PRELIMS QUESTIONS

Q1. Usually, high biodiversity is witnessed in Ecotones. This is because

1. Ecotone is a junction between two or more diverse ecosystems.

2. An ecotone has the highest primary productivity amongst all ecosystems.

Which of the above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) None

Answer: (A)

Explanation:

Because an ecotone is a zone in which two communities integrate, many different forms of life have to live together and compete for space. Therefore, an ecotone can create a diverse ecosystem. So, the ecotone contains not only species common to the communities on both sides; it may also include several highly adaptable species that tend to colonize such transitional areas Ecotones may display edge effect where the population density of some species is more in ecotone than adjoining communities. If different species can survive in both communities of the two biomes, then the ecotone is considered to have species richness that may be greater than adjoining communities. Statement 2: It is not necessarily true. E.g. an ecotone with desert and lake junction will not have higher productivity than an estuary ecosystem.

Q2. Regarding a Biotope, consider the following statements.

1. It is an ecological area that is usually larger than an ecosystem.

2. It is a common practice to isolate biotopes from each other for niche biodiversity propagation.

Which of the above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) None

Answer: (D)

Explanation:

Statement 1: It is an ecological area that supports a particular range of biological communities. Biotope is almost synonymous with the term habitat. A biotope is generally not considered to be a large-scale phenomenon. For example, a biotope might be a neighbouring park, a back garden, even potted plants or a fish tank on a porch. In other words, the biotope is not macroscopic but a microscopic approach to preserving the ecosystem and biological diversity.

Statement 2: It is commonly emphasised that biotopes should not be isolated. Instead, biotopes need to be connected and other surrounding life for without these connections to life-forms such as animals and plants, biotopes would not effectively work as a place in which diverse organisms live. So one of the most effective strategies for regenerating biotopes is to plan a stretch of biotopes, not just a point where animals and plants come and go. (Such an organic traffic course is called a corridor.

Q3. What do you understand by Ecological footprint?

(a) Non-monetary assessment of ecosystem integrity, health or resilience

(b) The way in which ecological agents reveal their preferences through ecological activity

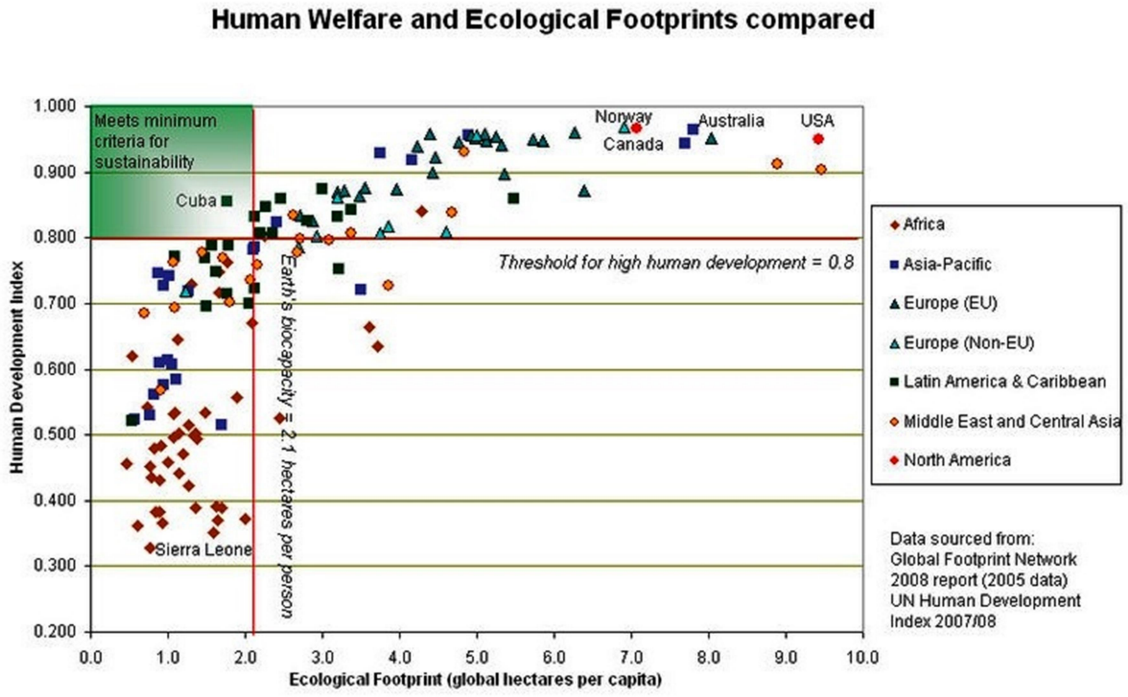
(c) A degree of impairment to an ecosystem, which when surpassed is too severe to allow recovery of that ecosystem

(d) An index of the area of a productive ecosystem required to produce the resources used and to assimilate the wastes produced by a defined population

Answer: (D)

Explanation:

As per the Millennium Eco Assessment it is an index of the area of productive land and aquatic ecosystems required to produce the resources used and to assimilate the wastes produced by a defined population at a specified material standard of living, wherever on Earth that land may be located. Ecological footprint analysis is widely used around the Earth in support of sustainability assessments. It can be used to measure and manage the use of resources throughout the economy and explore the sustainability of individual lifestyles, goods and services, organizations, industry sectors, neighbourhoods, cities, regions and nations. In 2013, the Global Footprint Network estimated the global ecological footprint as 1.6 planet Earths. This means that, according to their calculations, the planet's ecological services were being used 1.6 times faster than they were being renewed.



Q4. Depending upon the amount of net primary productivity the various ecosystems can be arranged in a decreasing sequence of yield. Which of these is the correct order?

(a) Tropical seasonal forest – Tropical rain forest – Temperate Grassland – Woodland and Shrubland.

(b) Tropical seasonal forest – Tropical rain forest – Woodland and Shrubland – Temperate Grassland

(c) Tropical rain forest – Temperate Grassland – Woodland and Shrubland – Tropical seasonal forest.

(d) Tropical rain forest – Tropical seasonal forest – Woodland and Shrubland – Temperate Grassland.

Answer: (D)

Explanation:

The order can be logically arrived at by elimination. Tropical rain forests receive overall more rainfall than seasonal forests and grasslands. So, (a) and (b) are eliminated. Also, a forest will certainly be more productive than grassland. So, (c) is also eliminated. The correct answer will be (d).

Q5. What symbiotic relationship is exemplified by lichens?

(a) Algae provides shelter, water and minerals; and the fungus provides food

(b) Fungus provides shelter, water and minerals; and algae provide food

(c) Fungus provides minerals and bacteria provides decayed matter fungi

(d) Bacteria protects against parasites, and algae provide food

Answer: (B)

Explanation:

Lichens are composite, symbiotic organisms made up of members of as many as three kingdoms. The dominant partner is a fungus. Fungi are incapable of making their food. They usually provide for themselves as parasites or decomposers. The lichen fungi cultivate partners that manufacture food by photosynthesis. Sometimes the partners are algae, other times cyanobacteria, formerly called blue-green algae. Some enterprising fungi exploit both at once. Lichens occur from sea level to high alpine elevations, in a very wide range of environmental conditions, and can grow on almost any surface.

Q6. If there are more number of Ecotones

1. There will be more number of eco transition zones
2. There will be greater species diversity

Which of the above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) None

Answer: (C)

Explanation:

A more diverse ecosystem is more stable, remember this as the golden rule. If there is less evenness among species, there will be greater diversity. If there are more number of Ecotones, there will be a lot of transition zones (e.g. ponds, grasslands etc), and there will be greater species diversity and inter-dependence. Finally, if less number of species dominate, it is good for the ecosystem diversity even more.

Q7. Which of these are non-biodegradable materials?

1. Cotton cloth
2. Ball-point pen refills
3. Glass objects
4. Silver Foil

Select the correct answer using the codes below.

(a) 1, 2 and 3 only

(b) 2 and 3 only

(c) 2, 3 and 4 only

(d) 1 and 4 only

Answer: (C)

Explanation:

The waste materials which cannot be broken down into non-poisonous or harmless substances in nature are called non-biodegradable waste. Examples are plastics, polythene bags, ball-point pen refills, synthetic fibres, and glass objects, metal articles like aluminium cans, iron nails, silver foil and radioactive wastes. Cotton cloth, paper, woollen clothes, wood etc. are bio-degradable.

Q8. Among the following, the largest population is likely to be found in

(a) Community

(b) Ecosystem

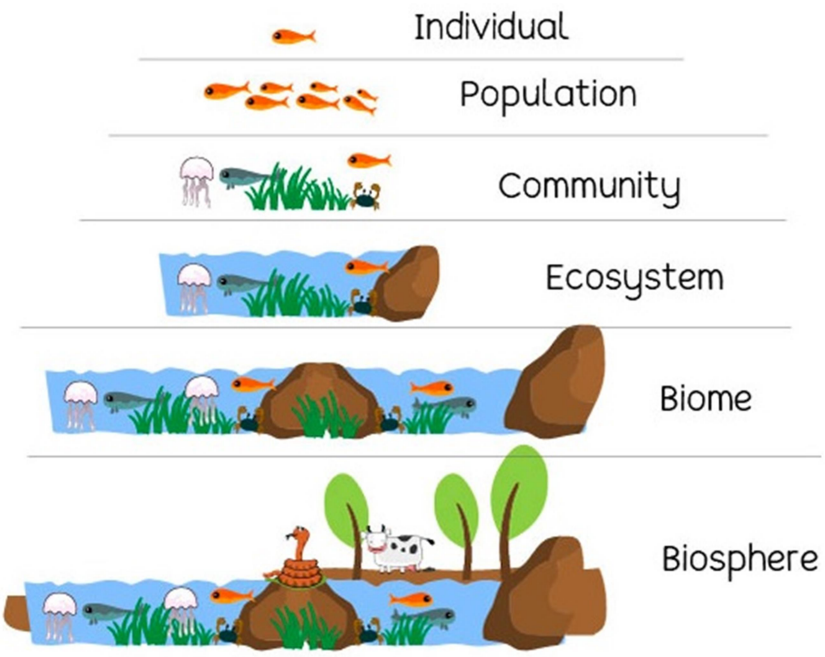
(c) Biome

(d) Biosphere

Answer: (D)

Explanation:

In the diagram below, several levels of an ecosystem have been given.



Levels of organisation in an ecosystem

Q9. The 'Ecosystem approach' relies on:

1. Integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way
2. Adopting completely organic and natural methods, bypassing anthropogenic scientific methodologies focused on levels of biological organization harnessing the mutual synergy

Which of the above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) None

Answer: (A)

Explanation:

As described by the Conference of the Parties to the CBD, the ecosystem approach is the primary framework for action under the Convention. "Ecosystem" means a dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit". It is a holistic approach to conservation. It is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems.

Q10. Regarding Ecological value, consider the following statements.

1. It is a Monetary Assessment of minimum requirements for Ecosystem Service Provision.
2. It includes an Assessment of Ecosystem Integrity, Health and Resilience.
3. It accrues to both Humans and Non-humans.

Select the correct answer using the codes below.

(a) 1 only

(b) 1 and 2 only

(c) 1, 2 and 3

(d) 2 and 3 only

Answer: (D)

Explanation:

Ecological Value is a **non-monetary** assessment of Ecosystem Integrity, Health, or Resilience, all of which are important indicators to determine critical thresholds and minimum requirements for ecosystem service provision. Essentially, it is the worth attributed to an organism, ecosystem, product, resource or activity, in terms of benefits to the environment. It is non-monetary because the value of Ecology is evaluated in terms of its intrinsic value as a part of the earth, and not because it provides secondary benefits that can be capitalized by humans. E.g. the value of pollination by bees can hardly be measured monetarily and is beneficial to both humans and non-humans.

Q11. Consider the following statements.

Assertion (A): Native Ecosystems that have undergone human-induced disturbance are often more Prone to Alien Invasions than Undisturbed Ecosystems.

Reason (R): Ecosystems, invaded by Alien Species, may not have the Natural Predators and Competitors present in their Native Environment that would Normally Control their Populations.

In the context of the above, which of these is correct?

(a) A is correct, and R is an appropriate explanation of A.

(b) A is correct, but R is not an appropriate explanation of A.

(c) A is correct, but R is incorrect.

(d) Both A and R are incorrect.

Answer: (B)

Explanation:

Invasive Alien Species (IAS) are species whose introduction and/or spread outside their natural past or present distribution threatens biological diversity. For a species to become invasive, it must successfully out-compete native organisms, spread through its new environment, increase population density and harm ecosystems in its introduced range. To summarize, for an alien species to become invasive, it must arrive, survive and thrive. Native ecosystems that have undergone human-induced disturbance are often more prone to alien invasions because there is less competition from native species. So, A is correct, but R does not explain it because it does not take into account the context of human intervention. For example, imported red fire ants (Solenopsis Invicta Buren) are more successful in establishing themselves in disturbed areas such as roadsides and agricultural fields and rarely colonize intact closed forests.

Learning: Invasive alien species occur in all taxonomic groups, including animals, plants, fungi and microorganisms, and can affect all types of ecosystems. Common characteristics of IAS include rapid reproduction and growth, high dispersal ability, phenotypic plasticity (ability to adapt physiologically to new conditions), and ability to survive on various food types and in a wide range of environmental conditions. A good predictor of invasiveness is whether a species has successfully or unsuccessfully

invaded elsewhere. Islands are especially vulnerable to IAS because they are naturally isolated from strong competitors and predators. Islands often have ecological niches that have not been filled because of the distance from colonizing populations, increasing the probability of successful invasions.

Q12. What is Land Footprint in Ecology?

(a) Area of land that is used to grow feed for animals within a country

(b) The proportion of built-up land as against the unused land

(c) The percentage of land to grow crops to the non-cropland

(d) Amount of land that is needed to produce a product by an organization or a nation

Answer: (D)

Explanation:

Land footprint is a consumption-based indicator, i.e. it looks at the resources needed to create a final product, or by an organisation or country, wherever they are in the world. An ecological footprint is measured using a different approach, with two key differences to land footprint: Ecological footprint adds together both real land use and a calculated (but not existing) area of forest to absorb CO2 emissions, to incorporate part of the impacts of climate change. In contrast, land footprint looks only at real land use and is often used in association with a carbon footprint to cover all climate-changing emissions Ecological footprint adjusts land areas to global hectares, while land a footprint is based on real land area or an estimate of it

Q13. The philosophy of Environmentalism advocates that

1. One should learn to live in harmony with the rhythms of the ecosystem
2. Humans should not manipulate the natural environment to serve their immediate interests
3. There is no way Humans can preserve or restore nature to its undisturbed form

Select the correct answer using the codes below.

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1 only

Answer: (A)

Explanation:

S1 and 2: Environmentalists maintain that human beings should learn to live in Harmony with the Rhythms of the Ecosystem and not Manipulate the Natural Environment to serve their immediate interests. They believe that mankind is using up and destroying natural resources to such an extent that we will bequeath only barren earth, poisoned rivers and polluted air to future generations. The roots of environmentalism can be traced back to the nineteenth-century revolt against industrialisation.

S3: It does not say that we cannot restore the Environment. It is an attempt to balance relations between humans and the various natural systems on which they depend in such a way that all the components are accorded a proper degree of sustainability.

Q14. Humus is least in which of the following soils?

(a) Laterite Soils

(b) Black Soil

(c) Alluvial Soil

(d) Soils of Temperate Forests

Answer: (A)

Explanation:

This is mainly due to the intense leaching of these soils by rainfall and high temperature. The thick brown or black substance that remains after most of the organic litter has decomposed is called humus. Earthworms often help mix humus with minerals in the soil. Humus contains many useful nutrients for healthy soil. One of the most important is nitrogen.

Q15. Decomposition of organic matter Its speed is determined by which of these major factors?

1. Soil Organisms
2. Temperature Conditions
3. Moisture Conditions
4. Quality of the Organic Matter

Select the correct answer using the codes below.

(a) 1 and 2 only

(b) 2, 3 and 4 only

(c) 3 and 4 only

(d) 1, 2, 3 and 4

Answer: (D)

Explanation:

It is largely a Biological Process that Occurs Naturally. High Temperature and High Moisture Aide the process of decomposition. In the decomposition process, different products are released: carbon dioxide (CO_2), energy, water, plant nutrients and resynthesized organic carbon compounds. **Learning:** Successive decomposition of dead material and modified organic matter results in the formation of a more complex organic matter called humus. This process is called humification. Humus affects soil properties. As it slowly decomposes, it colours the soil darker; increases soil aggregation and aggregate stability; increases the CEC (the ability to attract and retain nutrients); and contributes N, P and other nutrients. Soil organisms, including micro-organisms, use soil organic matter as food. As they break down the organic matter, any excess nutrients (N, P and S) are released into the soil in the forms that plants can use. This release process is called mineralization.

MAINS QUESTIONS

Q1. The impacts of climate change on ecosystem structure and function is real. What are the possible impact of change on ecosystems and what can be done to control it?

(10 Marks, 150 Words)

SNIPPETS

GOVERNMENT OF NATIONAL CAPITAL TERRITORY OF DELHI (AMENDMENT) BILL, 2021

The Ministry of Home Affairs (MHA) moved a Bill in the Lok Sabha in which it proposed that the "government" in the National Capital Territory of Delhi meant the Lieutenant-Governor of Delhi.

About:

- The Government of National Capital Territory of Delhi (Amendment) Bill, 2021 proposes to amend Sections 21, 24, 33 and 44 of the 1991 Act.
- Section 44 of the 1991 Act says that all executive actions of the L-G, whether taken on the advice of his Ministers or otherwise, shall be expressed to be taken in the name of the L-G.
- The Bill gives discretionary powers to the L-G even in matters where the Legislative Assembly of Delhi is empowered to make laws.
- The proposed legislation also seeks to ensure that the L-G is "necessarily granted an opportunity" to give her or his opinion before any decision taken by the Council of Ministers (or the Delhi Cabinet) is implemented.

Do you know?

- Delhi is a Union Territory with a legislature and it came into being in 1991 under Article 239AA of the Constitution inserted by the Constitution (Sixty-ninth Amendment) Act, 1991.
- As per the existing Act, the Legislative Assembly has the power to make laws in all matters except public order, police and land.

GREAT INDIAN BUSTARD

The Supreme Court intervened on behalf of the critically endangered Great Indian Bustards over the birds falling dead after colliding with power lines running through their dwindling natural habitats in Gujarat and Rajasthan.

About:

- **Scientific Name:** Ardeotis nigriceps.
- **Physical description:** Black crown on the forehead contrasting with the pale neck and head. The body is brownish and the wings are marked with black, brown and grey.
- **Diet:** They feed on grass seeds, insects like grasshoppers and beetles, and sometimes even small rodents and reptiles.

Distribution:

- India, effectively the only home of the bustards, now harbours less than 150 individuals in five States.
- Today, its population is confined mostly to Rajasthan and Gujarat. A small population also occur in Maharashtra, Karnataka and Andhra Pradesh.
- It is the state bird of Rajasthan.

Habitat:

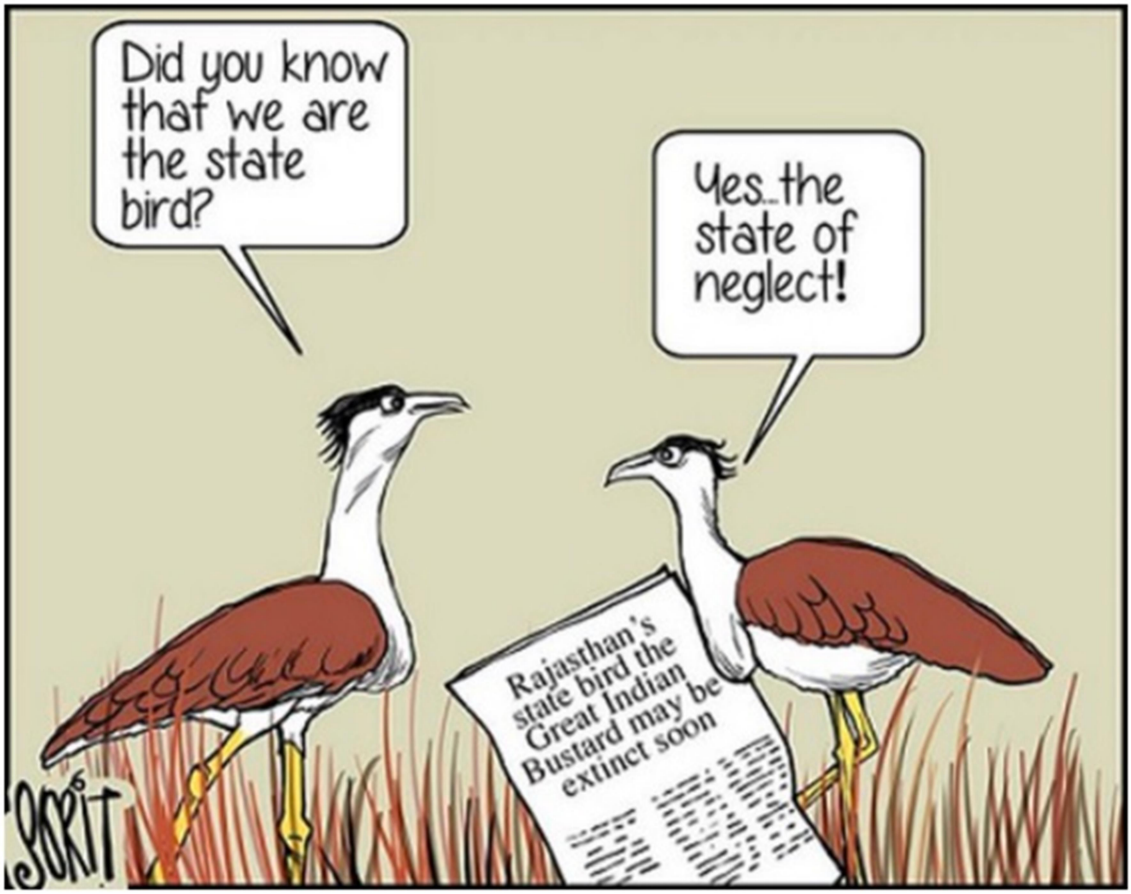
- Bustards generally favour flat open landscapes with minimal visual obstruction and disturbance, therefore adapt well in grasslands.
- They avoid grasses taller than themselves and dense scrub like thickets.

Conservation status:

- Listed in Schedule I of the Indian Wildlife (Protection)Act, 1972,
- Listed in Appendix I of CITES,
- Listed as Critically Endangered on the IUCN Red List.

Recent development:

- A Bench led by Chief Justice of India Sharad A. Bobde will examine on a priority basis whether overhead power cables can be replaced with underground ones to save one of the heaviest flying birds on the planet.
- The court found further that an alternative mechanism — to install flight bird diverters — to guide the birds away from the power lines would be expensive.



PROJECT RE-HAB

A pilot project launched in Kodagu, Karnataka entails installing bee boxes along the periphery of the forest and the villages with the belief that the elephants will not venture anywhere close to the bees and thus avoid transgressing into the human landscape. This idea stems from the elephants' proven fear of the bees.

About:

- An initiative of the Khadi and Village Industries Commission (KVIC), Project RE-HAB (Reducing Elephant-Human Attacks using Bees) intends to create "bee fences" to thwart elephant attacks in human habitations using honeybees.
- The pilot project was launched at four locations around Chelur village in the Kodagu district by KVIC. These spots are located on the periphery of the Nagarahole National Park and Tiger Reserve, a known conflict zone.
- Project RE-HAB is a sub-mission of the KVIC's National Honey Mission.
- Between 2015 and 2020, nearly 2,500 people have lost their lives in elephant attacks across India, of which 170 human fatalities have been reported in Karnataka alone, says the KVIC.

COMOROS

Indian Navy Ship Jalashwa arrived at the port of Anjouan in Comoros with one thousand metric tonnes of rice. This highlights the exemplary ties between India and Comoros within the framework of PM Modi's vision of SAGAR (Security and Growth for all in the Indian Ocean Region).

About:

- Comoros is an island country in the Indian Ocean.
- The Comoros is formed by Ngazidja (Grande Comore), Mwali (Mohéli) and Ndzuani (Anjouan), three major islands in the Comoros Archipelago, as well as many minor islets.
- The archipelago is situated in the Indian Ocean, in the Mozambique Channel, between the African coast (nearest to Mozambique and Tanzania) and Madagascar, with no land borders.
- Its capital and largest city are Moroni.
- As a member of the Arab League, it is the only country in the Arab world that is entirely in the Southern Hemisphere.
- It is also a member state of the African Union, the Organisation of Islamic Cooperation, and the Indian Ocean Commission.