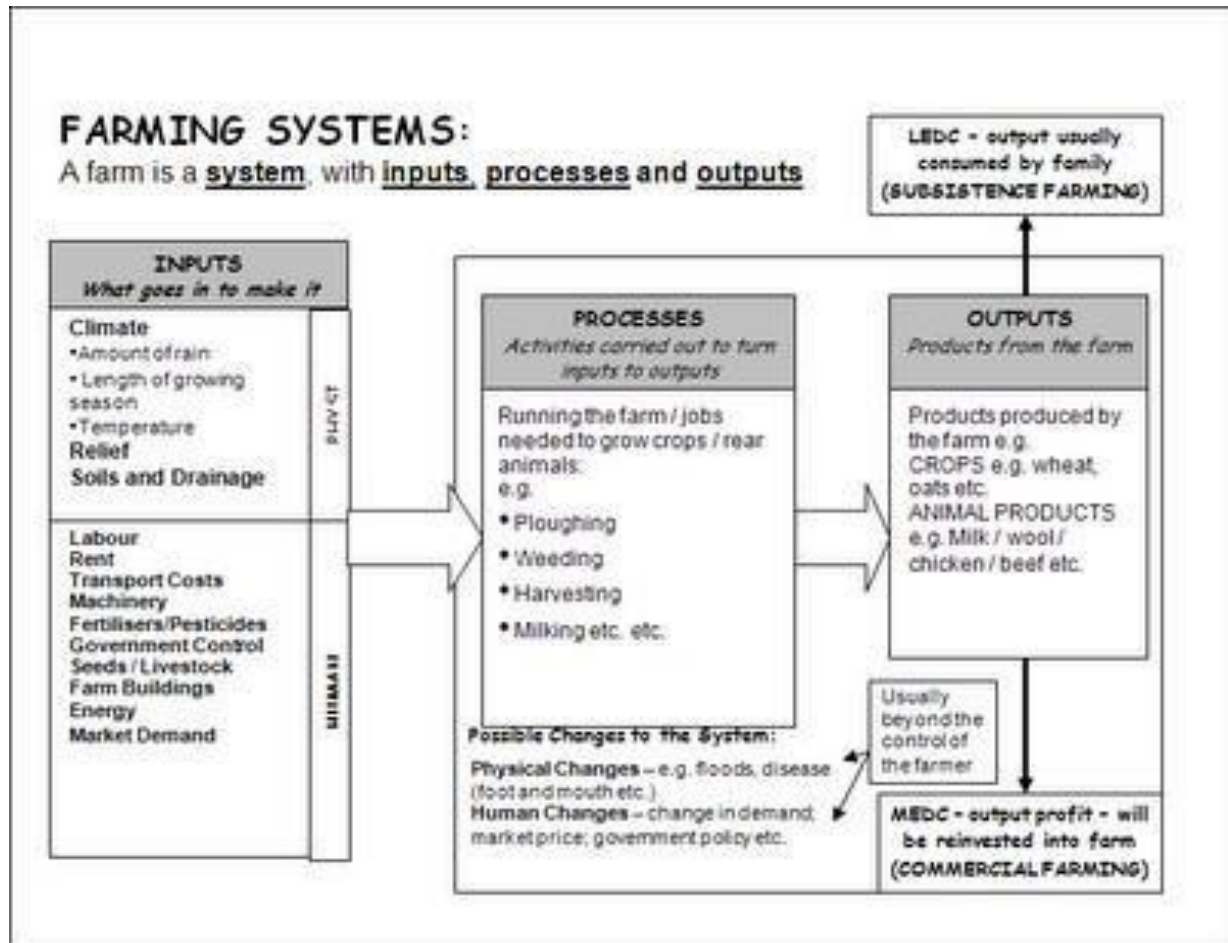


<https://www.google.com.fj/mgres?imgurl=http://dingo.care2.com>

Commercial agriculture is large scale production of crops or animal husbandary for economic gains or benefits; through distribution to wholesalers, retail outlets, specialized markets (domestic and international) and local markets.

This type of farming is mostly *capital intensive* than *labour intensive* to be able to cater for the increasing demands and diverse demands of the consumers.

The table shown on the next page tends to summarize the basic elements which make up a commercial farm.



[http://www.slideshare.net/icon66rt/agriculture-ppt-15538511?next\\_slideshow=1](http://www.slideshare.net/icon66rt/agriculture-ppt-15538511?next_slideshow=1)

## ⌘ **ACTIVITIES - CHARTWORK – USE OF MASS MEDIA, INTERNET, ETC.**

*On a vanguard sheet:*

- (i) *Paste pictures to differentiate between subsistence and commercial agriculture.*
- (ii) *List down the importance of each of these types of agriculture.*
- (iii) *Identify the factors which influences these types of agriculture.*

### 1.1.4 **TRADITIONAL AND CONTEMPORARY PRACTICES**

#### 3.1.4.1 **Traditional Practices (from traditional to early industrialization)**

In the primitive ages humans used sticks and stones for agricultural use. In the introduction of iron and steel in early industrialization stage, agricultural tools in these times developed into similar tools as those shown in these pictures.



<http://fengtaichina.en.madeinchina.com/product/VMpMLJfjaSWq/http://search.tb.ask.com/search/AJimage.jhtml?search>



<http://search.tb.ask.com/search/AJimage.jhtml?searchfor=image+of+traditional+>

Traditional agricultural practices are fundamental but somewhat complex with regards to the available tools and scientific knowledge on plants and animals. They used their own traditional knowledge, experience and instincts to formulate appropriate agricultural practices and ideas.

For instance, slash and burn is used to prepare land for farming, Even though it destroys the biodiversity and the organisms in the soil, the land are fertilized before farming commences. (Refer to diagrams below)



<https://www.google.com.fj/mqres?imgurl=http://img1.photographersdirect.com>

Through traditional ideas and their own form of technology these farmlands are transformed into areas of mixed farming neatly arranged into plots ( Diagram shows dry-land farming).



<https://www.google.com.fj/mqres?imgurl=http://api.ning.com/files/>

It can also be transformed into terraces for farming of numerous types of agricultural products. (Diagram shows wet-land farming)



<https://www.google.com.fj/mqres?imgurl=http://www.greenpeace.org/eastasia/>

Traditional farmers have also modified their practices to utilize vacant spaces like backyards though raised plot farming as shown in the diagrams below.



<https://www.google.com.fj/imgres?imgurl=http://matava.com/wp3/wp-content>

Other traditional farming practices include shifting cultivation (to allow land to fallow), crop rotation and basic animal husbandary.

For all traditional practices, harvesting is done manually.



<https://www.google.com.fj/mqres?imgurl=http://bp.blogspot.com>

### **3.1.4.2 Modern Practices (from late industrialization to modern times)**

Modern agricultural practices are based on a network of ideas and techniques of intellectuals, specialist farmers and science technology, specified for an agricultural type, climate type and soil type.



<http://www.slideshare.net/Nawarajintermediate/modern-agricultural-practices>

Modern technology has greatly influenced modern farming practices to strive towards attaining their objectives. It might be capital intensive, however, it certainly reduces the high labour cost and allows for mass production.



<http://search.tb.ask.com/search/AJimage.jhtml?searchfor=image+of+traditional+tiller&cb=>



<https://www.google.com.fj/search?q=modern+farming+tools&biw=1242&bih=585&tbn=isch&tbo=u&source>

Of the many modern agricultural techniques, a technique which is quite extraordinary but which has proven to be the most successful is the use of the Greenhouse. The picture shown demonstrates what a greenhouse is.



## GREEN HOUSE

A greenhouse (also called glasshouse) is a building in which plants are grown with perfect climatic conditions. Used to overcome shortcomings in the growing qualities of a piece of land, such as a short growing season or poor light levels, and they can thereby improve food production in marginal environments.

<http://www.slideshare.net/Nawarajintermediate/modern-agricultural-practices>

Other prominent modern agricultural practices are outlined in the resources given below. Agricultural practices are chosen to suit:

- ☐ the relief and soil type.
- ☐ the climate.
- ☐ the available capital and labour.
- ☐ Markets available.

## SUSTAINABLE TRADITIONAL AGRICULTURAL PRACTICES USED IN THE CARIBBEAN

- **Intercropping & polyculture:** symbiotic relations 'tween plants (shade, rooting systems), plant diversity encourages natural biological control of insect pests, provides year round food supply.
  - **Crop rotation w/ legumes:** helps retain soil fertility & year round food supply, (rotations involve red peas, gungo peas, cowpeas, string beans etc)
- 
- **Spatial organisation of crops in fields:** strip cropping, grass barriers, contour planting – all contribute to soil conservation, planting trees to act as wind breaks
  - **Fallowing:** helps restore soil fertility if sufficient time elapses, helps maintain vegetative cover to reduce erosion.
  - **Mulching:** helps reduce evapotranspiration & soil loss from wind erosion, adds nutrients to soil, minimises the impact of splash erosion.

[http://www.slideshare.net/icon66rt/agriculture-ppt-15538511?next\\_slideshow=1](http://www.slideshare.net/icon66rt/agriculture-ppt-15538511?next_slideshow=1)



- **Ramming, fly penning:** integrates crops & livestock into household production, reduces potential erosion by trampling, animal faeces manures the land.
- **Kitchen gardens & food forests:** traditional types of agroforestry.
- **Silvo-pasture:** combining food trees w/ pasture e.g. coconuts & cattle.

[http://www.slideshare.net/icon66rt/agriculture-ppt-15538511?next\\_slideshow=1](http://www.slideshare.net/icon66rt/agriculture-ppt-15538511?next_slideshow=1)

### ⌘ **ACTIVITY - RESOURCE BOOK – INDIVIDUAL ACTIVITY**

*Each individual is to compile a small resource book on traditional and modern practices in any of the theme countries.*

## **3.1.5 IMPORTANCE OF AGRICULTURE**

### **3.1.5.1 Some Environmental Importance**

1. **Retention of vegetation** –this is essential to retain soil cover. It also prevents soil erosion and retains to some extent the microclimate of that particular area.
2. **Retains the biodiversity** – retains the biodiversity to some extent such as to retain the food chains and food web of specific areas, thus saving most of the organisms from being extinct in a particular area.
3. **Retains soil cycles** – the presence of plants means humus for the soil which contributes to the nutrient cycles and other soil cycles.
4. **Retains soil fertility** – vegetation does not only retain soil cycles, it also retains all the elements which make up the whole soil composition. It also prevents soil erosion.

### 3.1.5.2 Some Economic Importance

1. **Source of income/livelihood** - it promotes employment and employment opportunities, and wealth to provide for the farmers daily needs and wants.
2. **Promotes investments** – as demands continue to vary there would continue to be an increase in investment opportunities and as population grows the market continues to expand.
3. **Increases Government Revenue and GDP** – as commercial agriculture increases the GDP of the country also increases which means the increase in Government Revenue (especially due to export earnings).
4. **Multiplier Effect** – earnings from agricultural sales have multiplying effects in a country. That is , from the revenue earned by the government which promotes development and economic growth to the earnings of a simple farmer which provides for his livelihood and social obligations.

### 3.1.5.3 Some Social Importance

1. **Source of fresh daily food** – this is the main reasons for practicing agriculture is to provide fresh food to the farmer and his/her family and especially to consumers.
2. **Source of healthy diet** – it provides food from all the food groups hence it provide healthy diets to the farmer and the consumers.
3. **Promotes development** – it will mean infrastructural development, technical and financial assistance provided by the government; development initiated by the farmer; and development created by other investors and services which are either drawn into or decentralized into these farming areas.
4. **Food security** – finally the growth of the agriculture sector would mean food security for the people.

## ⌘ ACTIVITY - RESOURCE BOOK – INDIVIDUAL ACTIVITY

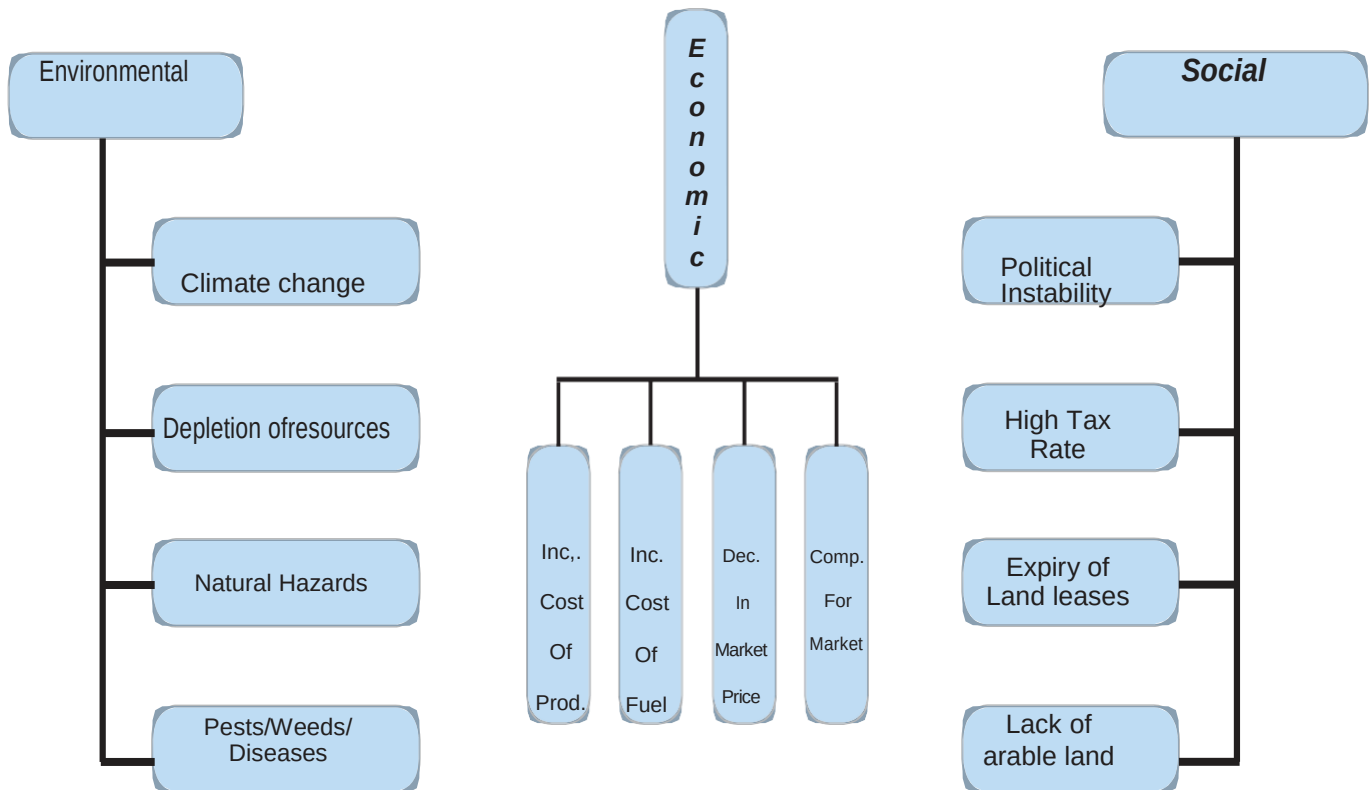
*Students are to research on six of each of the importance of agriculture.*

*Each individual is to compile a small resource book on the importance of agriculture in a specific theme country. The resource book should consist of the topics, pictures and short notes and examples.*

### 1.1.5 **PROBLEMS FACED BY AGRICULTURE**

In the bid to promote agriculture to solve the problem of food scarcity relative to population increase, barriers and constraints still arise to stall the advancement of the agricultural sector. Some of these problems are caused by man while most it is influenced by man.

Eg.

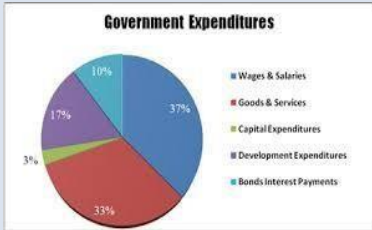


### ☞ **ACTIVITY** - RESOURCE BOOK – INDIVIDUAL ACTIVITY

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### 1.1.6 **PROBLEMS CAUSED BY AGRICULTURE**

| Environment                                                                                                           | Economic                                                                                                                              | Social                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Pollution</b><br>                 | <b>Leakage – foreign investors/ expats.</b><br>      | <b>Conflicts over land</b><br>                               |
| <b>Soil Degradation</b><br>         | <b>Inc. Gov. Expenditure</b><br>                    | <b>Poor working conditions</b><br>                          |
| <b>Loss of biodiversity</b><br>    | <b>Expenses of maintenance</b><br>                 | <b>Health risk – fertilizer deposits on vegetables</b><br> |
| <b>Destruction of habitats</b><br> | <b>Inflation – increase in prices of goods</b><br> | <b>Lack of space for development</b><br>                   |

<https://www.google.com/search?q=image+of>

### 1.1.7 **WAYS TO MINIMIZE THE PROBLEMS**

Some probable ways of minimizing the problems faced by agricultural sectors are:

#### ⌘ **Controlled Agriculture**

### Modern Agriculture Supposed to be Sustainable Agriculture

Modern agricultural practices enable farmers to meet ALL three goals of sustainability: conserve and protect natural resources; meet the food and fuel needs of a growing population; and be financially viable for both growers and consumers.



<http://www.slideshare.net/Nawarajintermediate/modern-agricultural-practices>

#### ⌘ **Sustainable Agriculture**

**SUSTAINABLE AGRICULTURE**

- The term sustainable agriculture means an integrated system of plant and animal production practices having a site-specific application that will, over the long term:
  - satisfy human food and fiber needs;
  - enhance environmental quality and the natural resource base upon which the agricultural economy depends;
  - make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls;
  - sustain the economic viability of farm operations; and
  - enhance the quality of life for farmers and society as a whole.

<http://www.slideshare.net/Nawarajintermediate/modern-agricultural-practices>

## ☞ Agro-forestry



<https://www.google.com/search?q=image+of+agroforestry&client=firefox->

Agro-forestry simply means farming while retaining part of the forest, as depicted above.

## ☞ Appropriate Technology – Aquaponics/Hydroponics



<https://www.google.com.fj/search?q=images+of+traditional+farming+practices+in+fiji>

The use of appropriate and applicable technology for quantity and quality in agriculture.

## ☞ **ACTIVITY - INTERNET/ LIBRARY RESEARCH - WORK INPAIRS**

*Students are to explain twelve problems from 3,1,7 and for each of these problems they are to identify the most probable solution which would minimize its effects. Each pair are to write a brief report on their research. This would be assessed and can be retained as a subject resource.*

### 1.1.8 CONTEMPORARY ISSUES



<https://www.google.com.fj/search?q=images+in+agriculture&biw=>

Economic Benefits or wealth gained from commercial agricultural has influenced money-minded farmers to continue to expand their farms without regards of space, land capacity and sustainability.

#### ⌘ Uncontrolled Scientific Knowledge



<http://search.tb.ask.com/search/AJimage.jhtml?searchfor=image+of+HYBRID+FRUITS>

Uncontrolled science practices in agriculture would result in undesired agricultural products which would destabilize the equilibrium in our ecosystem.

#### ⌘ Climate change



Climate Change has multiple effects to our environment. eg. Doughts, Flooding,Cyclones, etc.

## ⌘ Coastal Flooding

Coastal Flooding contributes to the destruction of agricultural land.



<https://www.google.com/search?q=image+of+climate+change>



<https://www.google.com.fj/search?q=images+of+beaches&biw=>

## ⌘ High population Growth

High population growth threatens food security and causes food scarcity.



<http://search.tb.ask.com/search/AJimage.jhtml?searchfor=image+of+high+population+growth>

### 1.1.9 **THE FUTURE OF THE AGRICULTURE SECTOR**

#### Further development of sustainable agriculture

We have observed the importance of agriculture in view of the many contemporary issues which is affecting the world today. Study the tables given below:

Components of GDP

|                                       | NZD (millions) | % of total   |
|---------------------------------------|----------------|--------------|
| Finance Insurance & Business Services | 39,235         | 28.8         |
| Personal & Community Services         | 16,552         | 12.2         |
| Manufacturing                         | 16,429         | 12.1         |
| Transport & Communication             | 14,184         | 10.4         |
| Retail, Accommodation, Restaurants    | 10,082         | 7.4          |
| Wholesale Trade                       | 9,947          | 7.3          |
| <b>Agriculture</b>                    | <b>6,939</b>   | <b>5.1</b>   |
| Govt Administration & Defence         | 6,794          | 5.0          |
| Construction                          | 5,443          | 4.0          |
| Fishing, Forestry, Mining             | 3,359          | 2.5          |
| Electricity & Gas                     | 2,680          | 2.0          |
| <b>Gross Domestic Product</b>         | <b>136,137</b> | <b>100.0</b> |

<https://www.newzealandnow.govt.nz/investing-in-nz/opportunities-outlook/economic-overview>

This indicates the need to further develop the agriculture sector in a sustainable way to elevate its GDP standings above other sectors which are the cause of most of problems on our planet Earth.

Exports - top 20 commodities

| Commodity                                 | NZ\$ (millions) | Year end           |
|-------------------------------------------|-----------------|--------------------|
| <b>Milk powder, butter, and cheese</b>    | <b>12,428</b>   | <b>31 Dec 2012</b> |
| <b>Meat and edible offal</b>              | <b>5,167</b>    | <b>31 Dec 2012</b> |
| Logs, wood and wood articles              | 3,160           | 31 Dec 2012        |
| Crude oil                                 | 1,790           | 31 Dec 2012        |
| Mechanical machinery and equipment        | 1,716           | 31 Dec 2012        |
| <b>Fruit</b>                              | <b>1,563</b>    | <b>31 Dec 2012</b> |
| Fish, crustaceans and molluscs            | 1,382           | 31 Dec 2012        |
| Wine                                      | 1,218           | 31 Dec 2012        |
| Electrical machinery and equipment        | 1,119           | 31 Dec 2012        |
| Aluminium and aluminium articles          | 1,042           | 31 Dec 2012        |
| Casein and caseinates                     | 890             | 31 Dec 2012        |
| Iron and steel articles                   | 874             | 31 Dec 2012        |
| Preparations of cereals, flour and starch | 917             | 31 Dec 2012        |
| Precious metals, jewellery and coins      | 807             | 31 Dec 2012        |
| Miscellaneous edible preparations         | 747             | 31 Dec 2012        |
| Optical, medical and measuring equipment  | 721             | 31 Dec 2012        |
| Wool                                      | 717             | 31 Dec 2012        |
| Wood pulp and waste paper                 | 589             | 31 Dec 2012        |
| Raw hides, skins and leather              | 567             | 31 Dec 2012        |
| Textiles and textile articles             | 560             | 31 Dec 2012        |

<https://www.newzealandnow.govt.nz/investing-in-nz/opportunities-outlook/economic-overview>

| SOPI June 2012 - Dairy sector production and export value |        |       |       |       |          |       |       |       |
|-----------------------------------------------------------|--------|-------|-------|-------|----------|-------|-------|-------|
| Year                                                      | ACTUAL |       |       |       | FORECAST |       |       |       |
|                                                           | 2009   | 2010  | 2011e | 2012  | 2013     | 2014  | 2015  | 2016  |
| Cows and heifers in calf or in milk <sup>1</sup> (mil)    | 4.35   | 4.61  | 4.68  | 4.82  | 4.93     | 4.96  | 4.98  | 5.17  |
| Milk solids produced <sup>2</sup> (mil kg)                | 1394   | 1437  | 1472  | 1555  | 1600     | 1619  | 1638  | 1768  |
| Milk price <sup>2</sup> (cents per kg milk solids)        | 472    | 610   | 709   | 687   | 727      | 785   | 864   | 783   |
| Total export value (\$ million) <sup>3</sup>              | 11429  | 10562 | 13042 | 14576 | 15575    | 16742 | 18287 | 17033 |

<http://www.mpi.govt.nz/agriculture/pastoral/dairy.aspx>

- ☒ The use of modern scientific knowledge to improve of the quality or quantity per unit area, and to meet the specific demands of the consumers.



<https://www.innovateuk.org/food>

- ☒ The need to maintain and/or improve on the variety of agricultural products.



<http://search.tb.ask.com/search/AJimage.jhtml?searchfor=image+of+HYBRID+FRUITS>

- ☒ The need to empower the people for food security and food sustainability.



<http://www.usaid.gov/what-we-do/gender-equality-and-womens-empowerment>

# CHAPTER FOUR

## MARINE RESOURCES

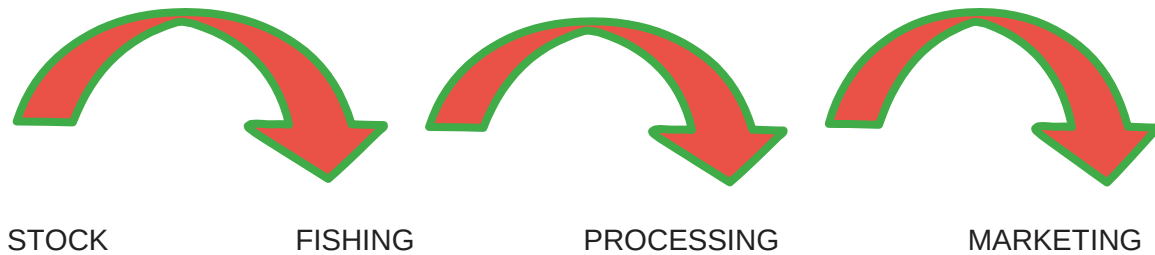
### SUB – STRANDS:

- ☒ Explain the types of marine environment and resources available and their significance.
- ☒ Explain how man's activities have affected the marine environment and its resources, and outline ways of conserving and protecting marine environment and appreciate its contributions to our daily living.

#### 1.1.1 A FISHERY

A fishery includes a complex set of interactions between the environment, the resources and the people involved in fishing and finding the catch.

There are four main parts of a fishery. These are:



**Fish Stock** or fisheries resources is a population of fish or other marine animals, which is exploited.

**Fishing Operations** includes all the fishing methods used by fisherman.

**Processing** may include the treatment of the resources, the storage and methods of producing the fisheries products.

**Marketing** simply refers to the sale of marine resources.

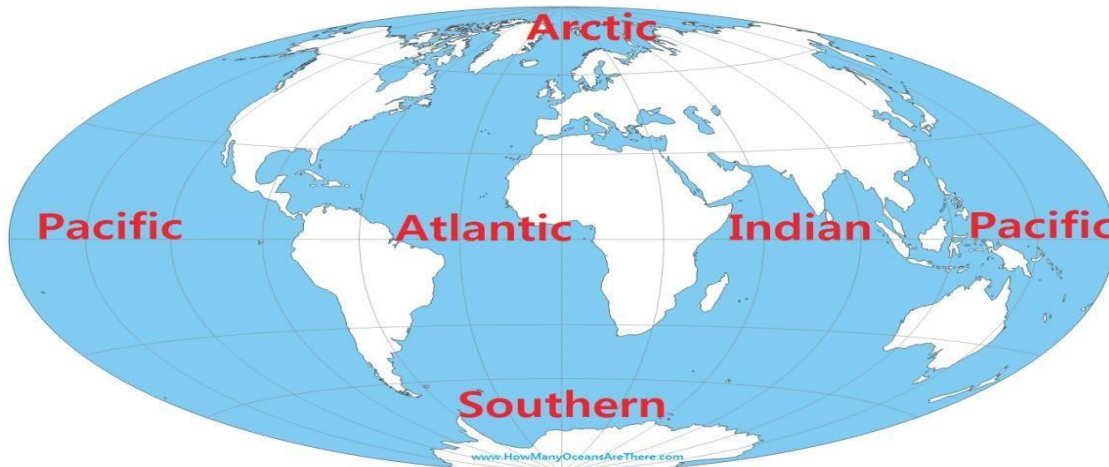
### ⌘ ACTIVITY - INTERNET/ LIBRARY RESEARCH - WORK INDIVIDUALLY

*Students are to discuss each part of the fishery in detail. Give specific examples from your theme countries.*

### 1.1.2 **MARINE ENVIRONMENT**

The marine environment consists of the ocean and estuarine areas where large volumes of fresh water from land and salty ocean water mix. **Oceans** are huge basins filled with water situated between the earth's landmasses.

The ocean covers 71% of the planet's surface and from outer space it gives the earth a blue appearance. There are five large oceans in the world: Pacific, Atlantic, Indian, Southern and Arctic. The ocean has salty water because it contains minerals and salts that have collected over millions of years. Salts such as sodium chloride (NaCl), potassium chloride (KCl), magnesium chloride (MgCl<sub>2</sub>) and Calcium Chloride (CaCl<sub>2</sub>), have been washed from land and carried into oceans by rivers.



Source: [www. google.com](http://www.google.com)

Like continents, oceans also have mountain ranges, deep canyons and vast plains which constantly change their shape. Molten lava from submarine volcanic eruption from within the mantle spreads over the ocean floor near the mid ocean ridges. At the same time, tonnes of sediment are washed from the continents and dumped into the sea bottom.

The deepest part of the ocean is known as **Trenches**. Because of the many different types of rock and the effects of weathering and erosion, coastal areas have their own special landform example smooth, sandy beaches and **mudflats** to rock cliffs and **coral reefs**.

Water is also moved within the oceans by huge currents. Currents passing close to the equator are warm while those near the poles are very cold. **Ocean currents** also move along the ocean floor. When cold dense water runs into the surface. When this happens the current takes organisms and nutrients to the surface, attracting fish and other sea organisms / creatures. This process is called **Upwelling**. Upwelling attracts shoals of fish, they are also our most important fisheries.

When wind blows across the ocean surface it sets up a rolling motion of water particles which we call **waves**. Waves contain energy that moves in the same direction as the wind. The amount of energy in a wave is usually determined by the speed of the wind and tides. **Tides** are ocean waters that rise according to tides. Strangely the earth tides are caused by moon and sun. The gravitational pull of the 'moon attracts water into the ocean, making it bulge along the line of force. The sun also attracts water but its tidal pull is less than half of the moon. This causes high tide and low tide.

## **Marine Ecosystem**

Most of the world's landscape lies under the sea, yet we are only beginning to learn about its formation and the many creatures that live there. The **continental shelf**, open ocean and ocean floor each have different physical surrounding so each environment has its own unique flora and fauna.

Marine plants tend to grow where both temperature and sunlight are available while sea mammals, fish, crustaceans and other creatures survive where there is food and protection. Each zone has its own particular **ecosystem**. Ecosystems are mangroves, coral reefs and rock shorelines. In an ecosystem are several food chains, where larger creatures dominate the small. When all food chains of an ecosystem are connected they form a **foodweb**. Many creatures depend upon each other for survival, the species in an ecosystem therefore are interdependent. Even a slight change in one part of the ecosystem will affect and change the other parts of the ecosystem.

Oceans and **seas** cover 360million km<sup>2</sup> or 71% of the earth's surface. Most oxygen occurs near the surface although some deep currents occur in the ocean floor. Sunlight may penetrate to a maximum of 600 metres in clear water for photosynthesis only occurs in the upper 60 – 100 metres. Oceans waters vary in temperature from around 28°C at the equator to -2°C around Antarctica. Salinity is highest near the surface due to evaporation. It gradually reduces with depth.

There are four main types of marine environment:

The marine environment consists of living and non-living surroundings of marine species. Both corals and sea-water are part of the marine environment.

There are many types of marine environment or ecosystems.

### 1. **Estuaries**

Estuaries are places where the rivers meet the sea. The mixing of river water and seawater causes low salinity and is said to be brackish. In this ecosystem there are often forests of mangroves and other coastal plants.

### 2. **Mangrove forests/swamps**

This environment provides shelter and food for marine organisms. Mangrove plants with their aerial roots help to stabilize the coastal ecosystem and retain the marine biodiversity which relies on this environment.

Some mountainous island like Fiji and Japan have sufficient rainfall to produce rivers. Estuarine areas where fresh water mixes with sea water at the mouths of large rivers, support the growth of specialized trees called mangroves. Mangroves live halfway between the land and the sea with their roots in an alternating environment of sea water and fresh water runoff from land.

Mangroves are trees with exposed roots growing along shorelines and near estuaries. In places they are so dense they form mangrove forests. The thick roots acts as baffles and slow down waves and tidal water. This allow for the build up of algae and decayed material called **detritus**, an important food source for fish, prawns and crabs. Roots are usually exposed at low tide. However, during high tide they are covered and provide protection for hungry fish.

Mangroves provide shelter and a constant supply of food for many different animals. The young or juveniles (babies/young) of some species such as prawns use mangroves and sea grasses beds as areas in which to grow (nursery areas) before moving out into deeper water. Other species such as mullet come to visit the area to breed, for larger fishes they come inshore to feed on smaller species. Mangrove therefore provides:

- (i) a safe habitat for young fishes, crustaceans and birds
- (ii) a buffer zone which reduces the impact of ocean waves, storm surges and river flooding
- (iii) shades to the young that dwell in its waters.
- (iv) its roots prevents coastal erosion and traps nutrients for the young fishes.

### 3. **Beaches and Sea-grasses**

Beaches are formed by particles of materials washed by waves or currents. In some cases, particles are carried from inland by rivers. Sea grasses have root systems which assist in the formation of sandbars and coastal landforms which provide food and shelter to many coastal marine organisms.

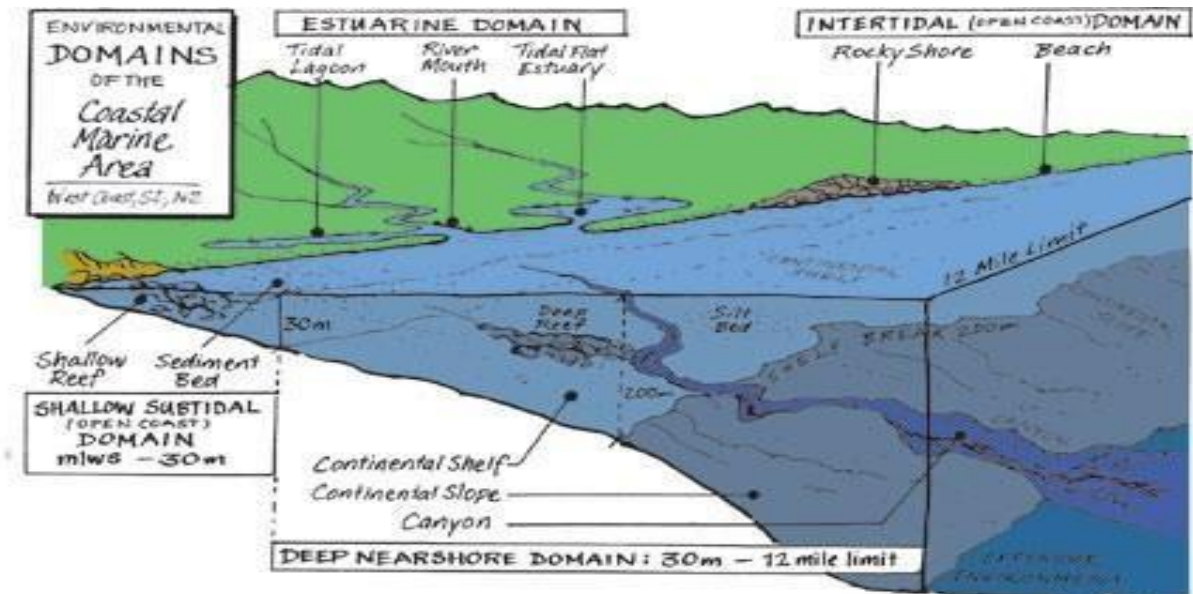
In some shallow water, sand areas there are extensive underwater meadows of grass-like plants collectively known as sea-grass. The sea-grass provides shelter and a constant supply of food for many different animals.

In some shallow water, sand areas there are extensive underwater meadows.

### 4. **Coral reefs and Lagoons**

Coral reef is a ridge of rock in the sea formed by the growth and deposit of coral. Coral reefs protect coastlines and coastal villages from large ocean waves formed by storms or cyclone. They are vital part of the coastal environment in the tropics and without them, many coastal areas would be without protection from the sea and without such a large variety of marine life.

Lagoon is a stretch of salt water separated from the sea by a low sandbank or coral reef.



There are three main types of coral reefs.

#### 4.1 **Fringing Reef**

These grow at the edge of continents and islands

#### 4.2 **Barrier Reef**

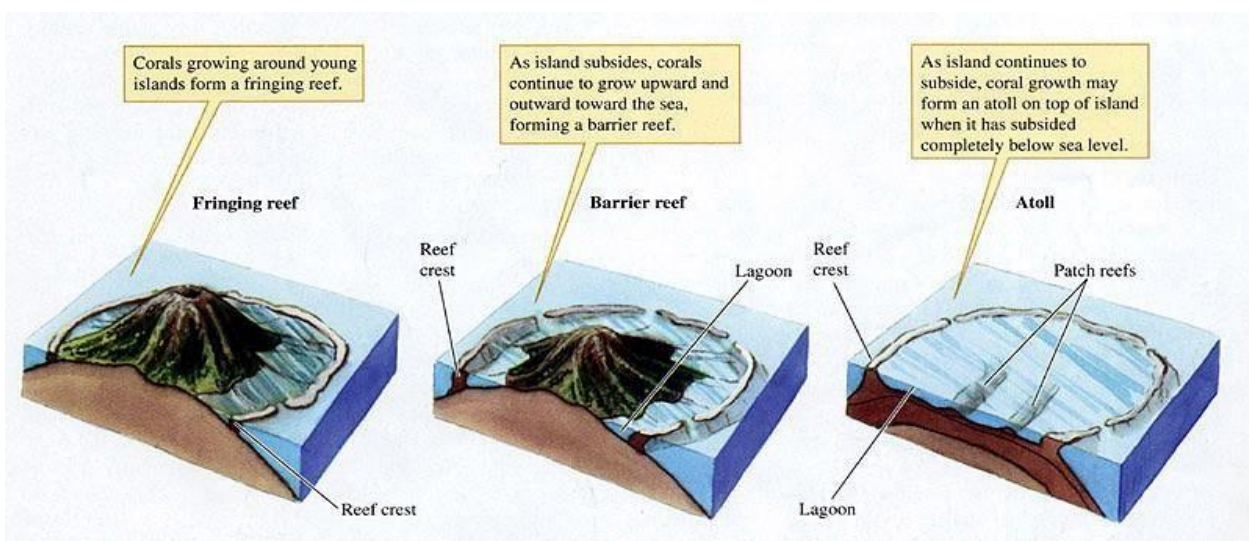
These are separated from the shoreline by a lagoon. It can cover the parallel coastline of an island. Its an extensive reef. Eg Kadavu's Astrolabe Reef; Lakeba's Late-I-Fisi and Late-I- Tonga.

#### 4.3 **Atolls**

These are coral reefs which grow in a circle or are built by currents. They grow in a circle around a lagoon over time, dead coral is broken down to form small areas of sand islet on the reef eg Wailagilala Island.

Coral reefs which are habitats and food sources for many marine organisms are living creatures themselves.

Apart from the above, there are certain marine organisms which depend on the lagoons for food.



Source : [www.google.com](http://www.google.com)

Coral reefs are formation produced by massive colonies containing billions of tiny coral animals, called Polyps, they secrete a stony substance calcium carbonate around themselves for protection when the coral dies, their empty Exoskeleton form layers that cause the reef to grow. They are found in the coastal zone of warm tropical and subtropical oceans.

Coral are beautiful natural wonders and are among the world's oldest most diverse and most productive ecosystems. Coral reefs provide a number of things which includes:

- (i) food and shelter for a variety of living things than most other natural areas in the world;
- (ii) important ecological and economical services such as removal of carbondioxide CO<sub>2</sub> from the atmosphere as part of the carbon cycle
- (iii) act as a natural barriers that helps protect 15% of the world's coastlines from erosion by battering waves and storms, and allows the ocean to replenish beaches with sand.
- (iv) support at least  $\frac{1}{4}$  of all identified marine species and 65% of marine fish species even though such reefs occupy less than 1% of the ocean floor.
- (v) provides fish and shellfish, jobs and building materials for some of the world's poorest countries.
- (vi) support fishing and tourism industries worth billions of dollars each year. Eg tourism generates about \$2 million per year from Fiji's barrier reef in Vanualevu and other parts of Fiji.
- (vii) Giving us an underwater world to study and enjoy.

Coral reefs are sometimes compared to tropical rainforests because they hold such high number of species biodiversity with complex ecological relationships.

### **3B ACTIVITY - INTERNET/ LIBRARY RESEARCH - WORK IN PAIRS**

***Students are to research on the different marine ecosystems. Each pair is to write a brief report on their research. This would be assessed and can be retained as a subject resource.***

### 1.1.3 **MARINE RESOURCES**

In the ocean each different types or species of fish or other marine animal can be grouped accordingly to the environment in which it lives. Some species lives:

- (a) inshore area such as the estuarine and lagoons
- (b) coral reefs
- (c) offshore in the open sea.

Regardless of where the species or resources live their uses are important for the survival of other resources and humans also. These resources are used for subsistence and commercial use.

In the early days people have fished the world's oceans and seas, today many countries rely on fish to provide protein to the population. Countries which have large populations or are unable to grow grain and beef send fleets of fishing vessels to all parts of the ocean searching for as much ocean produce as possible eg. Japan. Most of their catches consists of fish fins, crustaceans (prawns, crabs, lobsters), shellfishes (abalones, scallops, oysters) and other mollusks (octopus, squid). Large numbers of boats also travel the remote Southern Pacific oceans seeking tuna and shark.

The marine resources are edible and useful for many other purposes other than eating such as for:

- (a) Ornamental purposes – where shells are used for decoration, adornment  
eg jewellery. Japanese Mikimoto pearls, J.B. Huners Savusavu black pearls.
- (b) Seaweeds – used for nitrate supply to keep freshness in packaged foodstuff  
eg. Kiuva and Verata's seaweed harvesting sites.
- (c) Large Sized Fishes – used for recreation, fishing games, competitions and manmade water world's for amusement centres attractions. eg. Beqa and Kadavu Passages for shark feeding and game fishing competition.
- (d) Iron, sand, gravel, phosphates, magnesium, oil and natural gas are also available for men's use.

The marine resources or species can also be grouped according to where they thrive example in the various zones either on the upper layer of the waters or in the ocean floor. They are either **Pelagic Species** or **Demersal Species**. Pelagic Species are those that swim or feed on the surface of the water also referred to as top feeders. Demersal Species are those that swim, live or feed on the seafloor and are referred to as bottom feeders).

In fact fisheries resources can be classified into four main groups.

#### **A. Echinoderms**

☒ these have a covering or an external endoskeleton - with spiny covering.  
Eg. Sea cucumbers, Gastropods and Cephalopods.

#### **B. Molluscs**

☒ these are encased in one or two shells.  
Eg. Uni-valves and bi-valves.

#### **C. Crustaceans**

☒ these have a body covered with a hard shell and it has jointed legs.  
Eg. Lobsters, Crabs, Prawns.

#### **D. Fish**

☒ Characterised by endoskeleton with backbones.  
Eg. Inshore fish, Offshore fish, Pelagic fish, Demersal fish.

### **⌘ ACTIVITY - INTERNET/ LIBRARY RESEARCH - GROUP WORK**

*Students are to research on the different types of marine resources. They are to explain each of these and give examples from the theme countries. This would be assessed and can be retained as a subject resource.*

#### **1.1.4 THE LAW OF THE SEA**

Laws and legislation were signed and imposed to safeguard the sea and its resources. The purpose of this law is to help protect some heavily used ocean fisheries from overfished and allow recovery of ones already damaged from pollution that threatens the important food sources.

The United Nations Convention on the **Law of the Sea** (UNCLOS), also called the **Law of the Sea Convention** or the **Law of the Sea treaty**, is the international agreement that resulted from the third United Nations Conference on the **Law of the Sea** (UNCLOS III), which took place between 1973 and 1982.

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The convention introduced a number of provisions. The most significant issues covered were setting limits, navigation, archipelagic status and transit regimes, [exclusive economic zones](#) (EEZs), continental shelf jurisdiction, deep seabed mining, the exploitation regime, protection of the marine environment, scientific research, and settlement of disputes.

The convention set the limit of various areas, measured from a carefully defined baseline. (Normally, a sea baseline follows the low-water line, but when the coastline is deeply indented, has fringing islands or is highly unstable, straight baselines may be used.) The areas are as follows:

#### Internal waters

Covers all water and waterways on the landward side of the baseline. The coastal state is free to set laws, regulate use, and use any resource. Foreign vessels have no right of passage within internal waters.

#### Territorial waters

Out to 12 nautical miles (22 kilometres; 14 miles) from the baseline, the coastal state is free to set laws, regulate use, and use any resource. Vessels were given the right of innocent passage through any territorial waters, with strategic straits allowing the passage of military craft as transit passage, in that naval vessels are allowed to maintain postures that would be illegal in territorial waters. "Innocent passage" is defined by the convention as passing through waters in an expeditious and continuous manner, which is not "prejudicial to the peace, good order or the security" of the coastal state. Fishing, polluting, weapons practice, and spying are not "innocent", and submarines and other underwater vehicles are required to navigate on the surface and to show their flag. Nations can also temporarily suspend innocent passage in specific areas of their territorial seas, if doing so is essential for the protection of its security.

#### Archipelagic waters

The convention set the definition of Archipelagic States in Part IV, which also defines how the state can draw its territorial borders. A baseline is drawn between the outermost points of the outermost islands, subject to these points being sufficiently close to one another. All waters inside this baseline are designated *Archipelagic Waters*. The state has full sovereignty over these waters (like internal waters), but foreign vessels have right of innocent passage through archipelagic waters (like territorial waters).

#### Contiguous zone

Beyond the 12-nautical-mile (22 km) limit, there is a further 12 nautical miles (22 km) from the territorial sea baseline limit, the contiguous zone, in which a state can continue to enforce laws in four specific areas: customs, taxation, immigration and pollution, if the infringement started within the state's territory or territorial waters, or if this infringement is about to occur within the state's territory or territorial waters.<sup>[6]</sup> This makes the contiguous zone a hot pursuit area.

#### Exclusive economic zones (EEZs)

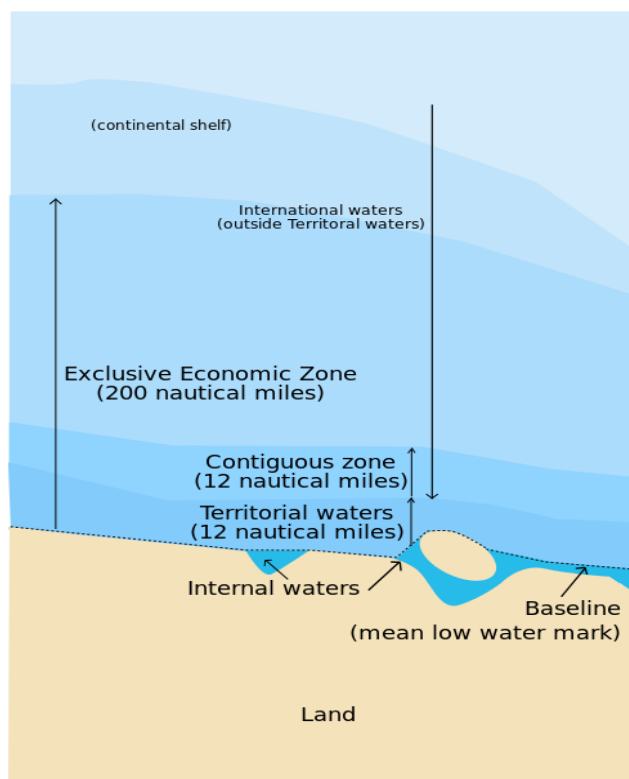
These extend from the edge of the territorial sea out to 200 nautical miles (370 kilometres; 230 miles) from the baseline. Within this area, the coastal nation has sole exploitation rights over all natural resources. In casual use, the term may include the territorial sea and even the continental shelf. The EEZs were introduced to halt the increasingly heated clashes over fishing rights, although oil was also becoming important. The success of an offshore oil platform in the Gulf of Mexico in 1947 was soon repeated elsewhere in the world, and by 1970 it was technically feasible to operate in waters 4000 metres deep. Foreign nations have the freedom of navigation and overflight, subject to the regulation of the coastal states. Foreign states may also lay submarine pipes and cables.

## Continental shelf

The continental shelf is defined as the natural prolongation of the land territory to the continental margin's outer edge, or 200 nautical miles (370 km) from the coastal state's baseline, whichever is greater. A state's continental shelf may exceed 200 nautical miles (370 km) until the natural prolongation ends. However, it may never exceed 350 nautical miles (650 kilometres; 400 miles) from the baseline; or it may never exceed 100 nautical miles (190 kilometres; 120 miles) beyond the 2,500 meter isobath (the line connecting the depth of 2,500 meters). Coastal states have the right to harvest mineral and non-living material in the subsoil of its continental shelf, to the exclusion of others. Coastal states also have exclusive control over living resources "attached" to the continental shelf, but not to creatures living in the water column beyond the exclusive economic zone.

Aside from its provisions defining ocean boundaries, the convention establishes general obligations for safeguarding the marine environment and protecting freedom of scientific research on the high seas, and also creates an innovative legal regime for controlling mineral resource exploitation in deep seabed areas beyond national jurisdiction, through an International Seabed Authority and the Common heritage of mankind principle.<sup>[7]</sup>

Landlocked states are given a right of access to and from the sea, without taxation of traffic through transit states.<sup>[8]</sup>



Source: [en.wikipedia.org/.../United\\_Nations\\_Convention](https://en.wikipedia.org/wiki/United_Nations_Convention_on_the_Law_of_the_Sea)

This Law recognizes 7 Administrative Zones:

### ⌘ **ACTIVITY - CHARTWORK - GROUP WORK**

*Students are to demonstrate the above information on a vanguard sheet This would be assessed and can be retained as a subject resource.*

### ⌘ **ACTIVITY - WRITTEN WORK - INDIVIDUAL**

*Students are to explain the importance of the Law of the Sea to Pacific Island Countries.*

#### 1.1.5 **IMPORTANCE OF THE MARINE RESOURCES AND FISHERY**

- ☒ Source of food/ Food Security

Marine resources are an important part of the diet of coastal dwellers in most countries. The development of the fishing industry means food provisions and food security.

- ☒ Source of employment/ Income

The existence of the fishing industry means employment, income and livelihood for the people.

- ☒ Source of Export Earnings

Export of marine products means increased revenue for the country.

- ☒ Promotes development

Development comes with economic growth.

- ☒ Provides proteins, vitamins and minerals.

Fish products are sources of proteins, vitamins and minerals.

- ☒ Retains food chain and food web

Marine species are mainly very important parts of some food chains and food webs.

- ☒ Retains biodiversity

As the food webs and food chains are retained then extinction of species can be avoided to retain biodiversity.

- ☒ Sustains life and natural beauty.

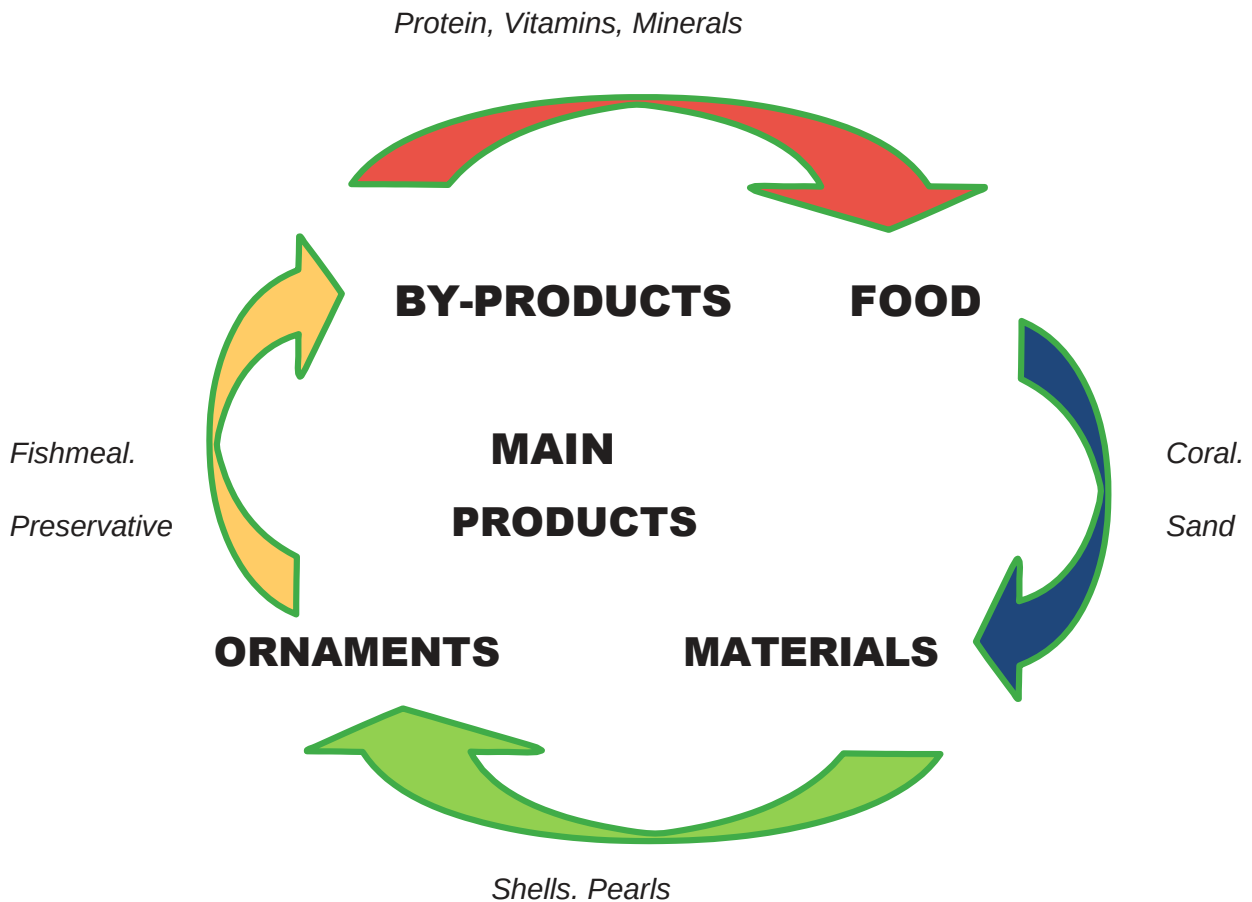
The ocean or the sea has its own characteristics and beauty.

- ☒ Etc.

### ⌘ **ACTIVITY - ESSAY - INDIVIDUAL**

*Students are to discuss four importance of marine resources Topics are to be allocated to individual students. This would be assessed and can be retained as a subject resource.*

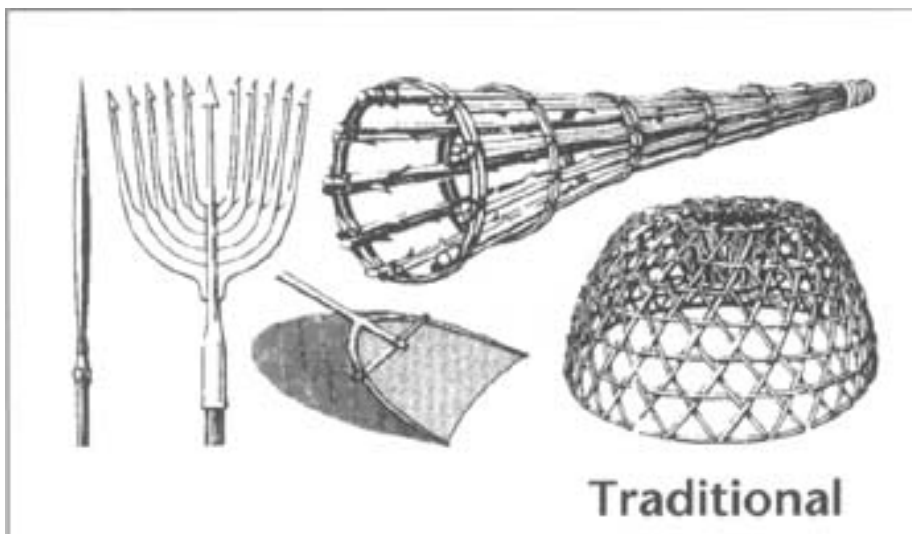
### 1.1.6 MARINE RESOURCE PRODUCTS



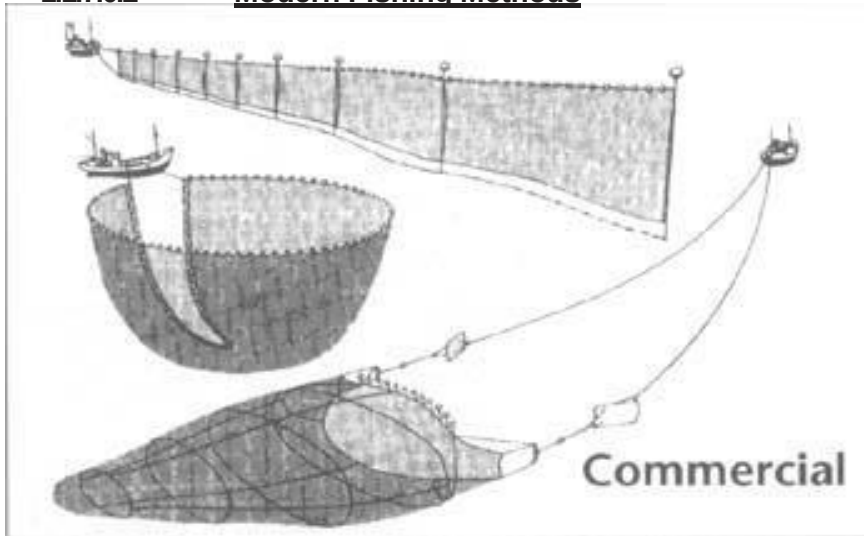
### 1.1.7 TRADITIONAL AND MODERN FISHING METHODS

#### 1.1.7.0.1 Traditional Fishing Methods

The most common traditional methods are the use of fish traps and spear fishing.



### 1.1.7.0.2 Modern Fishing Methods

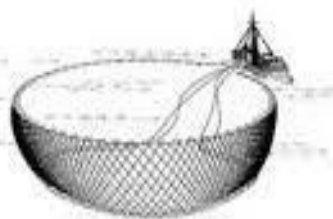


<http://www.fao.org/3/a-v1430e/V1430E04.htm>

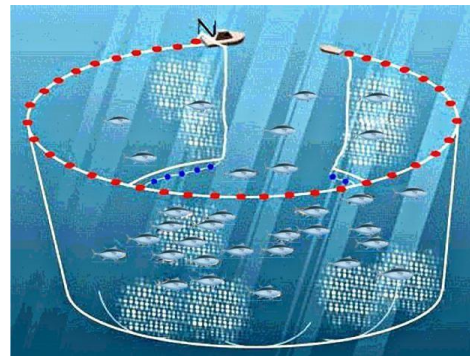
#### Purse Seine

Mainly skipjack and small yellowfin are caught by purse seine gear. Most catch is for canning.

About 75% of the tuna catch in the WCPO region is by



purse seine gear, about 1.9 million tonnes in 2009. Most of the purse seine catch is taken within 5 degrees of the equator.

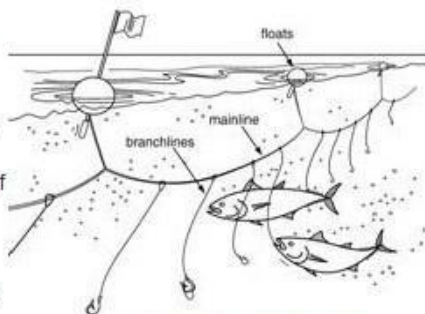


<http://www.europacifictuna.com/purseseine.htm>

#### Longline

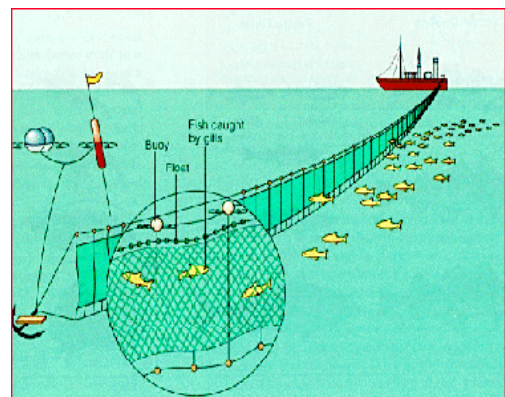
Most tuna caught by longliners are large size yellowfin, bigeye, and albacore. The prime yellowfin and bigeye often are exported fresh to overseas markets. Most of the albacore is for canning.

About 10% of the tuna catch in the WCPO region



is by longline gear, about 240,000 tonnes in 2009. There are two major types of longliners: (1) relatively large vessels with mechanical freezing equipment (often based outside

the Pacific Islands), and (2) smaller vessels that mostly use ice to preserve fish and are typically based at a port in the Pacific Islands.



<http://www.current/lectures/fisheries.html>

## Pole and Line

Mainly skipjack and small yellowfin are caught by pole-and-line gear. Most catch is for canning or producing a dried product.

About 7% of the tuna catch in the WCPO region is by pole-



and-line gear, about 147,000 tonnes in 2009. In the 1980s



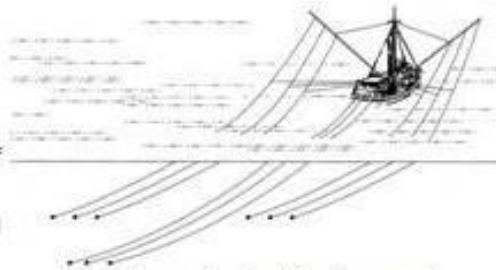
several Pacific island countries had fleets of these vessels, but most no longer operate due to competition with the more productive purse seine gear.

<https://greenfishbluefish.wordpress.com/tag/tuna-fishing/>

## Troll

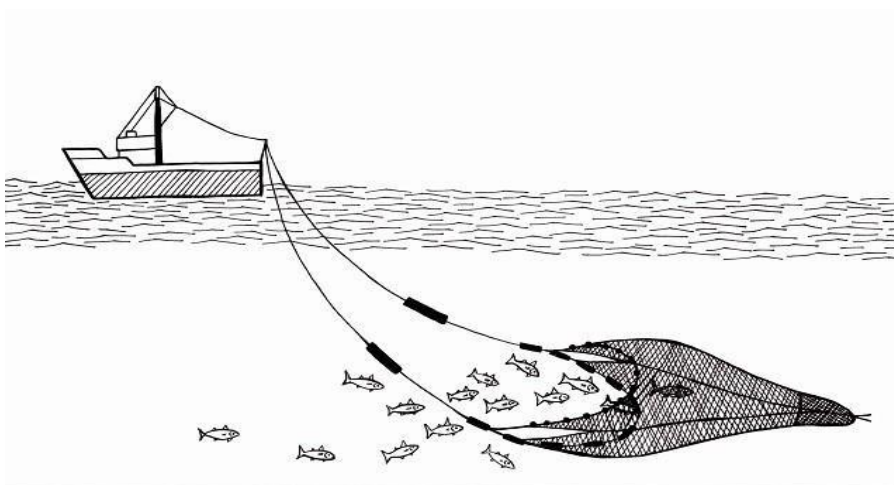
Large-scale trolling targets albacore for canning.

Gear types other than the three listed above are responsible for about 13% of tuna catch in the WCPO. Large-scale trolling is an important part of this. It



is carried out in the cool water to the south and north of the Pacific Islands region. Trolling in the south results in about 5,000 tonnes of albacore annually.

## Driftnet



<http://www.wwfsassi.co.za/?m=4&s=4&>

### **38 ACTIVITY - CHARTWORK - WORK IN PAIRS**

*Students are to compare traditional and modern fishing methods and identify its benefits and problems. Each pair is to display their findings on an A3 paper.*

#### **1.1.8 EXPLOITATION OF THE MARINE RESOURCES/ENVIRONMENT**

- |                                                        |   |                              |
|--------------------------------------------------------|---|------------------------------|
| <input type="checkbox"/> Overfishing                   | - | exceeding the quota.         |
| <input type="checkbox"/> Uncontrolled Fishing          | - | illegally fishing            |
| <input type="checkbox"/> Unsustainable Fishing Methods | - | use of explosives            |
| <input type="checkbox"/> Fishing of Undersized Fish    | - | fishing in off-seasons       |
| <input type="checkbox"/> Pollution                     | - | oil spills, dumping of waste |
| <input type="checkbox"/> Etc.                          |   |                              |

#### **1.1.9 MARINE RESOURCES AND SUSTAINABILITY**

##### **38 Marine Regulation**

There are four main regulations:

- (i) Limiting the catch (Quota)
- (ii) Limiting the number of fishing units (licence)
- (iii) Limiting the size of fish.
- (iv) Controls on fishing methods and gears.
- (v) Closed seasons and areas

## ⌘ Law of the Sea

(Refer to notes on UNCLOS)

By 1982, the custom of asserting a 12 nm territorial sea, 24 nm contiguous zone, and 200 nm EEZ was codified in the United Nations Convention on the Law of the Sea (UNCLOS).

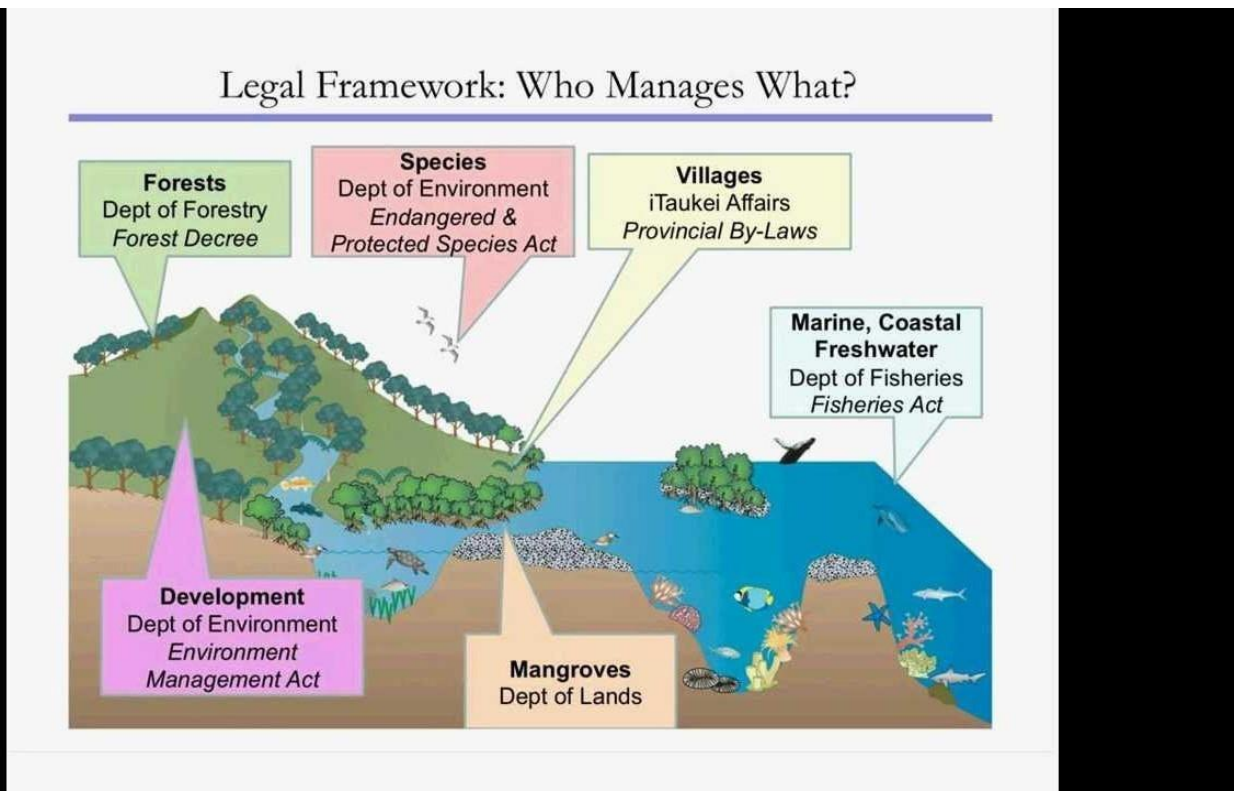
## ⌘ Pro-active actions/decisions

The Species of Concern list:

- Identifies species potentially at risk;
- Identifies data deficiencies and uncertainties in species' status and threats;
- Increases public awareness about those species;
- Stimulates cooperative research efforts to obtain the information necessary to evaluate species status and threats; and,
- Fosters voluntary efforts to conserve the species before listing becomes warranted.

<http://www.nmfs.noaa.gov/pr/species/concern/>

## ⌘ Use of applicable Frameworks



Source : [www.youtube.com](http://www.youtube.com)

### 1.1.10 **CONTEMPORARY ISSUES IN MARINE RESOURCES**

- ☒ **Climate Change** – global warming changes sea temperatures.
- ☒ **Exploitation of Resources** – overfishing, etc.
- ☒ **Population Increase** – increase in exploitation of resources.
- ☒ **Pollution** – endangers marine species.

### 1.1.11 **FUTURE OF MARINE RESOURCES**

- A. Use of modern technology for sustainable fishery.
- B. Allow for stock replenishment.
- C. Use of alternative sources of food and diet.

#### ⌘ **ACTIVITIES** - RESEARCH – INTERNET - INDIVIDUAL

*Research on the factors which contribute to the exploitation of marine resources. Students are to identify ways of minimizing these factors and enhance marine conservation. Compile a one page report.*

#### ⌘ **ACTIVITY** - SPEECH - PAIRS

*Students are to be allocated into groups of threes. Each group is to write up a speech based on one contemporary issue in marine resources and how it affects the fisheries in either of the theme countries. Each speech should not be more than three minutes long. Scripts are to be submitted for class resource.*

#### ⌘ **ACTIVITY** - RESEARCH - GROUPWORK

*Students are to visit the local fisheries departments and/or organizations and gather information on contemporary issues in marine resources and possible plans for the future of marine resources. Each group is to compile a report. This would be assessed and can be retained as a subject resource*

**\*\*\*THE END\*\*\***

# **APPENDIX**

## **1.0 Population - List of Terms**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aging Population<br>Asylum Seekers<br>Birth Rate<br>Carrying capacity<br>Census<br>Central Place Theory<br>Chawl<br>Circular and cumulative causation model<br>Cohort<br>Commuters<br>Compulsory migration<br>Cosmic City<br>Counter-urbanisation<br>Decentralization<br>Demographic Transition Model<br>Demographer<br>Demography<br>Dispersed settlement<br>Doubling Time<br>Ecumene<br>External migration<br>Fecundity<br>Fire wheel settlement<br>Gated community<br>Gentrification<br>Ghetto<br>Grand axis settlement<br>Hamlet | High income residential<br>Hinterland<br>Internal migration<br>Linear settlement<br>Low cost housing<br>Middle income residential<br>Millionaire City<br>Mortality<br>Natality<br>Natural Decrease<br>Natural Increase<br>Nucleated settlement<br>Optimum population<br>Population<br>Population change<br>Population control<br>Population density<br>Population displosion<br>Population distribution<br>Population explosion<br>Population implosion<br>Population pyramid<br>Poverty<br>Primate City<br>Pull Factors<br>Push Factors<br>Refugee<br>Replacement Rate<br>Rural settlement<br>Self-help housing<br>Settlement | Slum<br>Squatters<br>Squatter settlement<br>Urban blight<br>Urban drift<br>Urban renewal<br>Urban sprawl<br>Urbanisation<br>Voluntary migration<br>Zero population growth |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 2.0 **Tourism** - List of Term

|                     |                         |                        |
|---------------------|-------------------------|------------------------|
| Accessibility       | Gateway City            | Port of entry          |
| Accommodation       | Heritage                | Recreation             |
| Affordability       | Historic tourism        | Resort                 |
| Attraction          | Homestays               | Short haul market      |
| Attraction site     | Inclusive Tour          | Sight seeing           |
| Adventure tourism   | International tourist   | Souvenir               |
| Authentic Culture   | Itinerary               | Stop-over tourist      |
| Backpacker          | Leisure tourism         | Sustainable tourism    |
| Benchmark           | Long Haul Market        | Tour operator          |
| Controlled tourism  | Land-based activities   | Travel agent           |
| Cruise liners       | Leakage in tourism      | Tourism                |
| Cultural Tourism    | Market oriented pricing | Tourism investment     |
| Culture             | Market segmentation     | Tourist                |
| Customs             | Mass tourism            | Transit visa           |
| Day Visitor         | MICE                    | Visa                   |
| Departure Tax       | Meet and greet          | Water-based activities |
| Deregulation        | Motel                   | World Heritage Site    |
| Destination         | Multiplier effect       |                        |
| Destination tourist | Nature tourism          |                        |
| Domestic Tourism    | Outbound tour           |                        |
| Dwell Time          | Package tour            |                        |
| Ecotourism          | Passport                |                        |
| Globalisation       | Peak season             |                        |

# 3.0 Agriculture - List of Terms

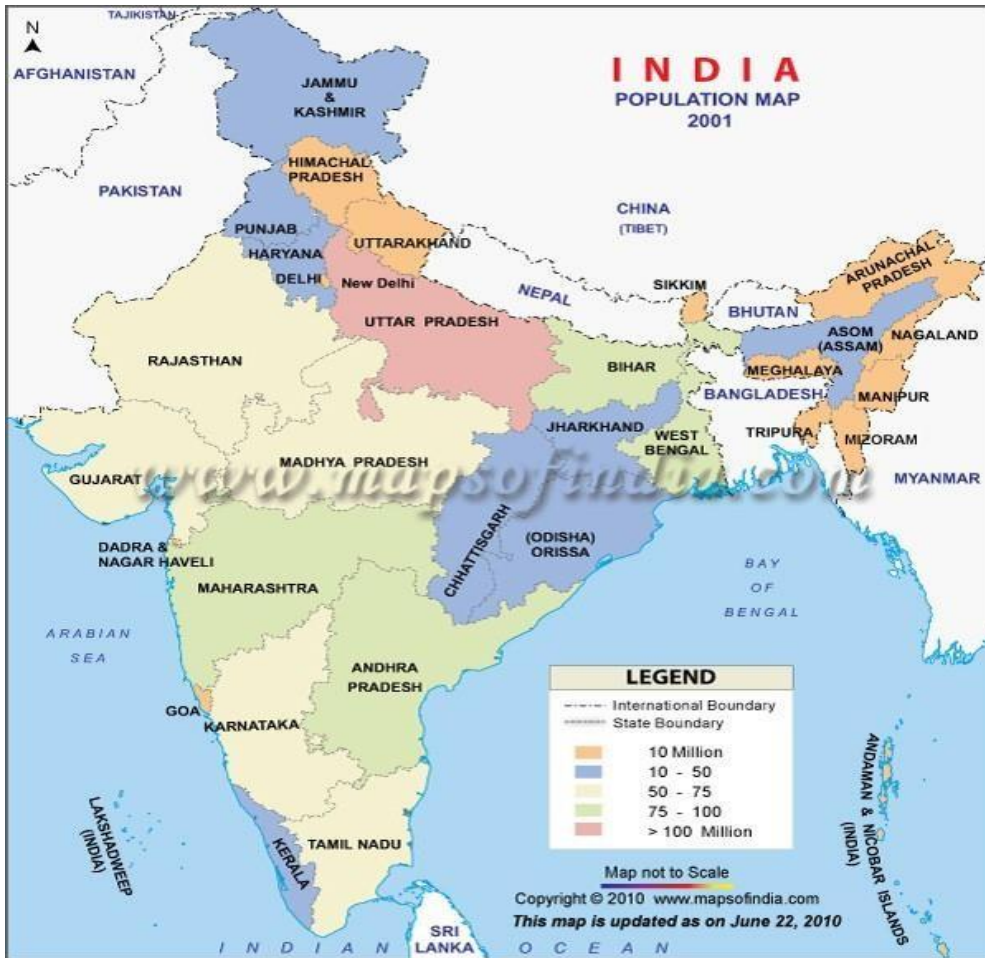
|                              |                            |
|------------------------------|----------------------------|
| Aerial topdressing           | Crop rotation              |
| Agribusiness                 | Crop irrigation            |
| Agriculture                  | Dairying                   |
| Agricultural diversification | Extensive agriculture      |
| Agricultural intensification | Extensive pastoralism      |
| Agroforestry                 | Farming                    |
| Agronomy                     | Food security              |
| Animal husbandry             | Food sustainability        |
| Arable land                  | Fertilizer                 |
| Artificial Insemination      | Fine wool                  |
| Alluvial soil                | Fodder crops               |
| Angiosperm                   | Genetically Modified Crops |
| Beef cattle                  | Green house                |
| Blue revolution              | Green revolution           |
| Bovine                       | Hay                        |
| Break feeding                | Herbicide                  |
| Composting                   | Herd testing               |
| Containerization             | Horticulture               |
| Capital intensive            | Hybrid                     |
| Clone                        |                            |
| Commercial agriculture       |                            |

|                         |  |
|-------------------------|--|
| Hydroponics             |  |
| Insecticide             |  |
| Land tenure system      |  |
| Labor intensive         |  |
| Mixed farming           |  |
| Mulching                |  |
| Pasture                 |  |
| Permaculture            |  |
| Pesticide               |  |
| Polyculture             |  |
| Poultry                 |  |
| Prime lambs             |  |
| Quota                   |  |
| Rotational grazing      |  |
| Share milking           |  |
| Shifting cultivation    |  |
| Silage                  |  |
| Store sheep             |  |
| Store beef              |  |
| Subsistence agriculture |  |
| Terrace farming         |  |
| Tramplng                |  |

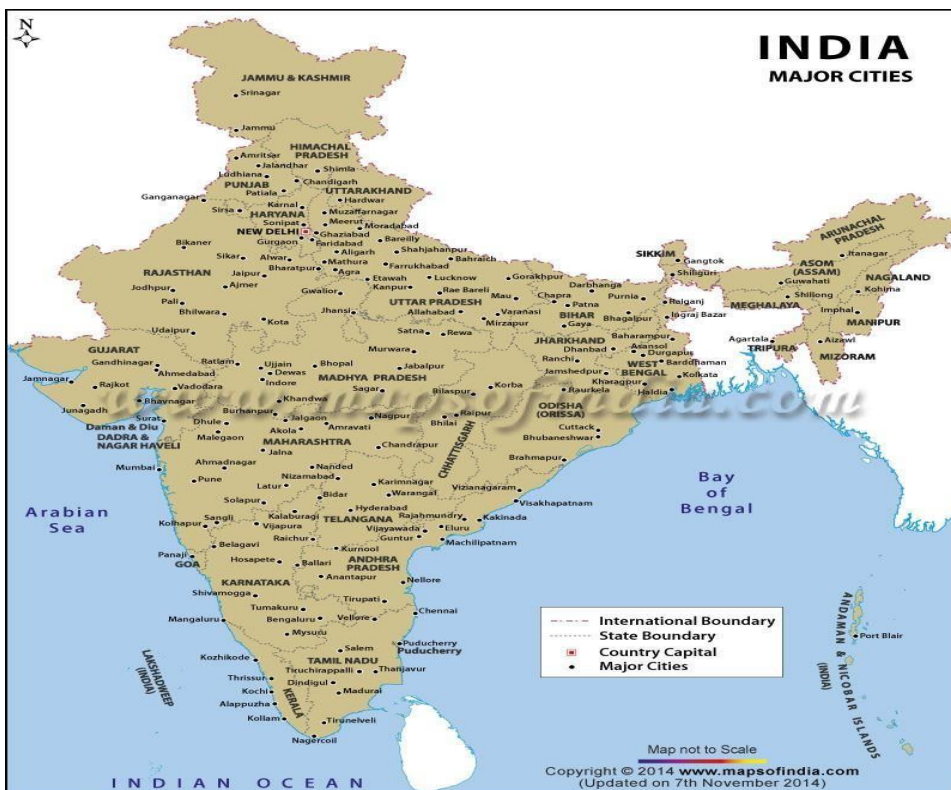
## 4.0 Marine Resources - List of Terms

|                     |                              |                           |
|---------------------|------------------------------|---------------------------|
| Aquaculture         | Estuaries                    | Maximum Sustainable Yield |
| Archipelagic State  | Eutrophication               | Molluscs                  |
| Archipelagic waters | Extinction                   | Moratorium                |
| Artisanal fishing   | Fish stock                   | Mud flats                 |
| Atolls              | Fishery                      | Oceans                    |
| Barrier Reef        | Fishing operation            | Ocean currents            |
| Baseline            | Fishing Aggregate Devices    | Pelagic species           |
| Benthic             | Fringing Reef                | Pole and Line             |
| Brackish water      | Gill Nets                    | Polyp                     |
| By-catch            | GPS                          | Purse Seine               |
| Carnivore           | Herbivore                    | Quota                     |
| Commercial Fishing  | High seas                    | Radar                     |
| Contiguous Zone     | Innocent passage             | Seagrass                  |
| Continental shelf   | Internal waters              | Seaweed                   |
| Continental margin  | Long Line fishing            | Sonar                     |
| Coral reef          | Lagoon                       | Spawning                  |
| Crustaceans         | Law of the sea               | Subsistence Fishing       |
| Demersal species    | Landlocked state             | Target species            |
| Down-welling        | Mangrove                     | Territorial waters        |
| Driftnet            | Mariculture                  | Tide                      |
| Echinoderms         | Marine environment           | Transit passage           |
| EEZ                 | Marine Protected Area        | Trawling /Trolling        |
|                     | Marine resource conservation | Trenches                  |
|                     |                              | Upwelling                 |

## 5.0 Map of India - Population

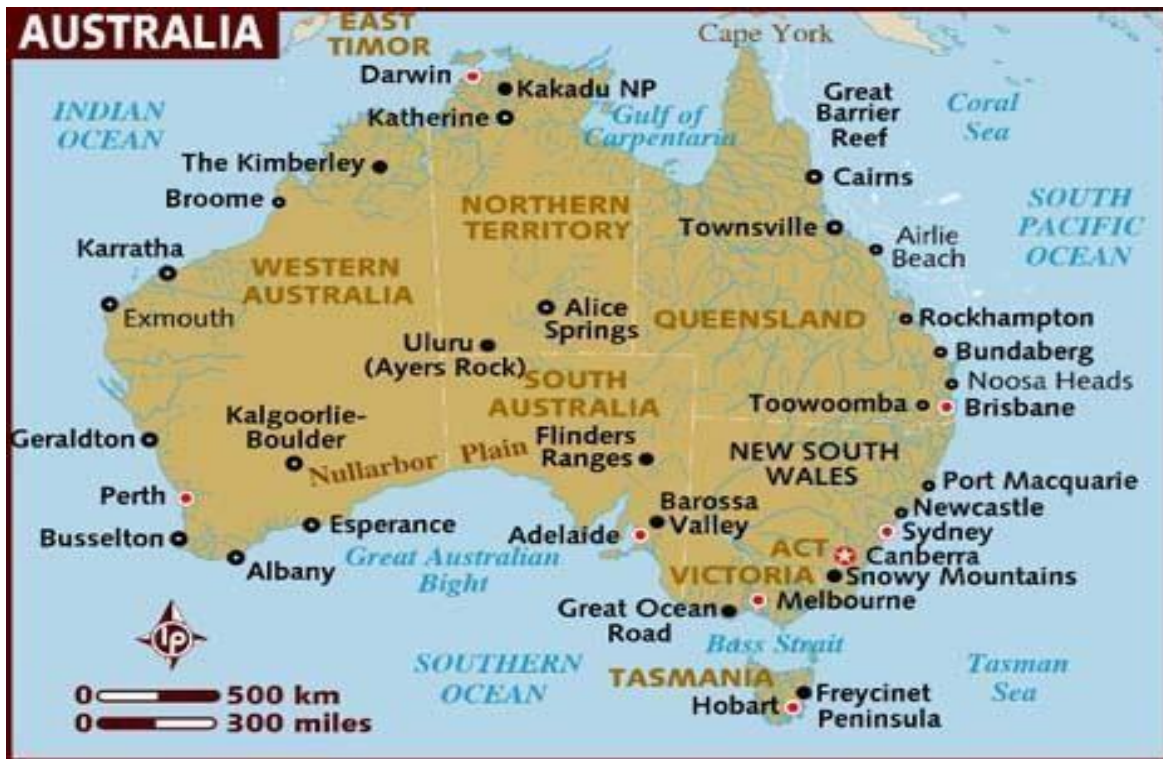


<http://www.mapsofindia.com/maps/india/population.htm>



<http://www.mapsofindia.com/maps/cities/india-map-with-cities.html>

## 6.0 Map of Australia – Tourism



<http://www.lonelyplanet.com/maps/pacific/australia/>



Opera House



Great Barrier Reef



Uluru



Sydney Harbour Bridge



Blue Mountains



Kakadu National Park



Fraser Island



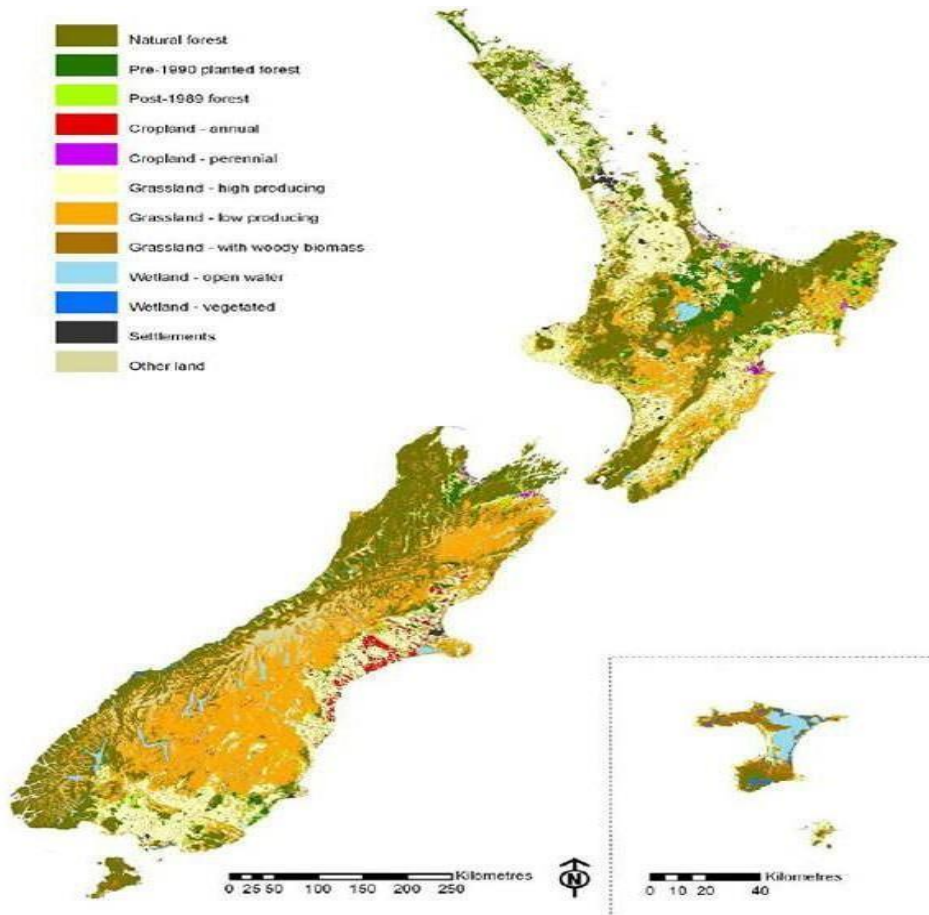
Daintree National Park



Bondi Beach

<http://www.planetware.com/tourist-attractions/australia-aus.htm>

## 7.0 Map of New Zealand - Agriculture



<http://www.mfe.govt.nz/publications/climate-change/new-zealand%E2%80%99s>



<https://www.google.com/search?q=map+of+major+cities+in+new+zealand&client=firefox-a&rls=org.mozilla:>

## 8.0 Map of Japan – Marine Resource



<https://www.google.com/search?q=map+of+japan&client=firefox-a&hs=lp6&rls=org.mozilla:en-US:official>



Fishing Fleet



Fishing Operation



Fish Treatment



Fish Sales



Fish Packaging



Whale Fishing

[http://search.tb.ask.com/search/AJimage.jhtml?pn=1&queryTerm=Fishing\\_industry\\_in\\_Japan](http://search.tb.ask.com/search/AJimage.jhtml?pn=1&queryTerm=Fishing_industry_in_Japan)