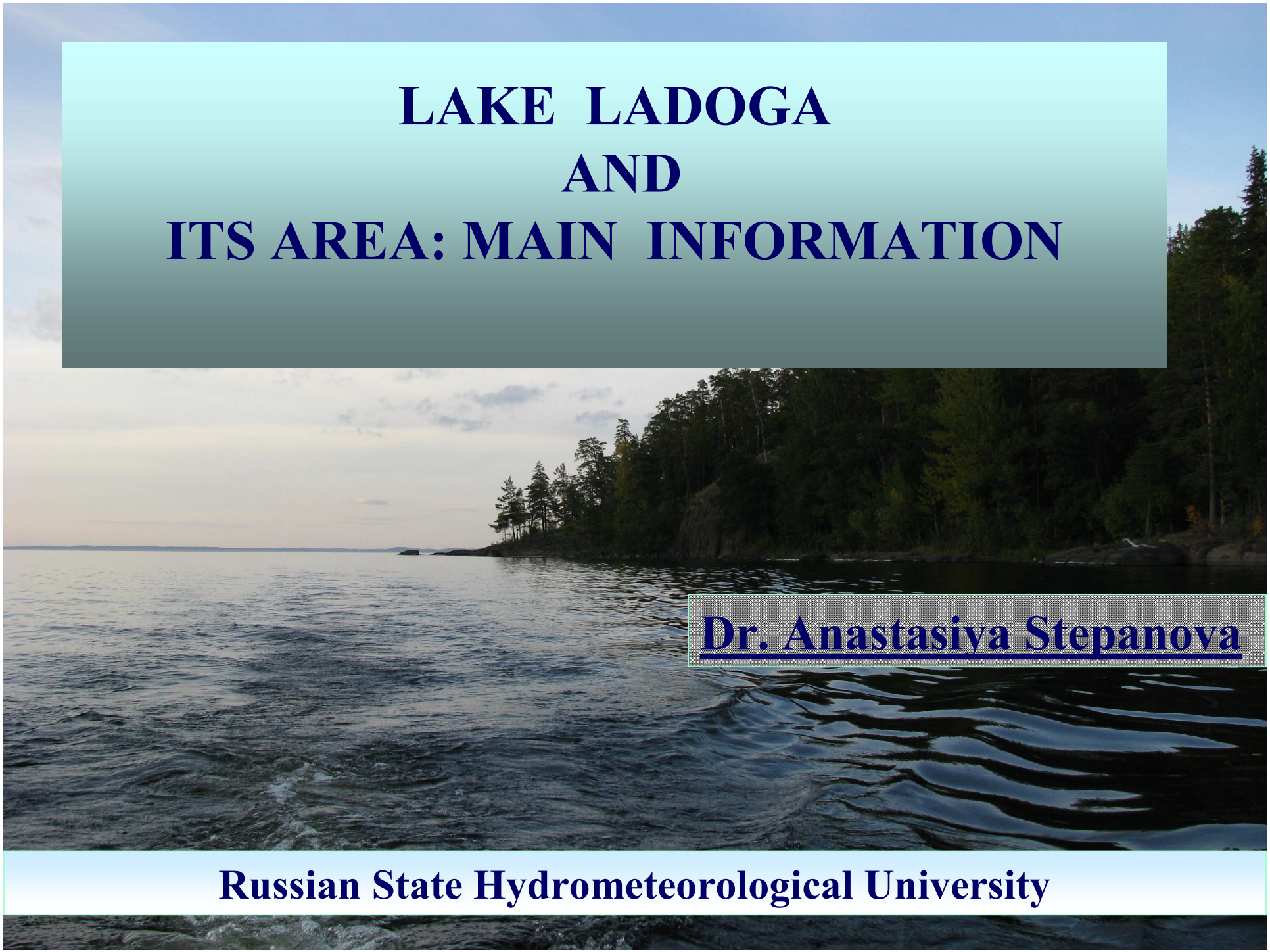


LAKE LADOGA AND ITS AREA: MAIN INFORMATION

Dr. Anastasiya Stepanova

Russian State Hydrometeorological University

- The purpose of my talk today is to consider Lake Ladoga as a part of family World great lakes

- My talk deals with the problem of biodiversity and it’s protection in Lake Ladoga region

The greatest fresh-water lake in the Europe

S – **area** - 17891 km^2
V – **volume** - 837 km^3
H_{med} **depth** - 46.8 m
H_{max} **depth** - 230 m

Ladoga lake is the unique natural object
and one of the most important water objects of northwest of the Europe.

The greatest fresh-water lake in the Europe.

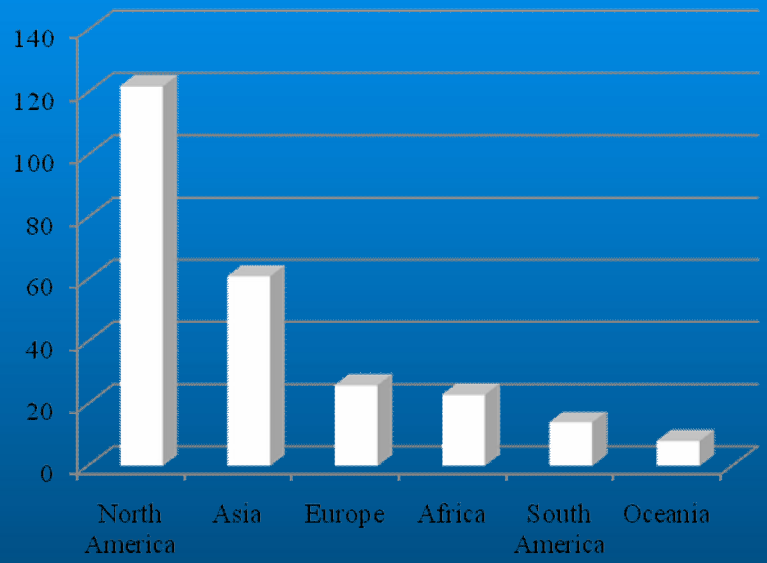
- How to realize the size or dimension of Lake Ladoga?

The area can be compared with the areas of some small countries, for example:

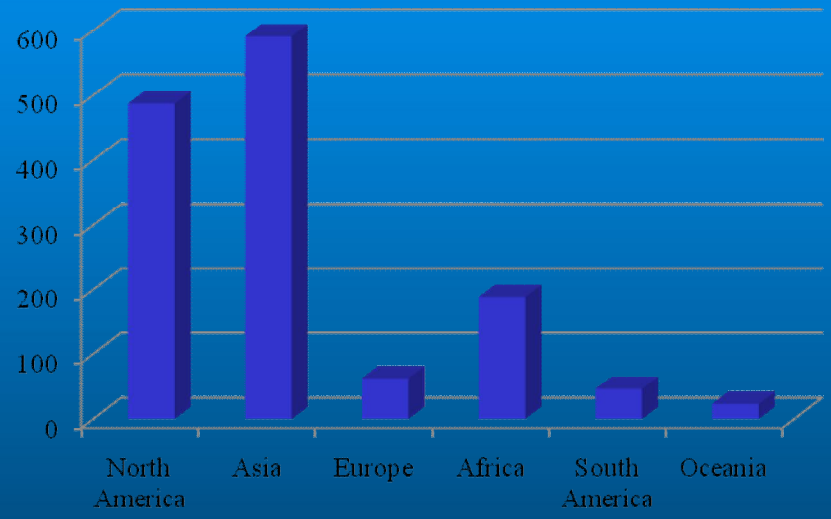
- The Netherlands - 41 526 km^2
- Belgium - 30 528 km^2
- Israel - 20 770 km^2
- Luxembourg - 2600 km^2

There are **253** lakes with a surface area greater than 500 km^2

A - Total number



B - Total area, km^2



Distribution (A) and area of large lakes by continent (B)

These lakes contain nearly 90 % of world's water supply.

World great lakes

some examples

Lake	Area, km^2	Maximum depth, m	Area rank
Caspian (Asia)	374 000	1025	**1**
Superior (North America)	82 100	407	**2**
Tanganyika (Africa)	32 900	1471	**7**
Baikal (Asia)	31 500	1741	**3**
Great Bear (North America)	31 326	452	**8**
Great Slave (North America)	28 568	625	**10**
Ladoga (Europe)	17 891	230	**16**
Onega (Europe)	9 700	127	**20**

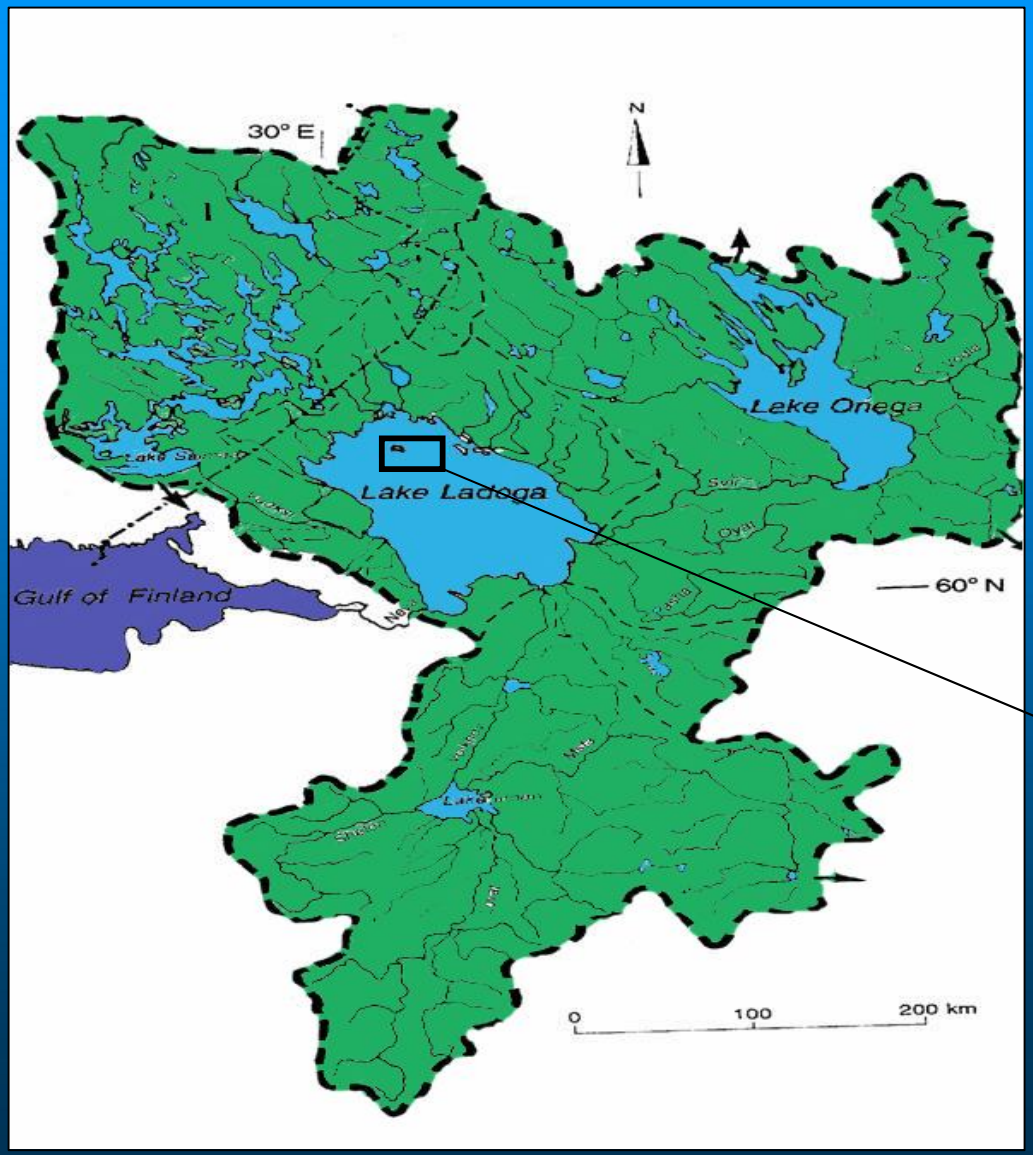
It's interesting to compare Lake Ladoga to some world great lakes.
Lake Ladoga is included into 20 greatest lakes of the world

Lake Ladoga – one of the world great lakes

Lake Ladoga is a unique natural object and its condition determines the climatic, ecological and economic parameters of a large part of the Baltic Sea.

Almost all water flowing into the Gulf of Finland through Neva River comes from Lake Ladoga. In turn, Neva gives (3/4) three fourth of the annual inflow of water in the Gulf of Finland, and together with the second largest river, the Vistula River they compound (2/3) two thirds of flow in the Baltic Sea.

Catchment area involves the essential of north-western region of Russia and part of Finland.



It is located on 258 600 km^2

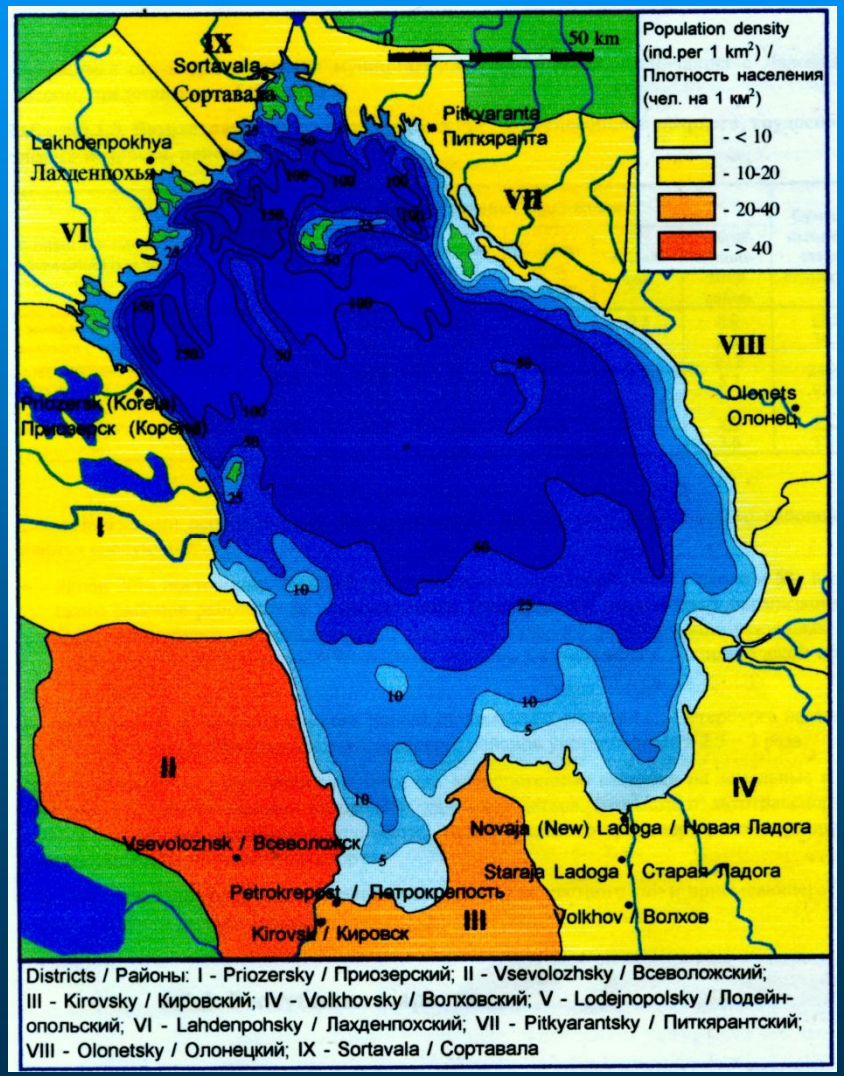
Valaam Archipelago

Catchment area.

In the Lake Ladoga region there are

- more than **50 000 lakes**
- **3500 rivers** extension more than 45000 km.

Catchment area-
Distribution of the population density among municipalities around Ladoga .



In general in Ladoga area average population density is **18.7 people** per sq. km.

35 % of them are rural residents for which natural resources are the main source of livelihood.

Catchment area.

- Let us consider the two largest in area of administrative entity of the Russian Federation.

The Leningrad region - **85 300** km^2

- 1631,9 thousands people

(1.5 % of the population of Russia)

Repablic of Karelia – **108,5** km^2

- 716,3 thousands people

(0.5 % of the population of Russia)

Catchment area – the Leningrad region

Industry in the Leningrad Region is made up of several sectors, including:

nationally important non-ferrous metals,

- **the pulp and paper sector,**
- **the chemical industry,**
- **engineering,**
- **the construction materials industry.**
- **There are 300 basic industrial enterprises, most of which are corporations.**

- The industrial enterprises of the Leningrad Region produce a wide assortment of industrial and technological products including petrol, diesel fuel, mineral fertilizers, aluminum, industrial wood, cellulose, paper, cardboard, machines, devices, and construction materials. In addition, there is a wide assortment of consumer goods, such as furniture, fabrics, clothing, and foods.

Catchment area – the Leningrad region

Agriculture. The agriculture in the Leningrad Region is very diverse. The crop production accounts for 16 percent of the commodity composition of output, and the animal industry for 74 percent;

There are 50 agriculture enterprises and 1500 farms.

- In addition, there are some branches of animal breeding in the region, for example breeding mink, muskrat, blue, black and silver fox and other animals.

Catchment area – Republic of Karelia

Industry is made up of several sectors, including:

- **the pulp and paper sector,**
- **mineral extraction,**
- **the chemical industry**
- While the population of Karelia comprises only 0.5% of the population of Russia, Karelia produces 22% of iron ore pellets, 36% of paper, 61% of paper sacks, 6% of timber, 4% of timber products. 70% of trout raised in hatcheries is produced in the Republic of Karelia.

Agriculture. The agriculture in Karelia is not very diverse. There are 18 agriculture enterprises

- There are some branches of animal breeding in the region, for example breeding mink, muskrat, blue, black and silver fox and other animals too.

The greatest fresh-water lake in the Europe.

- Interest in the study of Lake Ladoga is associated with many causes.
- From scientific and practical point of view - Lake Ladoga is:
- 1. a unique reserve of biodiversity
- 2. the source of high quality drinking water
- 3. complex of mineral and biological resources, some of which have not yet used by man.

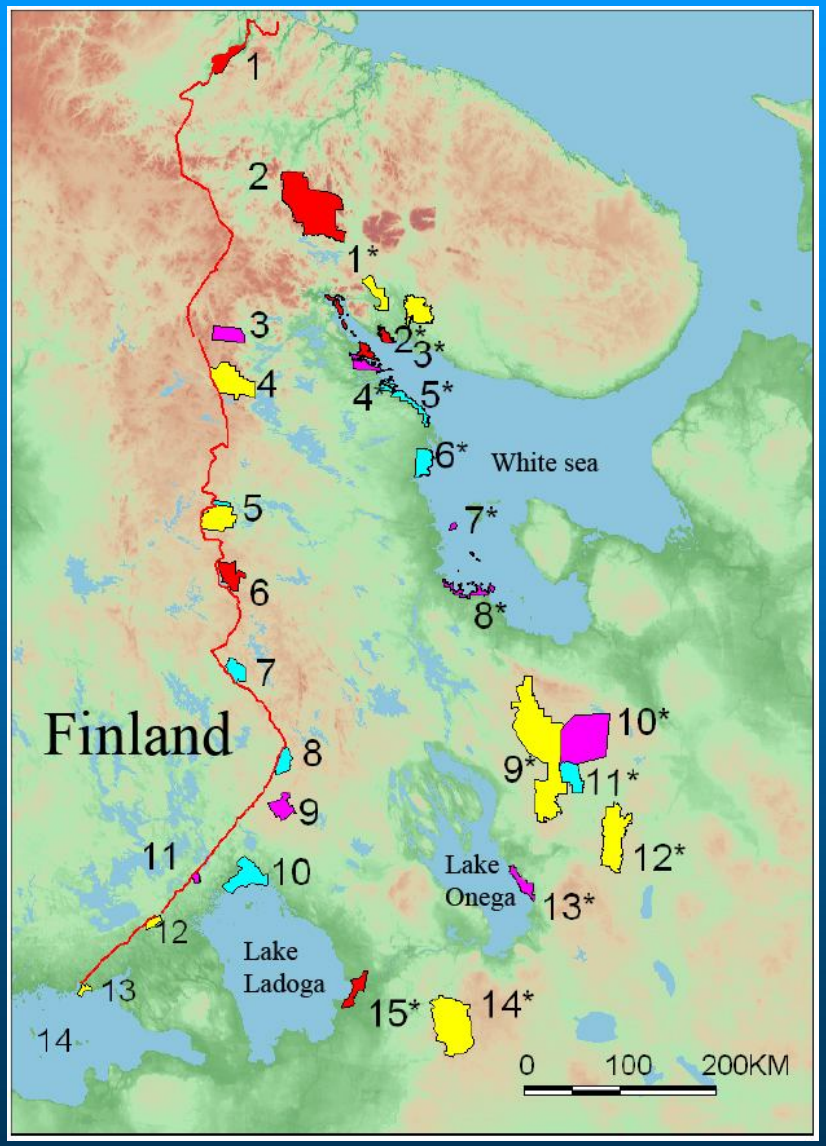
Reserve of biodiversity

- Floristic and faunistic richness of the lake is associated with the following main groups of causes:
- **Geological features of the lake**
- **Geographical location**
- **Genesis of flora and fauna during post-glacial period**

Reserve of biodiversity

- Linogenesis (that is, lake succession) is closely associated with the above reasons, but can also be considered as an independent main cause (autogenic succession).
- Of all large lakes, only the Ladoga is situated at the boundary of the ancient Baltic crystalline shield and the relatively young sedimentation mass (the Russian platform). Geological history of the Ladoga is reflected in the original and unique landscapes and in rock structure, which, in turn, underlie the great diversity of animals and plants in a limited area.
- Also unique is the position of the Lake at the border of biogeographical zones and subzones (southern and central taiga subzones). The boundaries of distribution areas of many southern and northern species lie near this border.
- The large size of the lake and the consequent biotope diversity result in formation of diverse flora and fauna of hydrobionts, many of which do not occur together in other water bodies. Biological diversity is also facilitated by the unique island system, the Valaam Archipelago. Its shallow coastal zone is situated in the central, deepwater part of the lake.

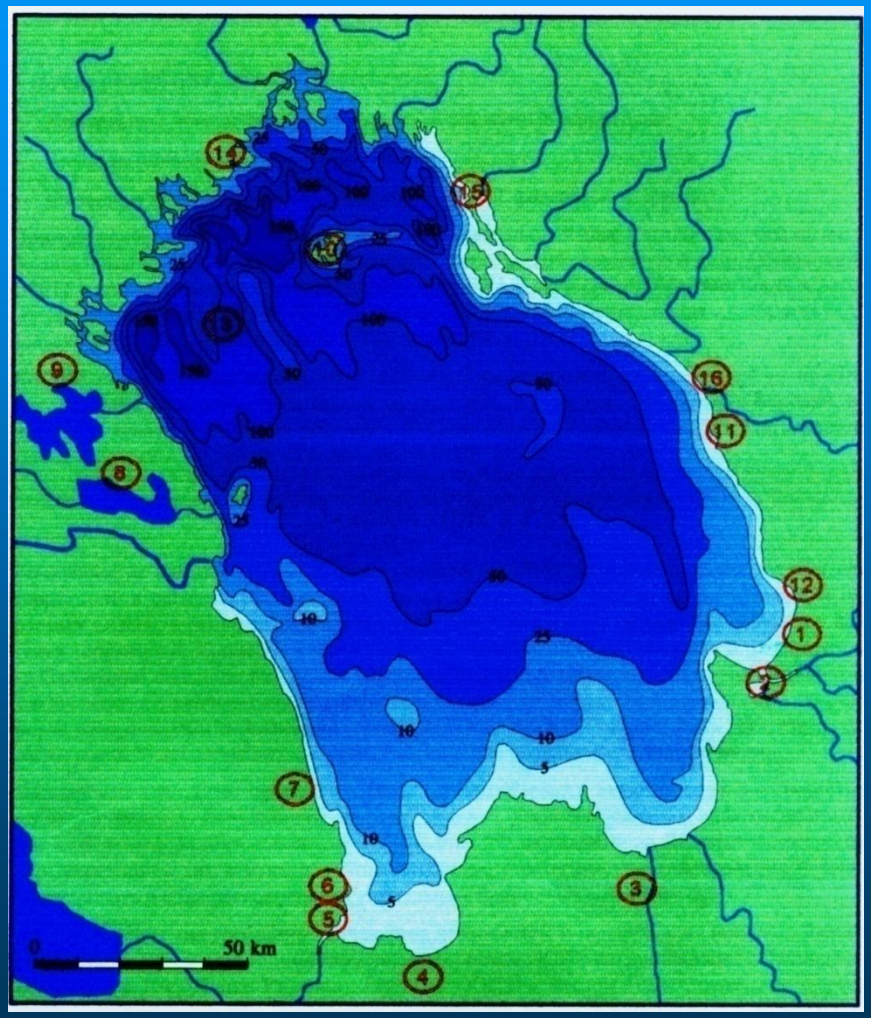
Protected areas



Existing and projecting PA of Russian Fennoskandia

In Karelia area of PA bigger than in the Leningrad region - 2.5%

Protected areas



In Lake Ladoga there is only one biosphere reserve. It' area - 410 km^2 . It was created in 1980.

Protected areas: main problems

- Inadequate number of PA's both around Ladoga and on the lake itself *(or lack of actual protection of valuable areas even though they may have been declared by the authorities)* leads to further degradation of natural resources. The strongest factors will be:
- uncontrolled logging along the shore of the lake and other water bodies,
- unorganized recreation and tourism (particularly harmful on islands),
- uncontrolled (or semi-legal) construction in water shelterbelts, valuable natural areas and areas already exposed to heavy human pressure (southern and south-western parts of the Ladoga Lake area),
- intensive amateur and semi-commercial fisheries and hunting.

Biodiversity conservation in the region: main problems

- Although general understanding of the necessity to preserve the Ladoga lake region there are significant differences in nature protection and nature use development approaches applied in different subjects of the Russian Federation comprising the Ladoga region .

- Despite quite a massive of data on biota and environment of the Ladoga region, investigations of the current state and dynamics of a number of components are missing. This makes difficult o foresee future changes and prepare adequate recommendations..

Biodiversity conservation in the region: main problems

- Sustainable nature use in the Ladoga Lake region, conservation of unique ecosystems simultaneously with socio-economic development are impossible without a unified **monitoring system** for the major environmental components, i.e. (1) water, (2) bottom sediments and aquatic organisms, (3) soil complexes, (4) vegetation, (5) atmosphere. Such a system will enable compilation of data for making general and detailed forecasts and recommendations for practical measures and revision of development programmes. Development of the unified monitoring system requires involvement of research organizations. The system can be based on the existing network of stations belonging to various departments.

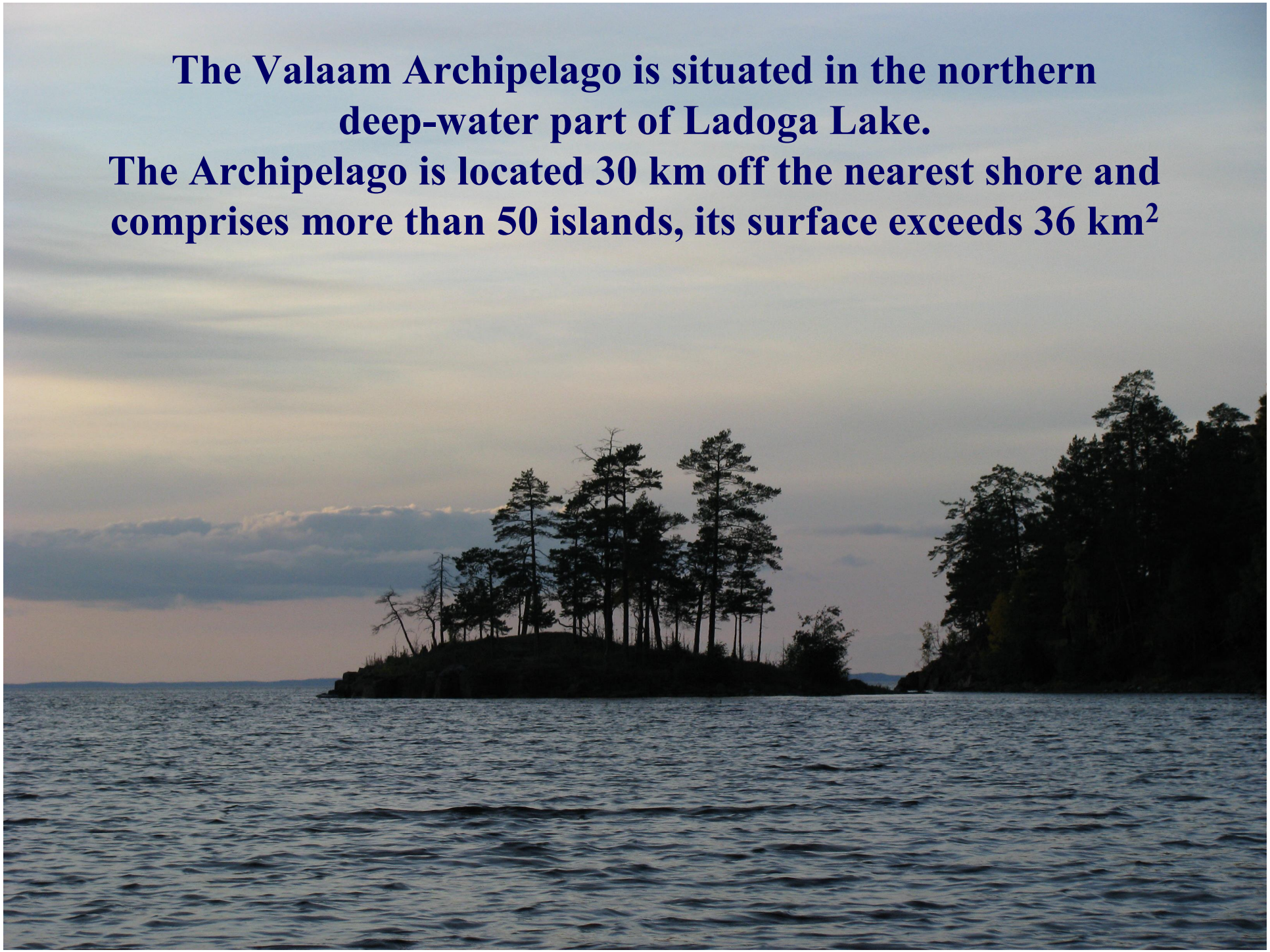
Northern deep-water zone of Ladoga lake

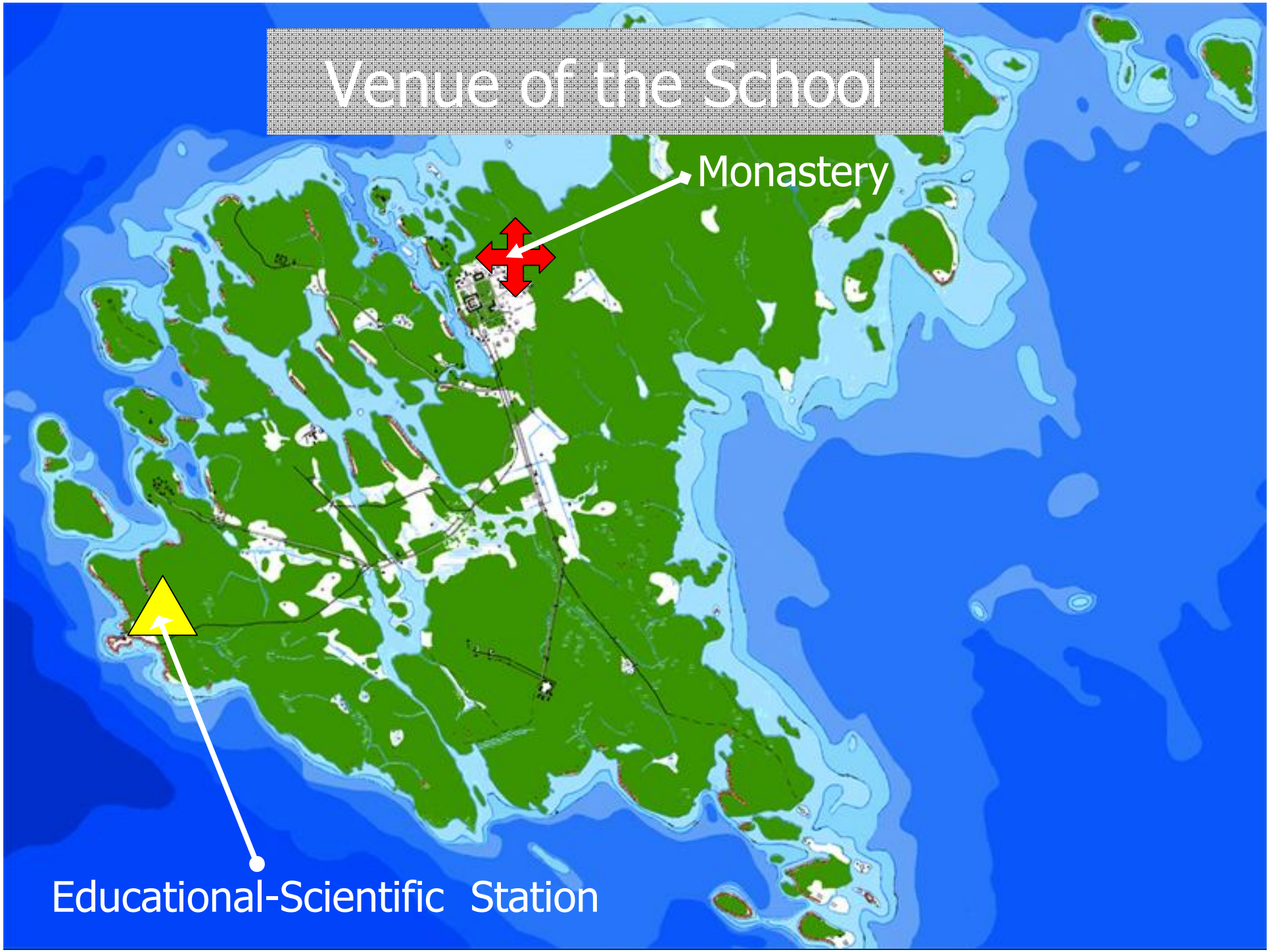
Because of its certain morphology and a hydrological mode, northern deep-water zone of Ladoga lake is less mentioned by the polluted waters of the rivers. It contains the main stocks of pure water. The control of hydrobiological, hydrochemical and other parameters is especially important, as loss of water quality in this area will inevitably cause degradation of Lake Ladoga ecosystem.

From this point of view coastal zone around Valaam Archipelago may be considered as an ideal area for monitoring anthropogenic effects such as eutrophication and pollution.

The Valaam Archipelago coastal zone

- It consists of a variety of open water areas, gulfs, bays, straits between islands, etc.
- The width of the shallow water zone (up to 5 m) varies greatly in the different parts of the archipelago. Near the Southern and Western shores vertical rocks sharply fall to the depths of 15-30 m while the shallow waters along the Northern and Eastern shores may extend to few kilometres.


The Valaam Archipelago is situated in the northern deep-water part of Ladoga Lake.
The Archipelago is located 30 km off the nearest shore and comprises more than 50 islands, its surface exceeds 36 km^2


Venue of the School
Monastery
Educational-Scientific Station

At the end of Lecture …

Analysis of the existing situation has demonstrated that the Ladoga Lake region plays an **important part** in maintaining stability in the whole of the Baltic Sea drainage area. This means that problems of Lake Ladoga are of **international concern**, and sustainable development in the area would largely ensure sustainable development throughout the **Baltic region.**

At the end of Lecture …

- You will find many adventures, unique work experience and lots of new impressions at St. Petersburg and on Valaam Island.
- I hope that we will live and work as a good team.


Thank you for your attention !

Bottom landscapes of Ladoga Lake.

Valaam Archipelago

Coastal zone of Lake Ladoga around Valaam Archipelago is part of a Valaam Ridge