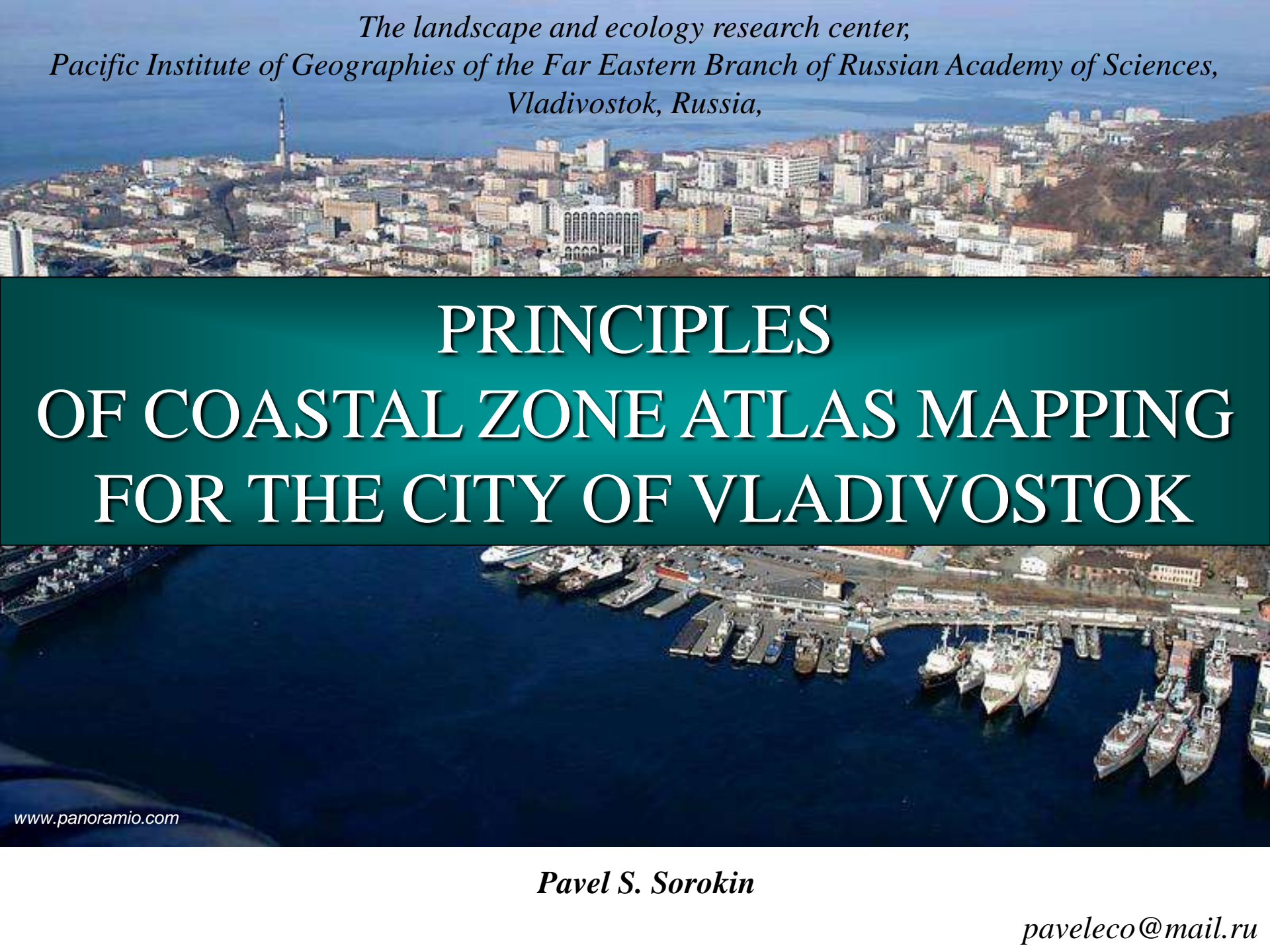


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The background of the slide is a composite of two aerial photographs. The top half shows a dense urban landscape of Vladivostok, with numerous buildings and a prominent tall tower on the left. The bottom half shows a busy harbor with many ships docked at piers. A dark green horizontal band with white text separates the two images.

PRINCIPLES OF COASTAL ZONE ATLAS MAPPING FOR THE CITY OF VLADIVOSTOK

www.panoramio.com

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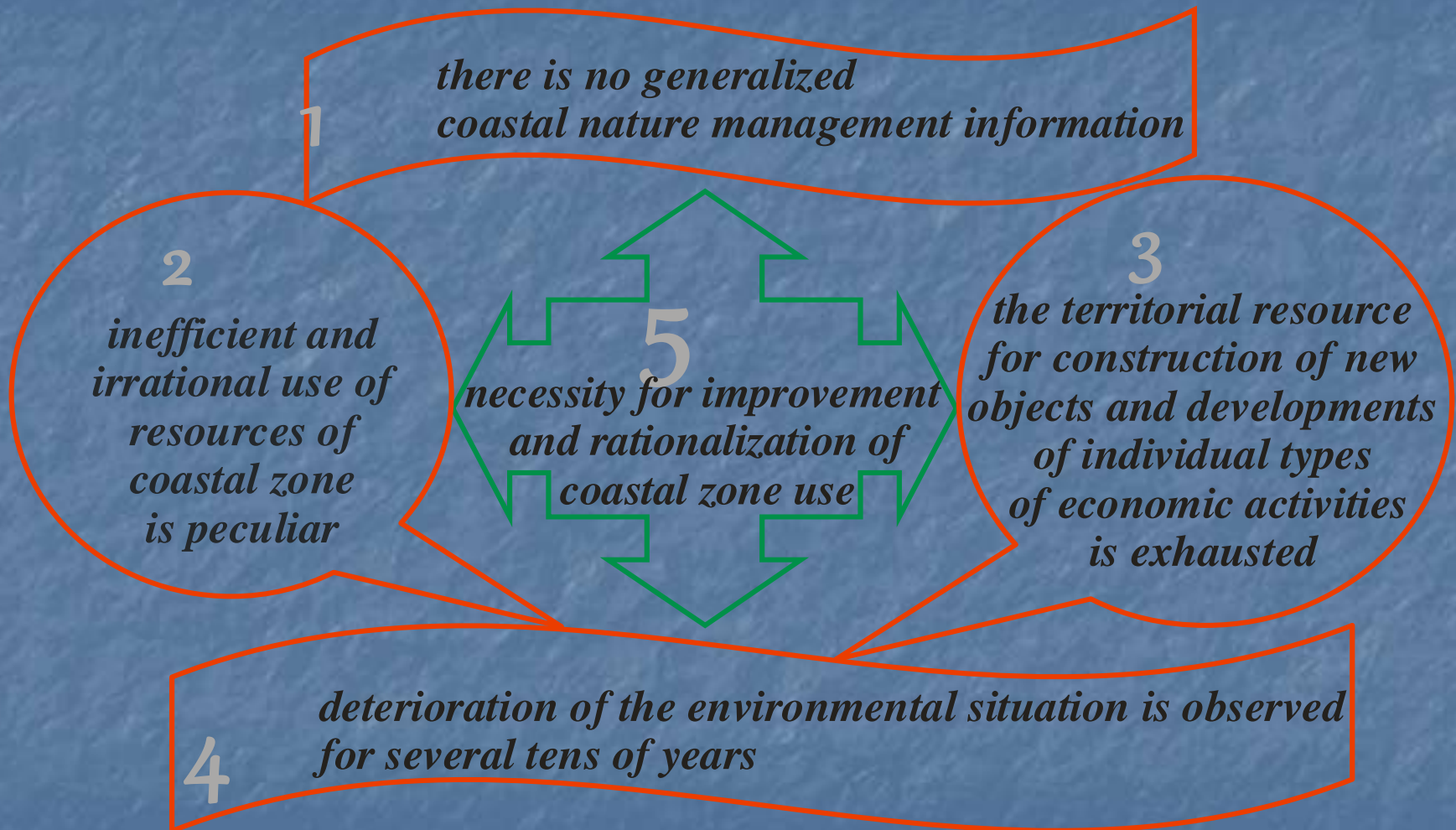


Goal of the study is the development of efficiency estimation principles of Vladivostok coastal territory use by method of cartographical and tabulated display of the information with application of GIS-technologies on the basis of topographic interpretation, open and share sources.

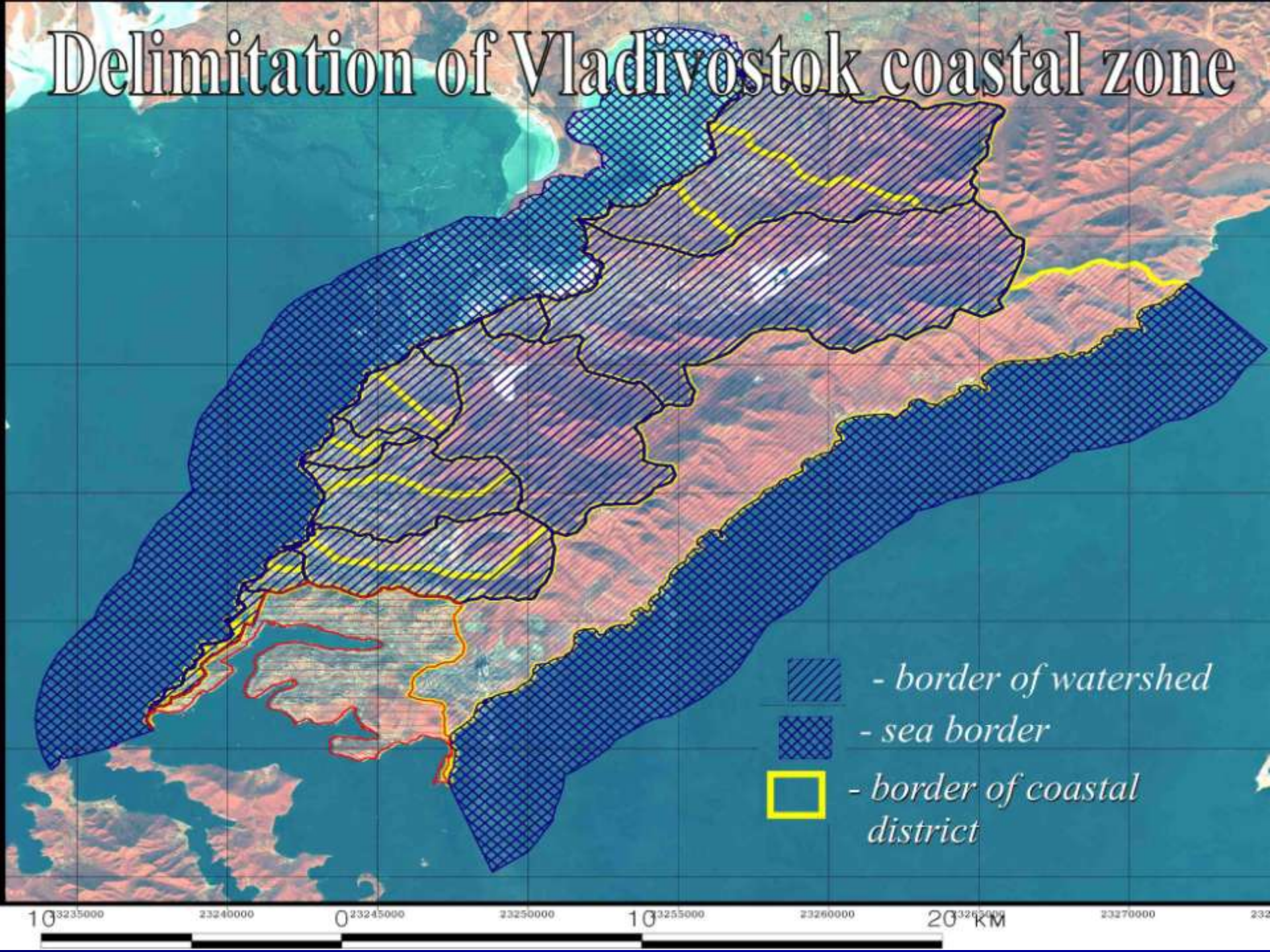
Objectives:

1. to determine Vladivostok coastal zone delimitation principles;
2. to carry out typification of nature management and functional zoning of Vladivostok coastal territory use;
3. to determine types of priority nature management in the allocated coastal areas;
4. to develop system of indicators of efficiency of coastal zone management and to estimate actual use of Vladivostok coastal territory on the basis of these indicators;
5. to conduct the analysis of conflictness between types of economic activities;
6. to reveal positive and negative elements in the network of developed coastal zone management;
7. to develop offers on improvement of the coastal zone management pattern.

Necessity of mapping of Vladivostok coastal territory atlas



Delimitation of Vladivostok coastal zone



All types of economic activities were grouped according to the principle of use of the territorial resource (tab. 1.)

Coastal territory use

Table 1

Urbanized area includes: central business and public districts, administrative and educational institutions, cultural and entertainment centers, health services, shopping centers

Area of industry includes: construction organizations, storage facilities, general and municipal services, structural components of energy and power supplies

Transport infrastructure: road and railway traffic arteries, depots, carports, boathouses and marinas

Recreation and sanatoria area

Undeveloped and littered shores, timber lands and recreational forests, military facilities

The areas under these activities were measured, and functional mapping of coastal areas was carried out (fig. 1.)

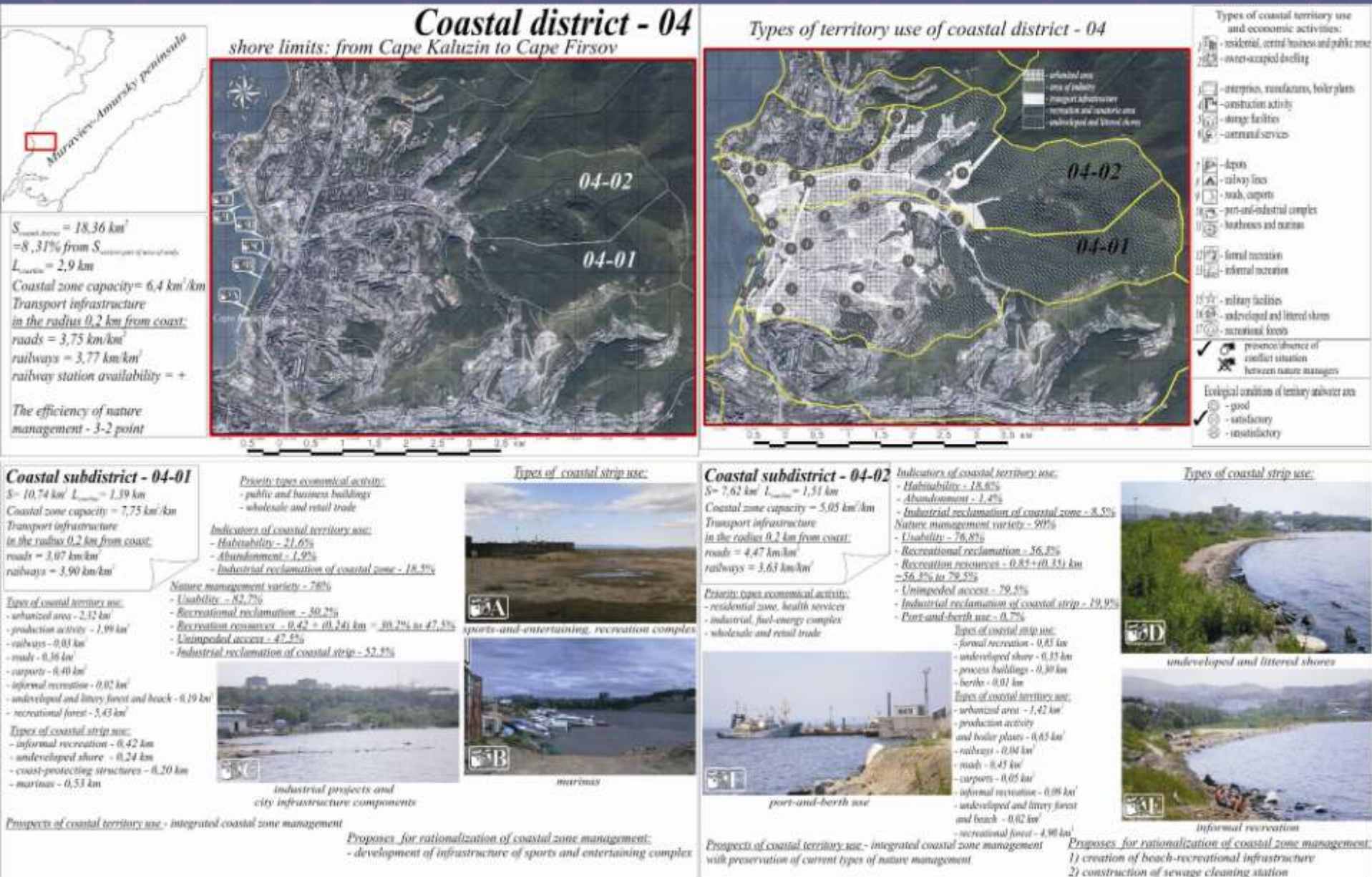


Fig. 1. The coastal zone atlas fragment

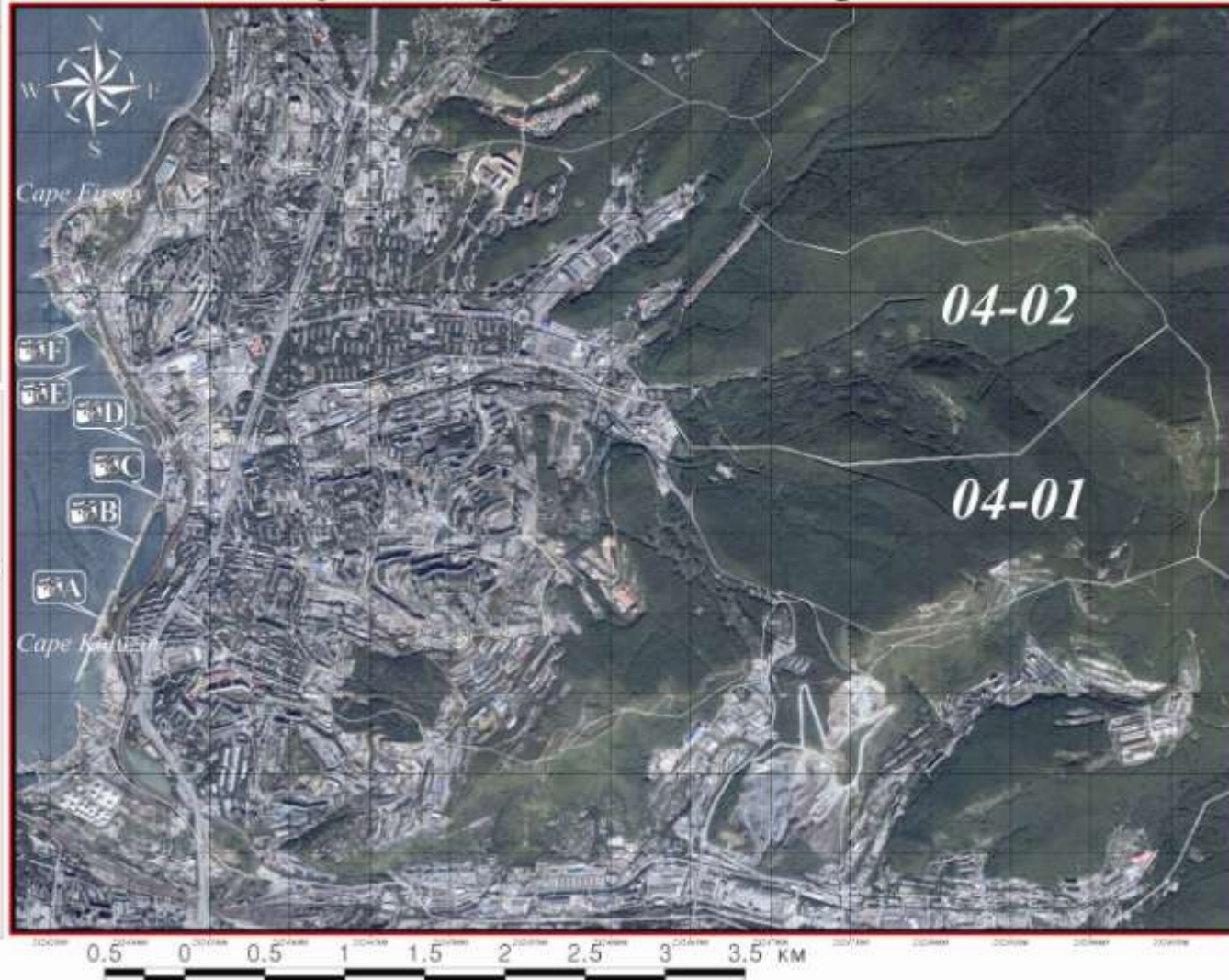
Coastal district - 04

shore limits: from Cape Kaluzin to Cape Firsov

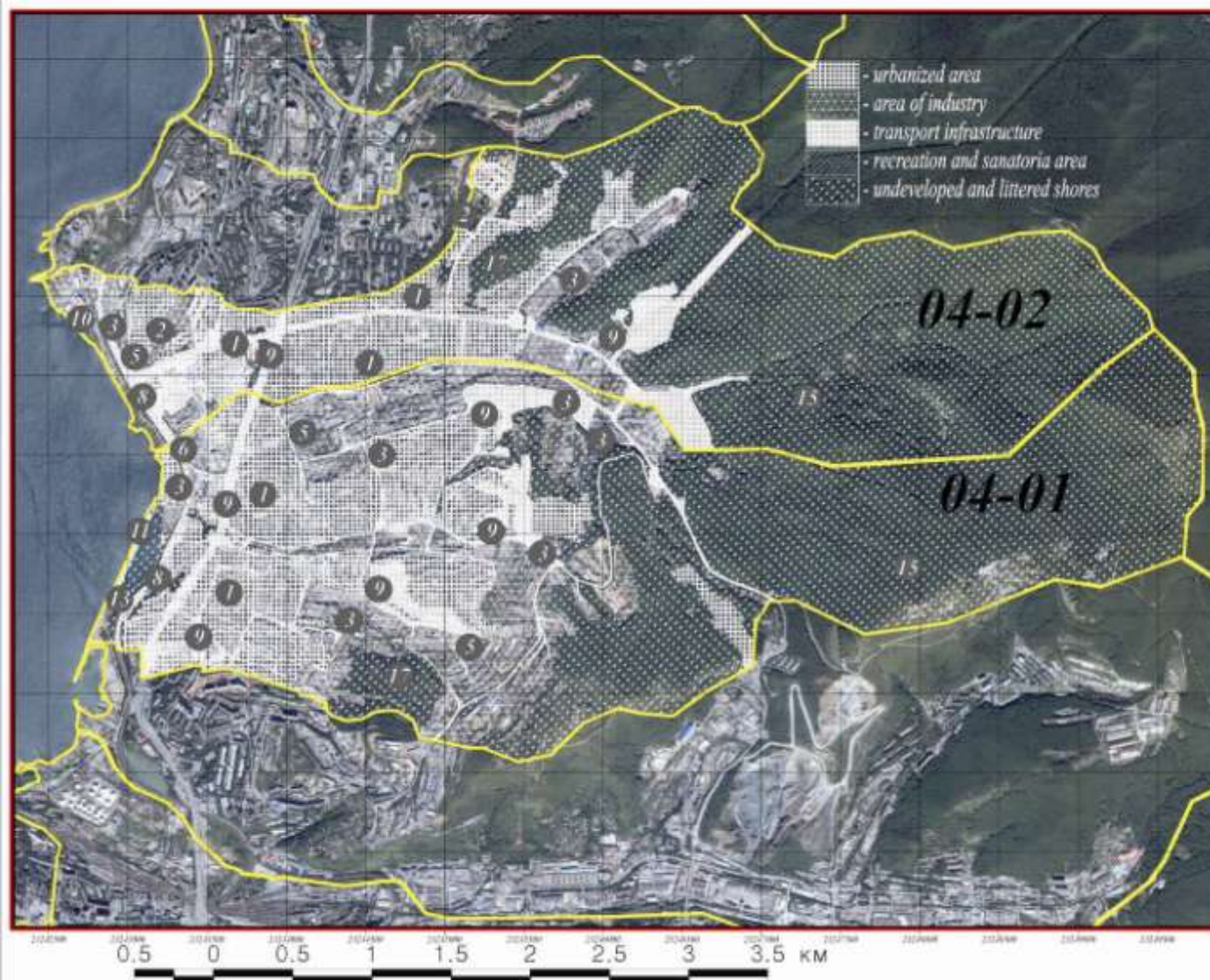


$S_{\text{coastal district}} = 18,36 \text{ km}^2$
 $= 8,31\%$ from $S_{\text{western part of area of study}}$
 $L_{\text{coastline}} = 2,9 \text{ km}$
 Coastal zone capacity = $6,4 \text{ km}^2/\text{km}$
 Transport infrastructure
in the radius 0,2 km from coast:
 raads = $3,75 \text{ km}/\text{km}^2$
 railways = $3,77 \text{ km}/\text{km}^2$
 railway station availability = +

The efficiency of nature management - 3 → 2 point



Types of territory use of coastal district - 04



Types of coastal territory use and economic activities:

- 1 - residential, central business and public zone
 - 2 - owner-occupied dwelling
 - 3 - enterprises, manufactures, boiler plants
 - 4 - construction activity
 - 5 - storage facilities
 - 6 - communal services
 - 7 - depots
 - 8 - railway lines
 - 9 - roads, carports
 - 10 - port-and-industrial complex
 - 11 - boathouses and marinas
 - 12 - formal recreation
 - 13 - informal recreation
 - 15 - military facilities
 - 16 - undeveloped and littered shores
 - 17 - recreational forests
- ✓ ✗ presence/absence of conflict situation between nature managers

Ecological conditions of territory and water area

- ✓
- good
 - satisfactory
 - unsatisfactory

On the basis of calculations of the area occupied by various objects of economic activities priority types of territory use have been defined.

Coastal subdistrict - 04-01

$S = 10,74 \text{ km}^2$ $L_{\text{coastline}} = 1,39 \text{ km}$

Coastal zone capacity = $7,75 \text{ km}^2/\text{km}$

Transport infrastructure

in the radius 0,2 km from coast:

roads = $3,07 \text{ km}/\text{km}^2$

railways = $3,90 \text{ km}/\text{km}^2$

Priority types economical activity:

- public and business buildings
- wholesale and retail trade

Indicators of coastal territory use:

- Habitability - 21,6%
- Abandonment - 1,9%
- Industrial reclamation of coastal zone - 18,5%

Nature management variety - 76%

- Usability - 82,7%
- Recreational reclamation - 30,2%
- Recreation resources - $0,42 + (0,24) \text{ km} = 30,2\% \text{ to } 47,5\%$
- Unimpeded access - 47,5%
- Industrial reclamation of coastal strip - 52,5%

Types of coastal territory use:

- urbanized area - $2,32 \text{ km}^2$
- production activity - $1,99 \text{ km}^2$
- railways - $0,03 \text{ km}^2$
- roads - $0,36 \text{ km}^2$
- carports - $0,40 \text{ km}^2$
- informal recreation - $0,02 \text{ km}^2$
- undeveloped and littered forest and beach - $0,19 \text{ km}^2$
- recreational forest - $5,43 \text{ km}^2$

Types of coastal strip use:

- informal recreation - $0,42 \text{ km}$
- undeveloped shore - $0,24 \text{ km}$
- coast-protecting structures - $0,20 \text{ km}$
- marinas - $0,53 \text{ km}$



industrial projects and
city infrastructure components

Types of coastal strip use:



sports-and-entertaining, recreation complex



marinas

Prospects of coastal territory use - integrated coastal zone management

Proposes for rationalization of coastal zone management:

- development of infrastructure of sports and entertaining complex

Aerial photograph from
Google Earth electronic base
and Coast photography of
Vladivostok city

Arc
View
ver. 3.3

There are presented informative and graphic blocks of
maps with the estimation of coastal territory use and
variants of rationalization of coastal zone management
in Vladivostok.

Coastal subdistrict - 04-02

$S = 7,62 \text{ km}^2$ $L_{\text{coastline}} = 1,51 \text{ km}$

Coastal zone capacity = $5,05 \text{ km}^2/\text{km}$

Transport infrastructure

in the radius 0,2 km from coast:

roads = $4,47 \text{ km}/\text{km}^2$

railways = $3,63 \text{ km}/\text{km}^2$

Priority types economical activity:

- residential zone, health services
- industrial, fuel-energy complex
- wholesale and retail trade



port-and-berth use

Indicators of coastal territory use:

- Habitability - 18,6%
- Abandonment - 1,4%
- Industrial reclamation of coastal zone - 8,5%
- Nature management variety - 90%
- Usability - 76,8%
- Recreational reclamation - 56,3%
- Recreation resources - $0,85 + (0,35) \text{ km}$
= 56,3% to 79,5%
- Unimpeded access - 79,5%
- Industrial reclamation of coastal strip - 19,9%
- Port-and-berth use - 0,7%

Types of coastal strip use:

- formal recreation - 0,85 km
- undeveloped shore - 0,35 km
- process buildings - 0,30 km
- berths - 0,01 km

Types of coastal territory use:

- urbanized area - $1,42 \text{ km}^2$
- production activity
and boiler plants - $0,65 \text{ km}^2$
- railways - $0,04 \text{ km}^2$
- roads - $0,45 \text{ km}^2$
- carports - $0,05 \text{ km}^2$
- informal recreation - $0,09 \text{ km}^2$
- undeveloped and littery forest
and beach - $0,02 \text{ km}^2$
- recreational forest - $4,90 \text{ km}^2$

Prospects of coastal territory use - integrated coastal zone management
with preservation of current types of nature management

Types of coastal strip use:



undeveloped and littered shores

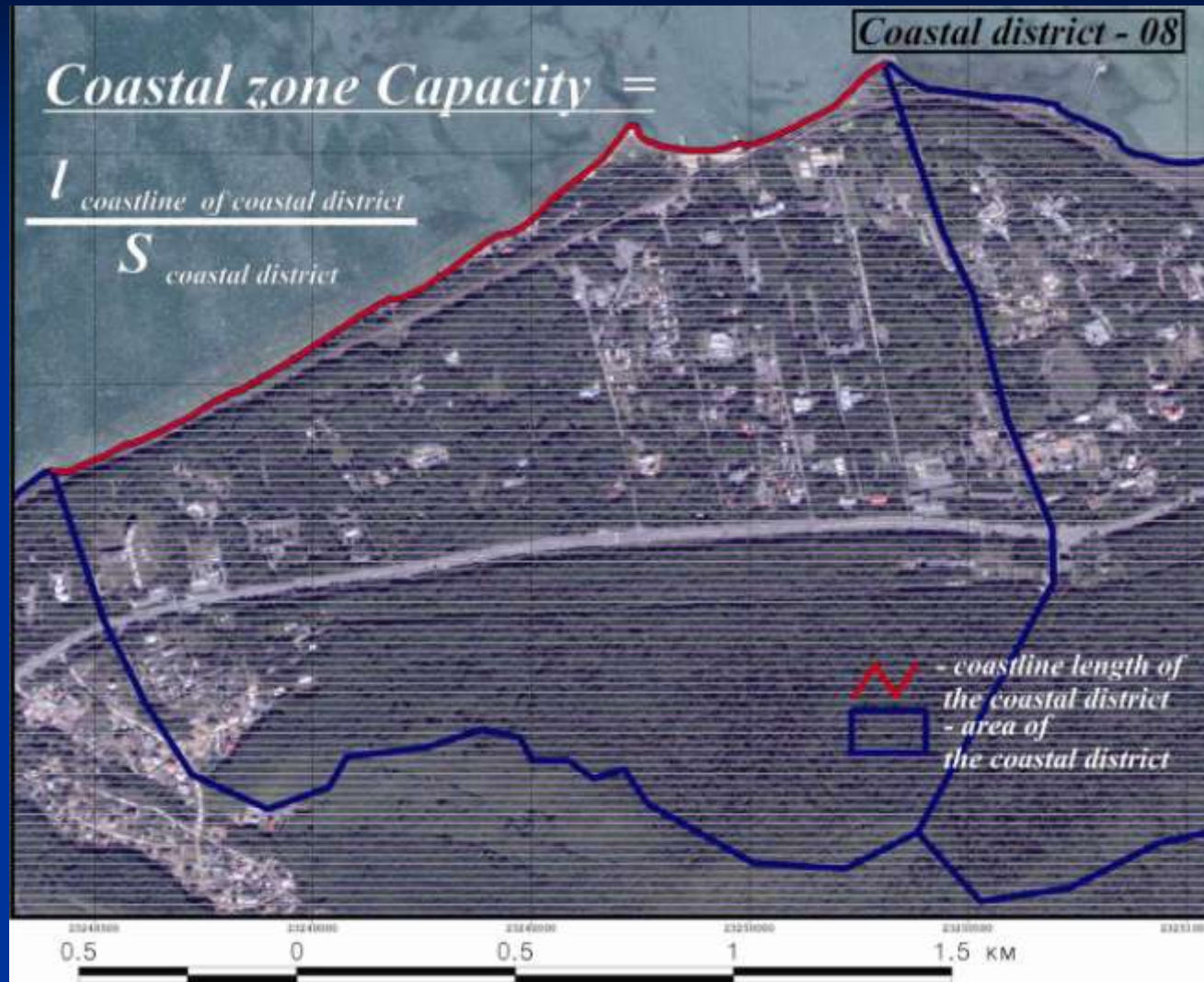


informal recreation

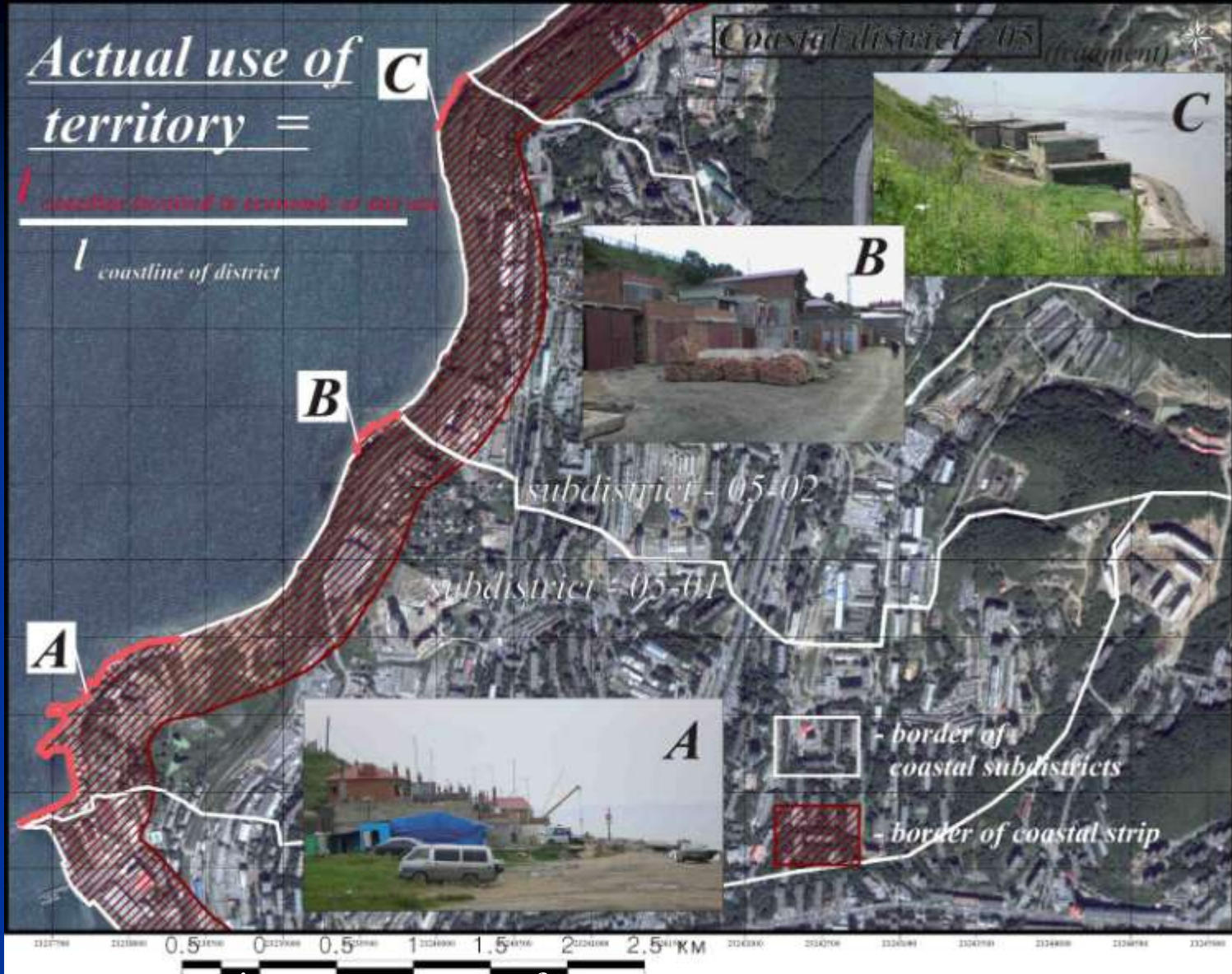
Proposes for rationalization of coastal zone management:

- 1) creation of beach-recreational infrastructure
- 2) construction of sewage cleaning station

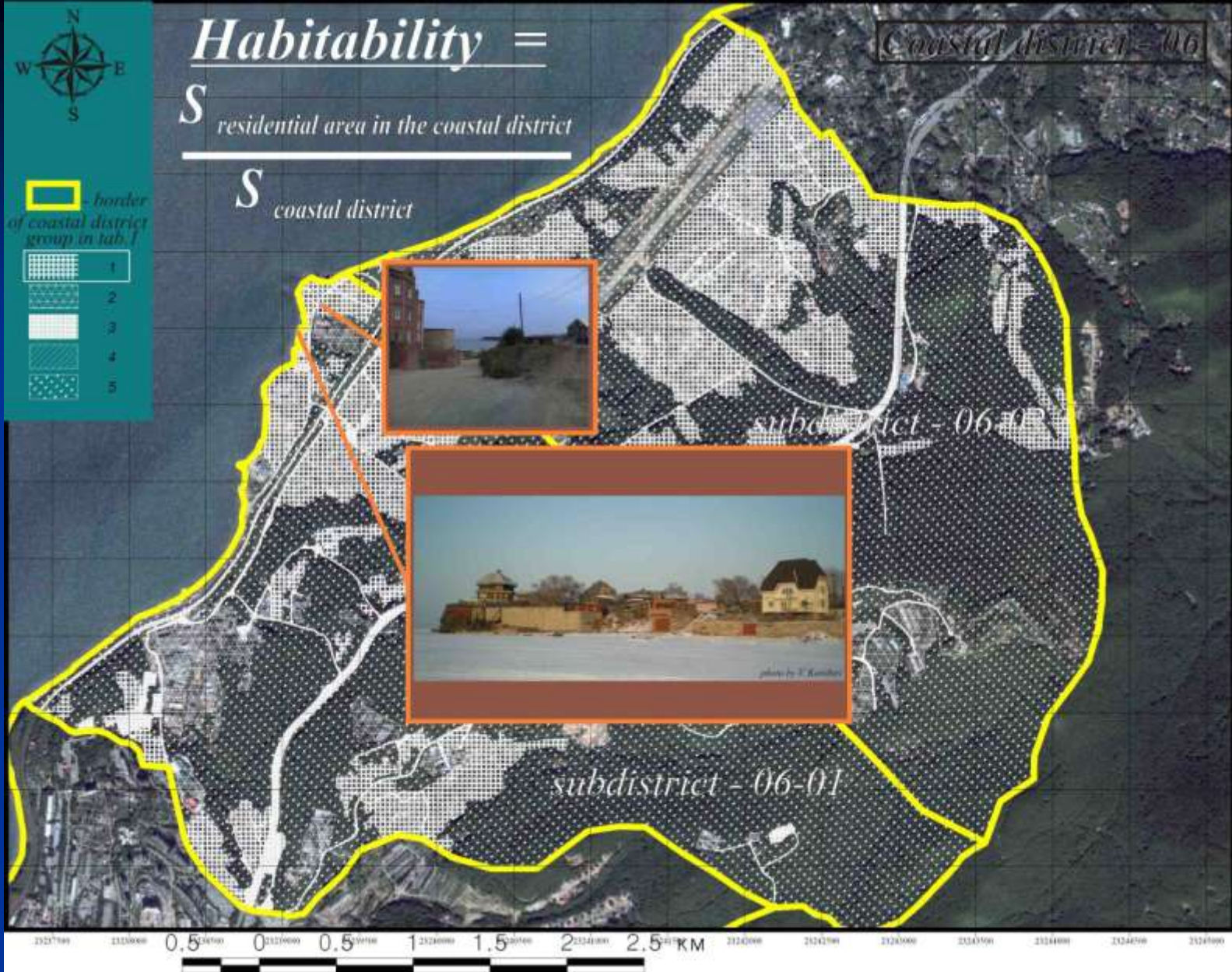
To estimate efficiency of use of territorial resource of the coastal zone the following indicators have been developed and used:



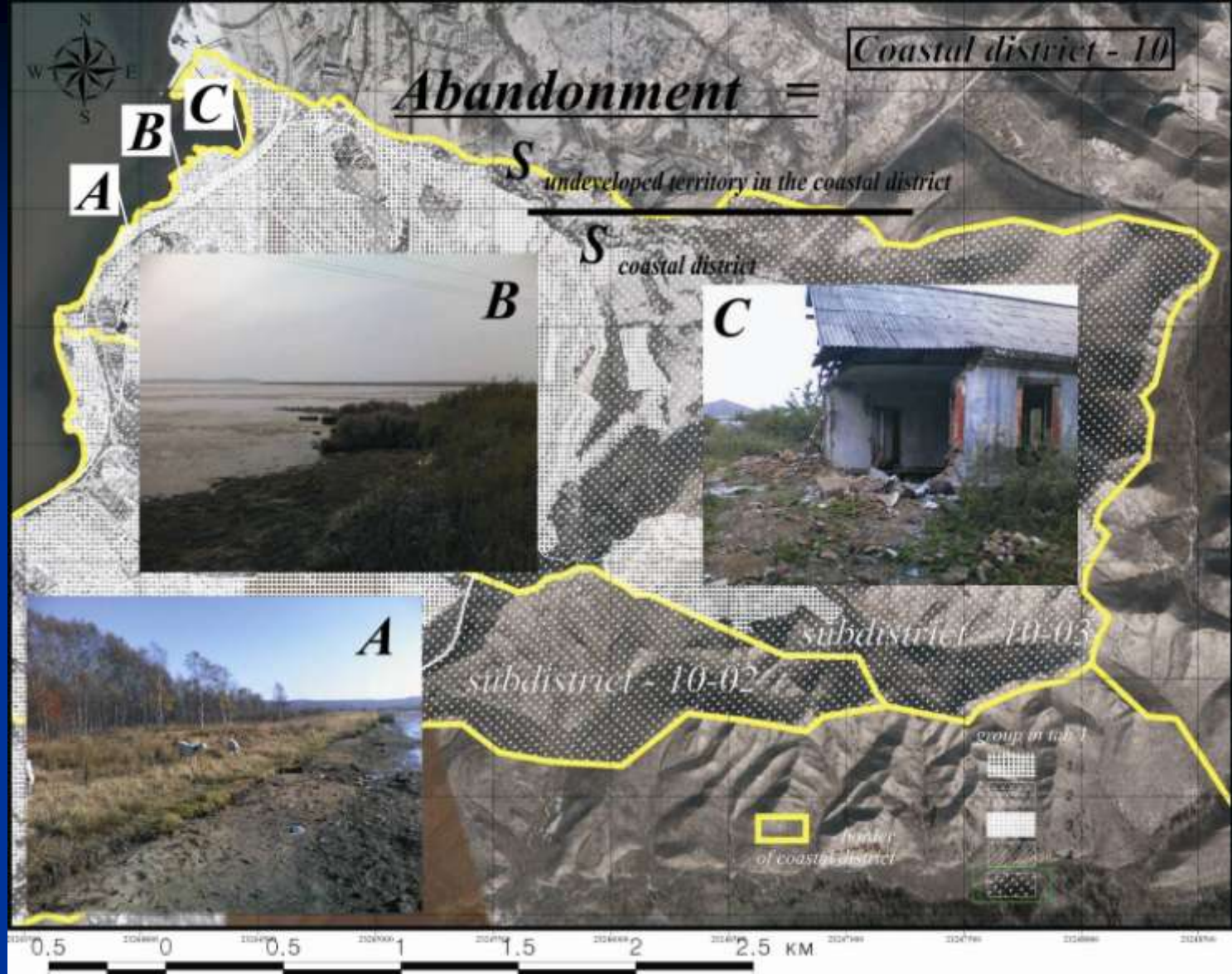
Coastal zone capacity: is ratio between the coastline length and area of the indicated coastal district. The indicator reflects unit of area (km²) per unit of coastline length (km).



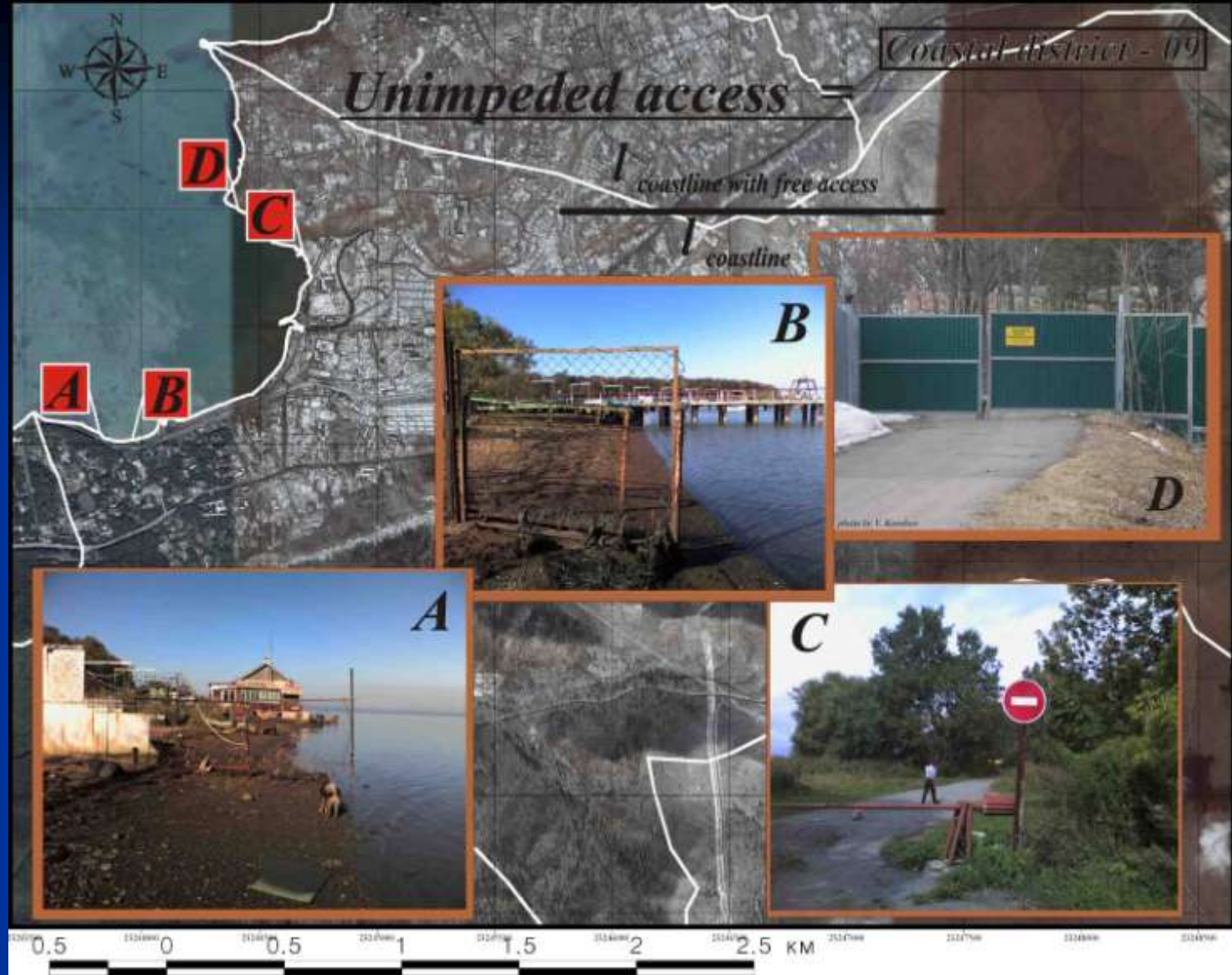
Actual use of territory: is percent ratio of coastline use that is ratio between coastline length involved in economic or any other use and the total length of the coastline. The indicator allows assessing actual coastal strip use and make conclusions on the extent of economical development of the coast.



Habitability: is density of residential area (km²), ratio of summarized area of the territories used under temporary and permanent residence of the population to the coastal district area. The indicator reflects extent of population density.

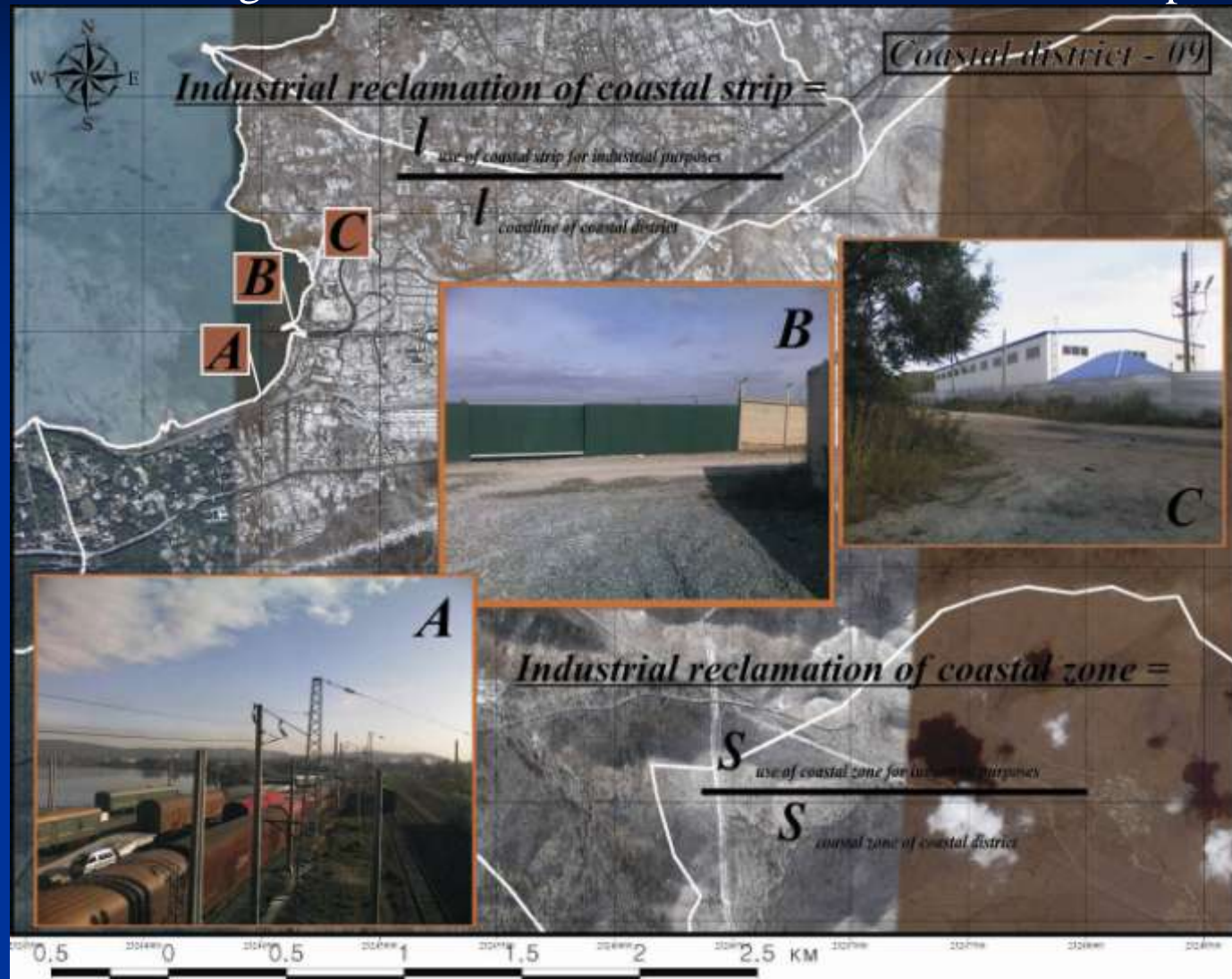


Abandonment: is area of undeveloped territory, i.e. actual nonoperating territory: unsanctioned recreational forest, unused military department areas, ruinous industrial buildings or dwelling houses (km² and % from area). The indicator reflects extent of undevelopment of the coastal subdistricts.



Unimpeded access: is ratio of free access to sea that is percent ratio of coastline length with free access and coastline length of the indicated coastal district. The indicator reflects degree of freedom of movement and limitations for any activity development on coastal strip.

Industrial reclamation of coastal strip: is ratio of use of coastal strip for industrial purposes that is percent ratio of coastline length of industrial subjects and economy activities and coastline length of coastal district. The indicator defines the specificity of coastal use.



Industrial reclamation of coastal zone: is percent ratio between industrial area and total area of coastal district (km). The indicator defines the specificity of coastal use.

Port-and-berth use: is percent ratio of use of coastal strip for sea transport that is ratio of coastline length transformed for sea transport constructions and coastline of coastal district. The indicator defines the ratio of sea transport use.





Recreational reclamation: is percent ratio of use of a coastal strip for the recreational purposes that is ratio of coastline length involved in recreational use and coastline length of a coastal district. The indicator defines the ratio of recreation development.





Recreation resources: the amount of them used for recreation and their possible amount to use for the meliorative and organizational purposes (km). The indicator defines actual and perspective use of a recreational resource.





Litteredness: is empirical estimation of ratio of waste pollution of territory and water area in indicated coastal district:

1 score: unsatisfactory (shore is littered, the water area is cluttered up);

2 scores: satisfactory (insignificant sites of pollution of the water environment are marked and periodic cleaning of territory is carried out);

3 scores: good (permanently clean territory and water area).



Density of roads (transport infrastructure) is the presence of roads in a coastal strip in radius of 200 m from a coastline (km of roads per 1 km² a coastal area). The indicator is useful for estimation of motor transportation saturation.



Availability of the railway: presence of railway stations in 200 m from coastline. The indicator is the factor promoting development of recreation and also the factor limiting development of some types of economic activities.



Freshwater supply: is the area of fresh-water reservoirs in the indicated coastal district (km² and % from the area). The indicator reflects the restriction of territorial resource and prospect of water resource use.



Nature management variety: is percent ratio between the total amount of nature management types in indicated coastal districts and the general amount types of nature management. The indicator reflects the variety use of coastal territory.

For the estimation of the effectiveness of nature management there was developed numerical score of territory efficiency status on condition of environment and ratio of balance of nature management:

1 score: seashore with degrading coastal territory and grave negative consequences (ecological, social-and-economical and etc.), where fast revision of coastal management strategy is required;

2 scores: unreasonable, ineffective, highly conflict use of coastal territory or abandoned seashore, where interference, harmonization and improvement of coastal management strategy are required;

3 scores: average quality of nature management with visible defects, needs for improvement and balanced economical activity;

4 scores: balanced and conceptual coastal management strategy with insignificant defects;

5 scores: ideal, resource-saving, balanced.

A dramatic sunset or sunrise over a city skyline. The sun is low on the horizon, creating a bright orange and yellow glow. A large, wispy cloud formation is visible in the upper half of the sky. The city skyline is silhouetted against the bright light of the sun.

Creation of the atlas for Vladivostok coastal zone shows its importance for planning and regulation of economic activities in the coastal zone.