



Teal Carbon Study at Keoladeo National Park

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Why in News?

Recently, India's first study on '**teal carbon**' was undertaken at [Keoladeo National Park \(KNP\)](#) in Rajasthan's Bharatpur district.

- Research has **found elevated methane emissions**, leading to a recommendation to use specialized **biochar to reduce these levels**.
- It highlighted the importance of **wetland conservation** in addressing climate adaptation and resilience challenges. The pilot project aimed to develop [nature-based solutions](#) to address climate change.

Note:

- [Biochar](#) is a **carbon-rich material** that enhances soil fertility, water retention, and crop productivity.
- It is made through **pyrolysis**, which involves heating biomass with little or no oxygen.

What is Teal Carbon?

- **About:**
 - Teal carbon refers to **carbon stored in freshwater (non-tidal) wetlands**, including vegetation, microbial biomass, and dissolved and particulate organic matter.
- **Types of Carbon:**
 - **Teal Carbon** is categorised based on its **role in ecosystems and its location**, distinguishing it from **black carbon** and **brown carbon**.
 - Unlike **black and brown carbon**, which are formed from the **incomplete combustion of organic matter** and contribute to **climate change**, teal carbon focuses on **carbon sequestration within wetland ecosystems**.
 - **Black Carbon:** It is a sooty black material emitted from the burning of fossil fuels, comprising a significant portion of [particulate matter](#) air pollution.
 - **Brown Carbon:** Produced from the incomplete combustion of organic materials like biomass. It absorbs [UV and visible](#) solar radiation, contributing to global warming.
 - **Blue Carbon:** Carbon stored in the **atmosphere and oceans**.
 - **Green Carbon:** Carbon sequestered in **terrestrial plants** through the process of [photosynthesis](#).
 - **Gray Carbon:** Emitted from **industrial processes and stored in fossil fuels** such as coal, oil, and biogas.
 - **Red Carbon:** Released by **biological particles found on snow and ice**.
- **Role in Climate Change:**
 - Teal carbon ecosystems can play a crucial role in mitigating climate change by **sequestering carbon**, raising groundwater levels, **reducing urban heat islands**, controlling greenhouse gases and mitigating floods.
- **Primary Reservoirs:**
 - The primary reservoirs of teal carbon include **peatlands, freshwater swamps, and**

natural freshwater marshes. These ecosystems are major contributors to the global carbon sequestration total.

- The global storage of teal carbon across ecosystems is estimated at approximately **500.21 petagrams of carbon (PgC).**

▪ **Threat:**

- They are highly **vulnerable to degradation** due to pollution, land use changes, water extraction, and landscape modifications which threaten their ability to store carbon and maintain ecological balance.

About Keoladeo National Park

- It is a wetland and bird sanctuary and a [UNESCO World Heritage Site](#) located in **Bharatpur, Rajasthan.**
 - [Chilika Lake](#) (Orissa) and Keoladeo National Park (Rajasthan) were recognized as the first [Ramsar Sites](#) of India in **1981.**
 - Currently, Keoladeo National Park and [Loktak Lake \(Manipur\)](#) are in the [Montreux Record.](#)
- It is known for its **rich avian diversity** and abundance of **waterbirds** and is home to over **365 species of birds**, including several **rare and threatened species**, such as the Siberian crane.
- **Fauna: Animals such as Jackals, Sambar, Nilgai, wild cats, hyenas, wild boar, porcupine and mongoose can be found in the region.**
- **Flora:** The principal vegetation types are tropical dry deciduous forest dominated by *Acacia nilotica* intermixed with dry grassland.
- **River:** Gambhir and Banganga are two rivers that flow through this National Park.

What are Wetlands?

- Wetlands are areas where **water covers the soil**, or is **present either at or near the surface** of the soil **all year or for varying periods** of time during the year, including during the growing season.
- **Initiative Taken for Conservation of Wetland:**
 - **Global Level:**
 - [Montreux Record](#)
 - [World Wetlands Day](#)
 - **National Level:**
 - [Wetlands \(Conservation and Management\) Rules, 2017.](#)
 - [National Plan for Conservation of Aquatic Ecosystems \(NPCA\)](#)
 - [Amrit Dharohar Capacity Building Scheme](#)
 - **National Wetland Conservation Programme (NWCP):** It was launched in 1985, to tackle threats to vulnerable wetland ecosystems and enhance their conservation.

RAMSAR CONVENTION

About

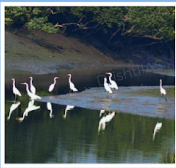
- Also known as the Convention on Wetlands.
- An intergovernmental treaty, adopted in 1971, in Ramsar, Iran.
- Entered into force in 1975.
- Wetlands that are of international importance are declared as Ramsar sites.
- Largest Ramsar Site in World: Pantanal: South America

Montreux Record

- Adopted in Montreux (Switzerland) in 1990.
- Identifies Ramsar sites that need priority conservation attention at national or international level.

Wetlands

- A place in which the land is covered by water – salt, fresh, or somewhere in between – either seasonally or permanently.
- Take many forms including rivers, marshes, bogs, mangroves, mudflats, ponds, swamps, billabongs, lagoons, lakes, and floodplains.
- World Wetlands Day: **2nd February**



India & Ramsar Convention

- Came into force in India: **1982**
- Total Number of Ramsar Sites: **75**
- Chilika Lake (Odisha), Keoladeo National Park (Rajasthan), Harike Lake (Punjab), Loktak Lake (Manipur), Wular Lake (Jammu and Kashmir), etc.
- Related Framework in India
 - The Ministry of Environment, Forest and Climate Change (MoEF&CC) has notified Wetlands (Conservation and Management) Rules, 2017 under the provisions of the Environment (Protection) Act, 1986 as regulatory framework for conservation and management of wetlands.
 - The 2017 Rules decentralise wetlands management and provide for the constitution of the State Wetlands Authority or Union Territory Wetlands Authority.

Key Facts

- Largest Ramsar Site: Sunderbans, West Bengal
- Smallest Ramsar Site: Vembannur Wetland Complex, Tamil Nadu
- State with the maximum number of Ramsar Sites: Tamil Nadu (14)
- Wetlands in Montreux Record:
 - Keoladeo National Park: Rajasthan
 - Loktak Lake: Manipur



UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q. "If rainforests and tropical forests are the lungs of the Earth, then surely wetlands function as its kidneys." Which one of the following functions of wetlands best reflects the above statement? (2022)

- (a) The water cycle in wetlands involves surface runoff subsoil percolation and evaporation.
- (b) Algae form the nutrient base upon which fish, crustaceans, molluscs, birds, reptiles and mammals thrive.
- (c) Wetlands play vital role in maintaining sedimentation balance and soil stabilization.
- (d) Aquatic plants absorb heavy metals and excess nutrients.

Ans: (c)

Q. Consider the following statements: (2019)

1. Under Ramsar Convention, it is mandatory on the part of the Government of India to protect and conserve all the wetlands in the territory of India.
2. The Wetlands (Conservation and Management) Rules, 2010 were framed by the Government of India based on the recommendations of Ramsar Convention.
3. The Wetlands (Conservation and Management) Rules, 2010 also encompass the drainage area or catchment regions of the wetlands as determined by the authority.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 3 only
- (d) 1, 2 and 3

Ans: (c)

Q. Consider the following pairs: (2014)

	Wetlands	Confluence of Rivers
1.	Harike Wetlands	Confluence of Beas and Satluj/Sutlej
2.	Keoladeo Ghana	Confluence of Banas National Park and Chambal
3.	Kolleru Lake	Confluence of Musi and Krishna

Which of the above pairs is/are correctly matched?

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (a)

PDF Reference URL: <https://www.drishtiias.com/printpdf/teal-carbon-study-at-keoladeo-national-park>

