ISSN: 2994-5569

Research Article

World Journal of Forest Research

"Global Coastal Environmental Management Master Plan", Embracing Environmental Mechanisms, for Protection, Care and Maintenance of our Planet

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Submitted: 2026, May 18 **Accepted:** 2026, Jun 23; **Published:** 2026, Jul 03

Citation: Kempton, R. (2026). "Global Coastal Environmental Management Master Plan", Embracing Environmental Mechanisms, for Protection, Care and Maintenance of our Planet. *World J Forest Res, 5*(2), 01-17.

Abstract

Two spheres of Influence embracing 'Earth's Environmental Mechanisms' are identified as the surface area, and the surrounding atmospheric elastic fluids which are devoid of boundary conditions within their circumferential mass, unlike set boundary conditions around the planet's surface.

A global atmospheric organizational plan proposes embracing Man's Science's 'Fluid Mechanics' to manage elastic fluids without boundary conditions, within Earth's Atmosphere. Legislation, must be continent based to regulate air pollution between land masses, enabling effective legal processes. The framework to be governed through Transitional Coastal Plan Zones of the five main Continents—two in the northern hemisphere and three in the southern hemisphere. The importance of the Coastal Transition Zone boundary conditions is paramount for anthropogenic reasons, to allow mankind to perceive a 'boundary state' tool able to monitor / record / control movement of elastic fluids in Earth's atmosphere, and the main continents may be used for part of a 'total environmental management plan'.

The concept for integrated Coastal Zone Management (ICZM) was first introduced at the national policy scale in the Coastal Zone Management Act (CZMA) enacted by the Congress of the United States in 1972. Master Plans for regional coastal management frameworks to be structured and developed around the world.

A 'Global Coastal Environmental Management Plan Model' is now required for our unique planet, to embrace, develop and manage several important tasks including, Global Atmospheric Pollution / Oceans Plastics Pollution / Ocean Total Renewable Energy facilities / Man's anthropogenic environmental mechanism named 'Climate Change', as well as the Beaches, Rivers & associated Agricultural Pollution and Coastal areas, identified under earlier Coastal Zone Management initiatives.

Keywords: Global Coastal Environmental Management, Atmospheric Elastic Fluids, Environmental Mechanisms, Coastal Transition Zones, Fluid Mechanics, Ocean Energy, New Environmental Legislation

1. Introduction

Earth's 'environmental balance mechanism' is defined within boundary conditions and founded on Man's perceived 'Laws of Science'. Earth's perceived system which embraces geology and chemistry pertains in part to the movement and transformation of chemical elements and their compounds between 'living organisms', known as the biogeochemical cycle, which involves 'fluxion' boundary conditions through anthropogenic boundaries and land matter conditions. A good example is photosynthesis .

The energy from the Sun heats the atmospheric matter, which rotates in unison with Earth and is responsible for creating the circulation of all 'elastic fluidised' matter. The curvature of Earth creates the variation of heat between the equator and the poles, producing two atmospheric (Hadley) cells; less dense air at the equator rises creating low pressure, and cold dense air falls at the poles.

The environmental mechanism on earth allows the air to rise at the equator and flow to the 30O latitudes, creating three cells for each hemisphere, namely, Hadley / Ferrel / Polar, Appendix 2 .

The fragmented progress of Air Pollution legislation has lacked structure and remains incomplete lacking any unified co-ordinated

directive from the global stage. It is now essential to restructure an intelligent approach towards setting out a structured framework for 'air pollution' controls founded around 'common but differential responsibility'.

The importance of the boundary condition, Coastal Transition Zone, is paramount for anthropogenic reasons, to allow mankind to perceive a boundary condition tool able to monitor / record / control the movement of elastic fluids in Earth's atmosphere, and the main continents may be used for this environmental management plan.

2. Environmental Mechanisms

2.1. Oceans' Surface, [70+%]

The Pacific and Atlantic Oceans appear not to mix due to differences in water density, salinity, and temperature, which create a visible boundary known as an oceanic front! This striking phenomenon is especially noticeable near Cape Horn, where the Pacific's Humboldt Current meets the Atlantic's Brazil Current. 29 May 2025.

The Indian Ocean is the warmest ocean in the world. Long-term ocean temperature records show a rapid, continuous warming in the Indian Ocean, at about 1.2 °C (34.2 °F) (compared to 0.7 °C (33.3 °F) for the warm pool region) during 1901–2012.

The Atlantic Water has the same salinity as Arctic Bottom Water but is much warmer (up to 3 °C [37 °F]). In fact, this water mass is warmer than the surface water and remains submerged only due to the role of salinity in density. This water mass is warmer than surface water and stays below only because its higher salinity increases density.

The Earth's Oceans are in perpetual motion, because of several natural based environmental mechanisms. This is Earth's natural 24/7 Energy and its analysis is beyond the scope of this paper . Temperature and salinity are two distinct characteristics of seawater that changes the density of the water, see Appendix 4 .

The Sun's energy is directly responsible for the stratification process to earth's oceans, which creates the environmental mechanisms to produce layers of transition boundaries through the ocean's depths, vital for all marine life, as we know and understand it . In Lakes and small bodies of water, the warm surface layer is less dense and forms a thermocline boundary condition, above which is the 'epilimnion', with the cooler water disconnected below as the 'hypolimnion'.

It is allegedly stated that it would take earth's environmental mechanisms over 1000 years to complete the oceans circulation of the planet .

2.2. Atmospheric Elastic Fluids

The earth 's rotation on a tilted axis, produces perpetual motion of the oceans in the southern hemisphere, while there is a greater land mass in the northern hemisphere.

This creates complex global weather patterns across the six cells around the planet.

The dynamic of combined mechanism switching between temperature and pressure, drives the movement of air masses, influencing weather patterns and climatic zones.

The atmospheric mechanisms also facilitate the distribution of moisture, shaping ecosystems and weather systems across the planet, including atmospheric pollution .

Anthropology defines the Coriolis effect, resulting from earth's rotation, as the pattern of deflection taken by objects not firmly connected to the ground as they travel long distances around earth, and which is responsible for many of the critical weather patterns. At the equator a maximum distance is travelled in one day, approaching 1,000 miles , while the distance travelled at the poles, approaches zero travel. In the northern hemisphere the motion is to the east, while in the southern hemisphere it is to the west. The build-up of trade winds and cyclones are examples of the Coriolis effect .

3. Global Coastal Environmental Management Transition Zone

Earth is a coastal planet. It comprises 361.13 million km2 of water (71% of total planet surface) and 148.94 million km2 of land area (29% of total planet surface).

The coastline of the world is so long that if we could stretch it, it would go 402 times around the equator. Furthermore, 84% of the countries of the world have a coastline either with the open oceans, inland seas or both .

A 'Global Coastal Environmental Management Structure Plan Model' is required, to combat 'Man's induced environmental mechanism, 'climate change', and other harmful anthropological effects, which cause serious harm to the footprints of the 'continental shelves, their margins', and the less saline coastal waters .

'Boundary zone' is the transition (separation) term for 'coast'. This definition strictly refers to that part of an island or continent that borders an ocean or its saltwater tributaries. Some authors refer to the coast as the "area where aquatic and terrestrial ecosystems interact" . A legal definition is given under UNCLOS, 'United Nations Convention on the Law of the Sea', Part VI, Continental Shelf, Articles 76- 85 , See Figure 1.

The concept for 'Integrated Coastal Zone Management' (ICZM) was first introduced at the national policy scale in the Coastal Zone Management Act (CZMA), enacted by the Congress of the United States in 1972. A Master Plan for global coastal management to be developed, which should embrace ecosystem-based management,

EBM, aimed at conserving and sustaining ecosystem services to benefit current and future human generations.

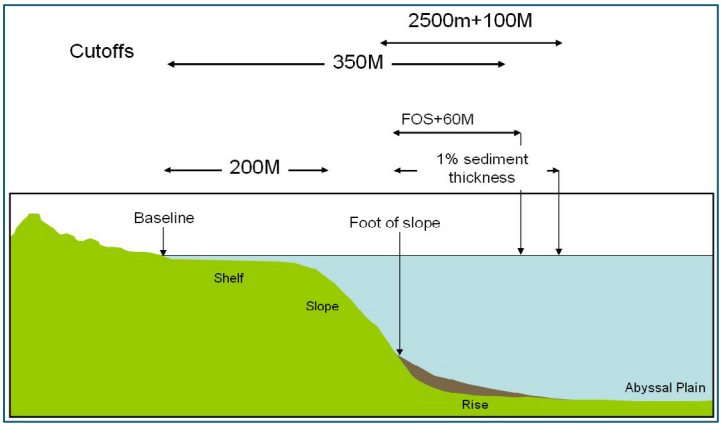
Sustainability and reliance to be considered with reference to: Independent World Commission on the Oceans (IWCO) workshop, which covers several Principles for Sustainable Governance of the Oceans, Example, earlier coastal disasters, such as the Indonesian Tsunami (2004) and Hurricanes Katrina and Rita (2005)

New International Laws must lead this approach to tackle climate change. It is important to embrace new legislation to the 'Regional High Seas', covering the agreement under UNCLOS, on 'Conservation and sustainable use of Marine Biological Diversity of areas beyond National Jurisdiction (BBNJ)', in force in January 2026.

A structured framework is necessary, embracing important limbs: Environment / Total Renewable Energy / multi-national Legislative regulatory powers, to embrace headings: coastal erosion, flooding, pollution (beach/rivers discharges), shoreline management (SMPs), ecology, habitats, climate change, coastal adaptation (linked to potential energy tidal projects). The Approach is to adopt 2 separate strategies embracing: Earth's, Surface / Atmosphere.

A. Example: In UK, Coastal resource management (CRM) is one of the major strategies to address the varied, wide-ranging and often interconnected issues that impact coastal areas. One such strategy around the UK coastal area is termed a Shoreline Management Plan (SMP), and England alone has twenty 89 SMPs.

B. A Global Atmospheric Structure Plan Organisation, founded on Earth's 5 main continents , is required to manage and control the atmosphere's elastic fluids spinning in unison with the planet.



UNCLOS, Article 76, Definition: Continental Margin Defined as, Continental Shelf / Continental Slope / Continental Rise. 200 Nautical Miles up to 350 nm Limits

Figure 1

It should be mentioned, the incompleteness of the environmental impact analysis (EIA) procedures needs expansive measures to action all areas of Vulnerability related to 'coastal management', to embrace the complete ecosystem of the International Coastal footprint embracing coastal waters.

4. Main Global Coastal Management Plan Tasks [(Coastal Resource Management (CRM)]: Global Atmospheric Pollution

A '*global atmospheric organizational plan'* proposes embracing Mans Science's Fluid Mechanics to record flow of elastic fluids without boundary conditions in Earth's atmosphere.

Legislation must be continent based to regulate air pollution between land masses, enabling effective legal processes. The framework to be governed through *transitional coastal plan zones of the five* main continents—two in the northern hemisphere and three in the southern hemisphere.

The earth's wind pattern forces change, North / South, at 30o and 60o latitudes along 'fronts', while rotational deflections travel great distances around East / West hemispheres in what is called the 'Coriolis' effect over the surface, spreading man's pollution. Careful global organization from all cultures is now urgently required .

A 'World Atmospheric Structure Plan' is required to measure, Earth's Atmosphere to monitor and record the movement of the globe's elastic fluid masses, and to be based on the planet's natural surface boundaries, namely the coastal regime.

Worldwide 'Coastal Zone Transition' configurations allow multiple scenarios to identify preferred boundary choices, while the globe's primary '*environmental mechanism'* (ocean current circulation) present a natural solution for the 'five Continents' scenario, two in the northern hemisphere and three in the southern hemisphere. The Oceans' *global circulation mechanism*, allied to the *unique separation* of the two southern hemisphere currents, concludes, Antarctica as a foundation Continent, under the stewardship of Australia / New Zealand.

4.1. Ocean Total Renewable Energy Capabilities

Total Renewable Energy capabilities are beyond the scope of this 'particular paper', except to mention that it belongs to the open research work gleaned from a Model for a '*UK Environmental Energy Master Plan*' prepared early in 2023, from which a trilogy of papers was published by 'SSRN' , in 2024

In 2025, a further paper identifies several additional Methodologies to harness Ocean Energy . *Reference Appendix* 8.

4.2. Oceans' Plastics Pollution

The 'Resolution adopted by the United Nations Environment Assembly' on 2 March 2022, to 'End plastic pollution' , recalled the United Nations Environment Assembly resolutions 1/6, 2/11, 3/7, 4/6, 4/7 and 4/9.

They affirmed the urgent need to strengthen global coordination, cooperation and governance to take immediate action towards the long-term elimination of plastic pollution in marine and other environments, and to avoid detriment from plastic pollution to ecosystems and the human activities dependent on them .

"The Intergovernmental Negotiating Committee to develop an internationally legally binding instrument on plastic pollution including the marine environment", noted with concern the high and rapidly increasing levels of plastic pollution.

Plastic accumulates in huge subtropical oceanic areas called gyres – massive circular currents that trap the floating plastic for decades, if not centuries.

There are five gyres in our oceans. The most polluted – and best-studied – is the infamous Great Pacific Garden Patch , located in the North Pacific Ocean, between Hawaii and California.

4.3. Man's Anthropogenic Environment Mechanism Termed ''Climate Change

Over a decade ago, the UK put into force the Climate Change Act (CCA) 2008 , setting targets for a reduction of Greenhouse Gases by 2050, to provide for a system of carbon budgeting for the purpose of limiting GHG from the atmosphere. The Act established 'The Committee on Climate Change' (CCC) to assist in 'carbon management', to monitor, advise and report with 'carbon budgets' and on 'monitoring / control' procedures towards the '2050 target' for reduction of GHG. *See Appendix 7 – History of Climate Change*.

Under general ancillary powers the committee may exercise its duties to take action to ensure it carries out its functions under the guidance of National Authorities and the Secretary of State. The British Standards Institute (BSI) fast tracked their Specification for 'Carbon management in Infrastructure' in May 2016, to enable accuracy, transparency, consistency, relevance and completeness of carbon management and GHG emissions quantification. The scope of PAS 2080 is about Carbon management as part of wider climate change mitigation; it is not about wider environmental or sustainability issues .

Under the specification the management of '*whole life carbon' in UK infrastructure is defined as embracing the 'transport', 'energy', 'water', 'waste" and 'communication' sectors* , and the management services covers the assessment, removal and reduction of GHG emissions measured as 'carbon dioxide equivalent', which relates and covers for the 6 gases quoted in the Kyoto protocol .

Responding to the fact that the built environment is responsible for most UK carbon emissions, it was updated in April 2023, retitled – '*Carbon Management in buildings and infrastructure* '. Its guidance was revised to set out how the sector can transition to net zero by 2050, by managing and reducing whole life carbon in buildings and infrastructure.

4.4. Main Shoreline Management Plans Tasks (CRM)

In 2017, the United Nations estimated that around 40% of the world's population, 2.4 billion people, live within 100 km of the coast, and 10%, 600 million people live at or below 10 masl . In 2019, and beyond, extreme wildfires, droughts, floods, and extreme rainfall events occurred worldwide, affecting many cities and settlements close to the coastlines.

Damaging and worsening anthropogenic conditions in coastal areas, now demands a Master Plan for a Global 'Coastal Management' framework embracing the main Continents. The Coastal footprint must include the *beaches, continental shelves*, their *slopes* and *margins*, **and the contiguous regional high seas.** *Environmental Impact Analysis tools, based on strategy plans and programmes, must target longer term stability over the next 100 years, to be linked to 'climate change'.*

The main shoreline management tasks embrace Beaches and comprehensive Pollution Control procedures, relating to Estuaries and Rivers discharges, into the Oceans.

Present UK water pollution control, and indeed Global legislation, remains fragmented, unclear, inefficient, and compounded by extremes relating to *agriculture pollution effects*, and discharging of poorly treated / untreated sewage, into rivers and their coastal areas.

The Water Framework Directive (WFD) regulatory controls, transposed in 2003 and updated in 2017 , focused target performance for member states to undertake to achieve 'good status' , whereas regulatory controls based on specification standards, to harness nutrient controls, appears to be the preferred choice for 'protecting the water, soil and air' . This is covered in (DEFRA) 'A Code of Good Agricultural Practice' in 2009.

After Brexit there was an opportunity for UK policy and regulatory control to give greater emphasis to specification and process standards, followed by performance targets, through a clearer programme of measures *for 'River Basin Management Plans' (RBMP) for nutrient control defined standard levels.* A comprehensive updated co-ordinated planned framework is

required to embrace the 'UK Implementation of the Nitrates Directive in England'. This, with the follow up 'Explanatory Memorandum' of NPPR 2008 and 'Consultation Guidance' , together with 'several important Nitrate Pollution Regulations' (NPPR 2016 , RPADPR 2018 , FW (EU Exit) R 2019).

Following exit from the EU, an approach to reference these important pieces of legislation in a 'reference Chart for environmental legislation towards an agricultural nutrient controls chart' is now a necessary task. This would create a useful reference tool, see, Appendix 9 . This coordinated structure plan approach requires as a starting point a particular 'environmental impact analysis tool mechanism for managing UK Water Pollution' which would embrace a UK Common Agricultural Policy (CAPUK), good agricultural and environmental conditions for UK farms (GAECUK) and to be a part of a suite of Impact Analysis reference books for adoption after Brexit. This must transition to the Global Environmental Coastal Plan.

5. Summary

5.1. Global 'Coastal Environmental Management Master Plan'

The principal tasks required to embrace, develop and manage the global Framework for regional coastal zones are Oceans Plastics Pollution / Atmospheric Pollution / Ocean Total Renewable Energy facilities / 'Climate Change' / Beaches / Rivers / Estuaries / Agricultural Pollution, together with a Master Framework for global regional Coastal Infrastructure.

5.2. A 'World Atmospheric Structure Plan' (WASP)

(WASP) to be set up to enable effective monitoring, recording and control procedures of the atmospheric pollution around the globe. This to identify pollution risks spreading beyond boundary demarcation borders for all regional zones / continents.

Region / Continent complete blanket cover to be adapted to identify regional unrest between neighbouring Countries and beyond, to track and contain unrest, and for effective Global control of atmospheric nuclear pollution across and beyond Continents.

5.3. Global Shoreline Management Framework

Important water pollution control measures are paramount to mitigate dangerous and poisonous increases of substances from Rivers and Estuaries discharges, into the World's Oceans.

A Worldwide structured framework needs to be given priority, to set out and restrict nutrient-controlled levels from poorly regulated global agricultural methods, embracing worldwide Nitrate pollution regulations for all Continents rivers and estuaries.

5.4. Oceans Plastic Pollution Waste Disposal Approach

A Worldwide recovery for all ocean plastic pollution needs urgent attention to tackle the five main oceanic Gyres. A global structured co-ordinate plan / programme to be developed to recover, collect, and transfer to a defined number of shoreline Plastic Waste Plants for storage / treatment / recycling.

The Great Pacific Garbage Patch located in the North Pacific would demand several such Plants located around this massive area. *Details of a global feasibility study are beyond the scope of this paper.*

5.5. New Environmental Legislation

Regional High Seas: Amendment to Article 76 of the '*United Nations Convention on the Law of the Seas'* of 10 December 1982, to modify the definition of the Continental Shelf, to include for the *Regional High Seas*, with an amendment to PART VII.
High Seas [Articles 86–120].

A New framework of Environmental regulations to be structured, to embrace Earth's particular 'environmental mechanisms', such as in the Paris Agreement, the legally binding international treaty for 'climate change' in 2015, and the earlier highly successful Montreal Protocol, which entered into force in 1989 and protected Earth's Ozone layer by phasing out chemicals that depleted it

5.6. Global Coastal Transition Zone for Near Future

The importance of the boundary condition, *Coastal Transition Zone*, is paramount for anthropogenic reasons, to allow mankind to perceive a *boundary condition tool* able to monitor / record / control the movement of *elastic fluids* in Earth's atmosphere, and the main continents may be used for this environmental management plan.

End Note: *This paper may be read in conjunction with the research paper titled:* ***" New Global Environmental Organization, to Head United Nations, and Embrace Present Failings and Shortcomings, for Protection, Care and Maintenance of our Planet.***[64]

Appendix 1 Photosynthesis

Facts Sheet

Subject: Photosynthesis

Carbon Dioxide + Water + ➡ (Sunlight) Sugar + Oxygen

$6CO_2 + 6H_2O = C_6H_{12}O_6 + 6O_2$

- The Photosynthesis process requires sunlight and low energy carbon dioxide.
- This releases oxygen and produces glyceraldehyde - 3- phosphate (GA3P)
- The carbohydrate molecules (high energy) converted into glucose
- These sugar molecules have the energised carbon needed by all living beings.

The photosynthesis process is multi-staged, based on a leaf structure comprising[65]:
Mesophyll *- the middle layer of several layers of cells.*
Stomata *- regulated openings (below the leaf)*
Chloroplast *- an organelle for the photosynthesis.*
Thylakoids *- stacks of disc shaped structures, within the chloroplast*
Chlorophyll *- embedded in the thylakoid membrane.*
Thylakoid lumen *- an internal space within the membrane.*
Granum *- is a stack of thylakoids*
Stroma *- liquid filled space around the stroma bed.*

Photosynthesis[66] is 2 distinct stages: the *light-dependent reactions* and the *light-independent reactions*. (The Calvin cycle)
The chemical energy collected in the 1st stage drives the assembly of sugar molecules from carbon dioxide.
The *light independent reactions* then temporarily store the energy using molecules as energy carriers. These carriers release energy and return for more energy.

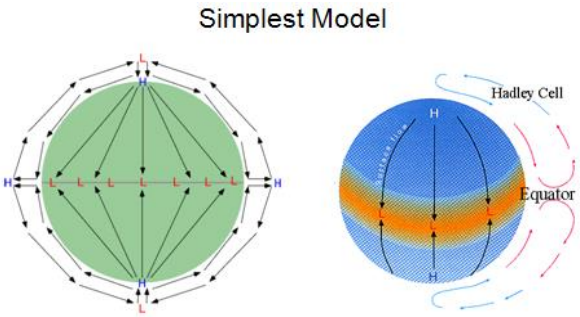
ATP + NADPH ATP + Pi + $NADP^+$
Adenosine triphosphate +Nicotinamide adenine dinucleotide phosphate

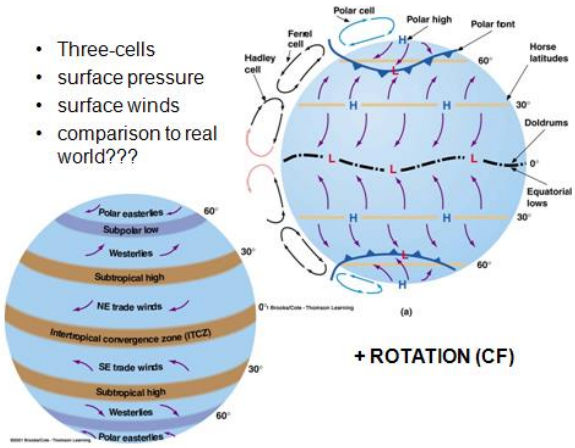
Adenosine triphosphate + inorganic phosphate (Pi) + Nicotinamide adenine dinucleotide phosphate

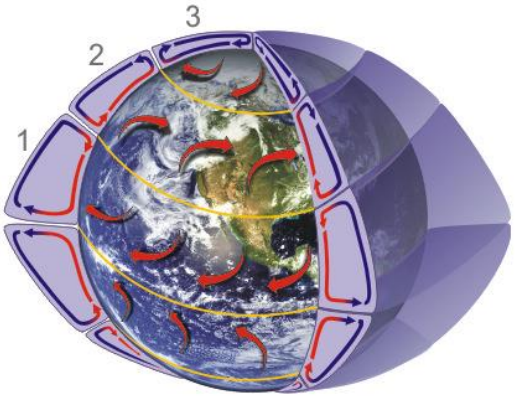
Summary statement:
→ Photosynthesis has transformed life on Earth.
→ By harness of energy from the Sun, the process evolved to allow living things to possess huge amounts of energy. Organisms called photoautotrophic, which require chlorophyll. This pigment absorbs portions of visible spectrum and captures energy from sunlight.
→ Eukaryotic autographs, plants and algae, have the organelles Chloroplasts = photosynthesis accumulates starch.
→ Prokaryotes, such as cyanobacteria altered process and occurs in folded membranes.

Plants and algae ➡ chloroplast organs ➡ photo synthesis ➡ starch

Appendix 2. Atmospheric Prevailing Winds[67]







Appendix 3

Facts Sheet

Subject: **Oceans Facts** **Date: March 2026**

T**he Pacific and Atlantic Oceans** appear not to mix due to differences in water density, salinity, and temperature, which create a visible boundary known as **an oceanic front**! This striking phenomenon is especially noticeable near Cape Horn, where the ***Pacific's Humboldt Current meets the Atlantic's Brazil Current***.[68] 29 May 2025

Quranic Verses: Surah Ar-Rahman 55:19-20: "He has let loose the two seas (the salt water and the sweet, meeting together); between them is a barrier which neither of them can pass".30 Nov 2024

The **Indian Ocean is the warmest ocean in the world**. Long-term ocean temperature records show a rapid, continuous warming in the Indian Ocean, at about 1.2 °C (34.2 °F) (compared to 0.7 °C (33.3 °F) for the warm pool region) during 1901–2012

Atlantic Water has the same salinity as Arctic Bottom Water but is much warmer (up to 3 °C [37 °F]). In fact, this water mass is warmer than the surface water and remains submerged only due to the role of salinity in density.
This water mass is warmer than surface water and stays below only because its higher salinity increases density.

The density of sea water, however, is influenced by both its **temperature and salinity.** Density increases as salinity increases and as temperature decreases.28 Mar 2023

Salinity is the dissolved salt content of a body of water. It is a strong contributor to conductivity and helps determine many aspects of the chemistry of natural waters and the biological processes within them.18 Dec 2025

The concentration of salt in seawater (its salinity) is **about 35 parts per thousand**; in other words, **about 3.5% of the weight of seawater comes from the dissolved salts.**

Pressure is the force per unit area exerted by a fluid, while **density** is the mass per unit volume of a substance. In general, pressure and density are directly proportional to each other, meaning that **as pressure increases, density also increases**,

Man's Perceived Science:
Bernoulli's principle is a key concept in fluid dynamics that relates **pressure, speed and height.** For example, for a fluid flowing horizontally, Bernoulli's principle states that an increase in the speed occurs simultaneously with a decrease in pressure.

The pascal (symbol: Pa) is the unit of pressure in the International System of Units (SI). It is also used to quantify internal pressure, stress, Young's modulus, and ultimate tensile strength. The unit, named after Blaise Pascal, is an SI coherent derived unit defined as one newton per square metre (N/m2).

When you add salt to the water, it dissolves and increases the amount of matter in the water without increasing its volume, causing the water's density to increase. With enough salt added to the water, the density of the water is greater than the egg , allowing the less dense egg to float. **Example: In the Dead Sea, Man's buoyancy mechanism could flip over without body self-restraint.**

Appendix 4
Earth's Environmental Mechanisms - Oceans Currents in perpetual motion

Facts Sheet

Subject: ***Earth's Environmental Mechanisms - Oceans Currents in perpetual motion.***
Thermohaline Circulation[70] is the slow but relentless ***driving mechanism*** creating *Ocean circulation*, supported by secondary mechanisms from the ***prevailing winds*** **and the** ***solar power*****.**

Temperature and **Salinity** are the two characteristics of seawater that changes the density of the water. Cold and salty water is denser than freshwater. Cold water will sink below warmer water, denoting a further mechanism.

It is allegedly stated that it *would take over 1000 years*[71] *to complete the oceans circulation mechanism.* Reference IPCC Smithsonian figure[72].

The importance *mechanism* of *Earth's poles* for Ocean circulation.

- Seawater freezes, it leaves salt.
- Remaining water becomes saltier, and denser.
- Increase salt lowers freezing temperatures.
- Highly salted water sinks below other seawater, *creating another mechanism*, known as ***downwelling***.
- This 'down-well' water pushes water along the depths / pulls water across the surface, creating a pump effect that creates movement to the ocean, providing the mechanism for the 'Ocean conveyor'.

Reference '*finger of death'*, known as *a 'brinicle'*[73]*.*
Ice formation in these immersed conditions create channels of **brine** (very salty water), colder than freezing, creates the mechanism for moving down through channels of ice, collects more salt with further cooling. In shallower areas brine reaches seabed, before warming / diluting and this environmental mechanism results in threat to small marine creatures (sea cucumbers etc).

Anthropologic Observation: Ocean circulation relies on cooling / sinking of water at earth's poles. As the greenhouse effect raises temperature, particularly at the poles, water no longer getting as cold. Results – less sea ice form – water has increase melt water dilution. Water getting less cold / less salty, resulting in surface water being marginally less dense, thus sink marginally less. This natural based condition is marginally slowing down the process; resulting in the question, **Is the Ocean circulation slowing down**[74]**?**

Test: Under above ocean circulation mechanism, identifying **'***older water'* would mean proof of *slowing circulation mechanism.*
Carbon-14 Isotope -a radioactive isotope of carbon could be utilised for this purpose. This is termed *carbon dating*.
Apparent Oxygen Utilisation: This principle is deep water cannot have oxygen added.
Noth Atlantic Deep Water formed in Arctic by cold, salty water sinking and flowing south, and in Southern Ocean meets another body of water, but does not mix.(Due to different densities of masses)
Antarctic Bottom Water formed at south pole, is coldest water / densest of all, termed powerhouse of Ocean circulation.
Keeping Earth's poles cool keeps our Ocean mass moving.

Appendix 5. Salinity

Facts Sheet

Salinity[75] is the dissolved salt content of a body of water. It is a strong contributor to conductivity and helps determine many aspects of the chemistry of natural waters and the biological processes within them. Salinity, along with temperature and pressure, helps govern physical characteristics of water such as density and heat capacity.

Dead Sea is the lowest waterbody on Earth, with the lowest elevation on land. The Dead Sea's water is about 10 times saltier than normal ocean water.13 Jan 2025

In a kilogram of water, there are 34.482 grams of dissolved salt that we call "salinity." The other 965 or so grams are freshwater. So, when we're talking about salinity, we're talking about the number at the bottom of the table: 34.482[76].

Big Idea[77]: *Seawater contains many dissolved substances, and these add mass to the water producing a greater mass per unit volume, or density, than that of pure water. The relationship between the density of a fluid, weight of an object, and buoyancy* ***is critical in understanding the ocean,*** *because* ***density has a direct influence on the way seawater,*** *and objects in seawater,* ***behave.***

Seawater has a higher density than fresh water. Seawater contains many dissolved substances, and these add mass to the water in which they are dissolved. This produces a greater mass per unit volume, or a density higher than that of pure water. *The amount of salts dissolved in water is known as salinity.* In waters, where large amounts of suspended sediments are present, the density also increases.

T*he relationship between density of fluid, weight of an object, and buoyancy is a basic concept in understanding the behaviour of seawater.* Students often have difficulty identifying the factors that influence whether an object sinks or floats in a liquid. When deciding whether an object sinks or floats, they consider the object's mass, or volume, instead of density. Different objects also have different densities, and depending on their relative densities to solutions, they will either sink or float.

Appendix 6 Ocean Plastics Pollution.

January 2025

Historical Information:

- Plastic was first developed in mid-19th Century as replacement for natural materials such as ivory and tortoiseshell.[78]
- 1st Synthetic plastic, called celluloid. – created by John Wesley 1869. First produce photographic film, later consumer products: combs, buttons, billiard balls, etc.
- Early 20th Century, invention Bakelite. This paved the way for mass production of plastic products.
- Plastic packaging became most visible use of plastic in our daily lives. Environmental Impact: Can take hundreds of years to decompose.
- Plastic in Food and Beverage Industry - keep food fresh and prevent spoilage.

Ocean Plastics – Useful information:

- Nearly half plastic sinks because of low buoyancy.
- Other half floats – majority does not go far out to sea. 80% beach on coastline within month.
- HDPE[79] likely to travel long distances.
- Plastic accumulates in huge subtropical oceanic areas called gyres. -massive circular currents that trap floating debris for decades.
- 5 gyres in our oceans. Great Pacific Garbe Patch(GPGP) , in North Pacific, between Hawaii & California. (Estimated twice size of Texas.)
- Around 100 million kilograms of plastic estimated in (GPGP)- 1.8 trillion pieces larger than 0.5 mm. About 8% of the mass is microplastics.

Microplastics are plastic pieces that measure less than five millimetres across. (Some microplastics have formed by breaking away from larger plastics that have fragmented over time. Others have been made small intentionally, for example cosmetic microbeads used in facial scrubs.)

Plastics. In the Ocean: https://noc.ac.uk/under-the-surface/ocean-plastics

Reference: Conventions & Assemblies:

United Nations Environment Assembly of the United Nations Environment Programme
UNEP/EA.5/Res.14
Distr.: General 7 March 2022

'Intergovernmental Negotiating Committee to develop an international legally binding instrument on plastic pollution, including in the marine environment'
1 December 2024
CHAIR'S TEXT1

Appendix 7 – History of Climate Change

The United Nations 1st Earth Summit in Stockholm

Conference on the Human Environment on 16th June 1972
Including the Stockholm Declaration and Action Plan for the Human Environment
embracing 26 Principles, placing environmental issues at forefront of international concerns.
United Nations Environmental Programme (UNEP)
is responsible for coordinating responses to environmental issues within the United Nations system.
established after UNIP in Stockholm in June 1972.

Brundtland Report

United Nations published 1987
Gro Harlem Brundtland, former Norwegian Prime Minister, Chair of World Commission on Environment and Development (WCED)
Sustainable development three fundamental pillars: **social, economic and environmental**

The Montreal Protocol

Agreement signed 1987 – entered into force 1989.
On Substances that Deplete the Ozone Layer
Global agreement to protect the Earth's ozone layer by phasing out the chemicals that Deplete it.
Incudes both production and consumption of ozone-depleting substances.

The United Nations Framework Convention on Climate Change. (UNFCCC)

Signed in some 153 Countries at the 2nd Earth Summit in Rio de Janeiro, Brazil in 1992, - 27 Principles.
Signed **Convention on Climate Change (CCC)** Articles 27 - (CBDR)], & **Convention on Biological Diversity (CBD),** endorsed Rio Declaration & Forest Principles, & adopted **Agenda 21**, for sustainable development.
Countries submit plans for climate action, **nationally determined contributions (NDCs) -** Paris Agreement (Article 4).
The **Commission on Sustainable Development (CSD)** to monitor and report on implementation of the **CBD** has two supplementary agreements: Cartagena Protocol & Nagoya Protocol (Biosafety – LMOs: governing movement of 'Living Modified Organisms').

The UNFCCC was formed in 1994.

To stabilise the greenhouse gas emissions and to protect the Earth from the threat of Climate Change.

Conference of the Parties (COP)

On Climate Change / Environmental Topics
Apex decision-making body of the UNFCCC
The first conference (COP 1) was held in 1995 in Berlin.

The Kyoto Protocol was adopted on 11 December 1997

Operationalises the UNFCCC
By committing industrial Countries and economies in transition to limit and reduce gases (GHG) emissions.
In accordance with agreed individual targets.
28 Articles / Annex A – CO_2/CH_4/N_20/HFCs/PFCs/SF_6 & Sectors & Source Categories / Annex B – Quantified emission limitation or reduction commitment.
Article 12 - Allows CERs **(Certified Emission reductions)** [equivalent: 1 tonne CO_2]

The Paris Agreement (2015)

Legally binding international treaty on climate change.
Adopted by 196 Countries at COP 21 in Paris, on 12th December 2015
Works on a 5-year cycle of increasingly ambitious climate action carried out by the Countries.
Adopted at COP21 to control 'green house gases' to 1.5^{O}C by 2030.

Appendix 8.) Ocean Methodologies. .

Information Sheet

12 September 2025

Subject: Additional Methodologies to harness Ocean Energy in the Regional High Seas[80].

Augmentation of present Methodologies to harness vast kinetic energy resources in the High Seas[81].

Proven performance of existing methodologies (Continental Shelf)
(1. La Rance[82] Tidal Power Station / 2. MayGen[83] Tidal Power Station)

1. *Tidal Range Projects* in coastal waters
Sihwa Lake Tidal Power Station is the world's largest tidal power installation, with a total power output capacity of 254 MW Megawatt. (When completed in 2011, it surpassed France's 240 MW La Rance Tidal Power Station, which was the world's largest for 45 years.) It is operated by the Koreen Water Resources Corporation.

2. *Tidal Stream Projects* in coastal waters
MayGen Tidal Energy Project, continues to break records, delivering over 37GWh of clean and predictable renewable energy[84].
"*In December 2024, the final turbine of the four turbines for Phase 1 were deployed, and therefore the site is now fully operational. This means that the site is delivering 6 MW of power*"[85].

3. Thermal energy – due to the temperature gradient between the sea surface and deepwater can be harnessed using different Ocean Thermal Energy Conversion (OTEC) processes.

4. Salinity Gradients: At the mouths of rivers, where fresh-water mixes with salt water, energy associated with the. Salinity gradient can be harnessed using pressure-retarded reverse osmosis process and associated conversion technologies.

Classification requirements for High Seas expected methodologies to harness Kinetic Energy resources in Oceans.

5. Epipelagic Zone (mixed layer) : *Ocean Passage collection projects* in regional high seas.
Reference 6.2.(i)

Mesopelagic Zone – restricted to transition zone for carbon sequestration.

6. Slope currents contiguous to continental shelves.[86]
Continental Slope Stream Projects.

5. Arctic Ocean[87] Deepwater current along Oceans' transition zone
Deep Stream Oceans Projects.

References:
Energy Act 2023. General reference: Schedule 16 – Mergers of energy network enterprises.
Reference, Part I - New Domestic Law, Patentability, Inventive step.

Appendix 9: UK Agricultural Pollution legislation controls reference chart

Protecting our Water, Soil and Air,* A Code of Good Agricultural Practice (DEFRA, 2009)**, Chapter 4 ***(Replaces 3 Codes - Water / Air / Soil)

Manure Management Plan: a step-by-step guide for farmers (DERA, 2003)

Water (Prevention of Pollution) (Code of Good Agricultural Practice) Order 2009, SI No.46

Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England) Regulations 2010 (SI 2010 No.639)

Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England) (Amendment) Regulations 2010 (SI 2010 No.*1091)*

***Explanatory* Memorandum (the SSAFO Regs)**

protection of waters against pollution caused by nitrates from agricultural sources. (91 /676/EEC).

Implementation of the Nitrates Directive in England
7th Report 2007-8
From Council Directive 91/676/EEC (OJ L375, 31.12.1991, P1)

↓

The Nitrate Pollution Prevention Regulations 2008 No. 2349

Explanatory Memorandum

↓

The Protection of Waters against Pollution from Agriculture - Consultation on Implementation of the Nitrates Directive of 2013 - 2016 (December 2011)

Fulfils Defra's obligations under the Directives to carry out a **review every 4 years** of its designations of Nitrate Vulnerable Zones **(NVZs)**

Guidance on complying with the Rules for Nitrate Vulnerable Zones for 2013 to 2016

↓

Nitrate Pollution Prevention Regulations 2015, (SI 2015 No.668)

↓

Nitrate Pollution Prevention (Amendment) (No.2) Regulations 2016 (SI 2016 No.1254)

↓

Environmental Permitting (England and Wales) Regulations 2010 SI No. 675
Environmental Permitting (England and Wales) Regulations 2016 SI 1154
Regs 12, 38-41, 44 and Schedule 21

↓

Reduction and Prevention of Agricultural Diffuse Pollution (England) Regulations 2018 (SI 2018 No 151)

Explanatory Memorandum (enforced by EA)

↓

Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 (SI 2019 No.558)

Regs 13 &16 cover and amend SI 2010 No.1091 / NPPR 2015

Reg 4 amends s93 WRA 1991, to ensure it's 'fit for purpose".

review every 4 years begins on 1st January 2016

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