The Curonian Lagoon Ecosystem and its Ecosystem Services

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The Curonian Lagoon is located in the South-eastern part of the Baltic Sea

In Lithuanian Kuršių Marios, is the **biggest coastal lagoon** in Europe
This lagoon is shared by two countries:

- the **central-northern** part of the lagoon belongs to **Lithuania**
- the **central-southern** part belongs to **Kaliningrad District of Russia**
In the Lithuanian part the lagoon lies between the mainland and an dunar-sandy spit called Curonian Spit, which is nowadays a National Park and UNESCO Heritage Site.
The main influencing river discharging freshwater is the Nemunas River.
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- Curonian Lagoon is **connected** with the sea by the **Klaipeda Strait**
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Environmental characteristics of the Curonian Lagoon*:

- **Area**: 1584 km\(^2\)
- **Volume**: 6000*10\(^6\) m\(^3\)
- **Mean depth**: 3.8 m
- **Maximum depth**: 5.8
  (14 in navigation channel)
- **Catchment area**: 100458 km\(^2\)
- **Secchi Depth**: 0.3-2.2 m

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Environmental characteristics of the Curonian Lagoon*:

- Sediment typology:
  - **Fine sand** predominantly
  - **Muddy** areas

*Baltica 16 (2003) 13-20

The Curonian Lagoon bottom sediments in the Lithuanian water area

Egidijus Trimonis, Saulius Gulbinskas, Modestas Kuzavinis
Environmental characteristics of the Curonian Lagoon*:

- **Air temperature**: from -2.8 to 16.8 °C (monthly averages)
- **Water temperature**: 0.1 – 19.3 °C (monthly averages)
  - Maximum 24-25 °C
- **Residence time**: 81 days
- **Ice covering**: 110 days per year in average

Environmental characteristics of the Curonian Lagoon*:

- **Salinity**: 0-8 PSU
- **pH**: 8.1-9.2
- **Annual N input**: 33000 – 64000 t/yr.
- **Annual P input**: 1200 – 4000 t/yr.
- **Trophic level**: eutrophic

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- Biological components: Phytoplankton

![Pie chart showing percentages of different ecological zones.](chart)

- M - marine
- R - marine-brackish
- B - brackish
- N - limnic-brackish
- L - limnic
- K - marine-brackish-limnic

**Identification of algae species in the Curonian Lagoon**

SUBMARINER Report 2/2013:

Irina Olenina
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- **Biological components: Phytoplankton**
  - 526 species found in the lagoon
    - Freshwater species
      - dominant species: *Stephanodiscus hantzschii, Aphanizomenon flos-aquae, Microcystis aeruginosa*
    - Brackish-water species:
      - dominant species: *Heterocapsa rotundata, Skeletonema costatum, Coscinodiscus granii*

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- Biological components: Zooplankton*

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➢ Biological components: Zooplankton*

• Freshwater species
  – dominant species: *Bosmina* spp, *Daphnia* spp., *Cyclops strenuus*

• Brackish-water species:
  – dominant species: *Acartia bifilosa, Chydorus sphaericus, Cercopagis pengoi*

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Biological components: Fish fauna*

- 57 recorded fish species:
  - resident species: roach (*Rutilus rutilus*), perch (*Perca fluviatilis*), common bream (*Abramis brama*), reeye (*Scardinius erythrophthalmus*)
  
  ![roach](http://fishesofaustralia.net.au/images/image/Rutilus_rutilus_GSchmida.jpg)
  ![perch](http://www.animalbase.uni-goettingen.de/animalbaseimage/Perca_fluviatilis_GSchmida.jpg)
  ![common bream](http://www.animalbase.uni-goettingen.de/animalbaseimage/Abramis_brama_02.JPG)

  ![redeye](http://www.animalbase.uni-goettingen.de/animalbaseimage/Scardinius_erythrophthalmus04.jpg)

  - migrating species: Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta trutta*), smelt (*Osmerus eperlanus*), eel (*Anguilla anguilla*)

  ![Atlantic salmon](http://www.animalbase.uni-goettingen.de/animalbaseimage/Salmo-salar_01.JPG)
  ![sea trout](http://www.ittiofauna.org/webmuseum/pesciossei/osmeriformes/osmeridae/osmerus/osmerus_eperlanus/images/osmerus_eperlanus04.jpg)
  ![smelt](http://www.animalbase.uni-goettingen.de/animalbaseimage/Osmerus_eperlanus_02.JPG)
  ![eel](http://www.fao.org/fi/figis/culturespecies/data/assets/images/Anguilla/Anguilla_anguilla.jpg)

Biological components: Benthic communities*

- **Macrophytes**
  - 18 submerged macrophytes species
  - dominant species: *Phragmites australis, Potamogeton perfoliatus, Potamogeton pectinatus*

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- **Biological components: Benthic communities***
  
  - **Macrozooobenthos**
    
    - 85 species
    - Dominant species: *Marenzelleria neglecta, Dreissena polymorpha, Pontogammarus robustoides*

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- **Biological components: Predators**
  - **Cormorants** (*Phalacrocorax carbo sinensis*)
    - Impact of fish fauna similar to fisheries
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- **Biological components: Predators**
  - **Cormorants** (*Phalacrocorax carbo sinensis*)

![Graph showing the number of breeding pairs of great cormorants in Juodkrante colony (western coast of the Curonian Lagoon, Lithuania) from 1989 to 2009.](image)

**Figure 1.** The number of breeding pairs of great cormorants in Juodkrante colony (western coast of the Curonian Lagoon, Lithuania) in 1989 – 2009

THE ROLE OF GREAT CORMORANT (*PHALACROCORA CARBO SINENSIS*) FOR FISH STOCK AND DISPERAL OF HELMINTHES PARASITES IN THE CURONIAN LAGOON AREA

Saulius Švazas\(^1\), Natalia Chkalova\(^1\), Gennady Grishanov\(^1\), Zilvinas Pėtyš\(^1\), Amiolas Sruoga\(^1\),
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Biological components: Predators

- Cormorants (*Phalacrocorax carbo sinensis*)

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Protection Status of the Lagoon

Natura 2000 Network Viewer
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- The lagoon is important for **human development** because of the delivery of ecosystem goods and services.
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Ecosystem services can be defined broadly as:

“the benefits people take from the environment”

According to Common International Classifications of Ecosystem Services (CICES), services can be divided into 3 groups:

- **Provisioning Services**
- **Regulating & Maintenance Services**
- **Cultural Services**

*Citetext:*

*(Download at [www.cices.eu](http://www.cices.eu) or [www.nottingham.ac.uk/cem](http://www.nottingham.ac.uk/cem))

*Report to the European Environment Agency*  
*Revised January 2013*
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Provisioning Services of Curonian Lagoon (most common)

- Wild plants, algae and their outputs
- Wild animals and their outputs
- Animals from in situ aquaculture
- Plants and algae from in situ aquaculture
- Surface water for drinking purposes
- Fibers and other materials from plants, algae and animals for direct use or processing
- Materials from plants, algae and animals for agriculture
- Surface Water for non-drinking purposes
- Plant based resources
- Animal based resources
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Regulating & Maintenance Services of Curonian Lagoon (most common)

- Filtration/sequestration/storage/accumulation by ecosystems
- Dilution by atmosphere, freshwater and marine ecosystems
- Mass stabilization and control of erosion rates
- Buffering and attenuation of mass flows
- Flood Protection
- Maintaining nursery populations and habitats
- Pest and Disease control
- Decomposition and fixing processes
- Chemical condition of salt waters
- Global climate regulation by reduction of greenhouse gas concentrations
- Micro and regional climate regulation
Cultural Services of Curonian Lagoon (most common)

- Experiential use of plants, animals and land-/seascapes
- Physical use of land-/seascapes
- Scientific and Educational
- Heritage, cultural
- Entertainment
- Aesthetic
- Symbolic
- Sacred and/or religious
- Existence
- Bequest
A SYSTEM APPROACH FRAMEWORK FOR COASTAL RESEARCH & MANAGEMENT

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