

# Research into the Coastal Zone Protection Plans of Dalian



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# Research Content

- **Natural conditions of the coastal zone**
- **Situation and problems of development** ► ●
- **Marine industrial distribution** ► ●
- **Research into the direction of development and utilization of the coastal zone** ► ●
- **Study of the control index of sea filling coastline** ► ●

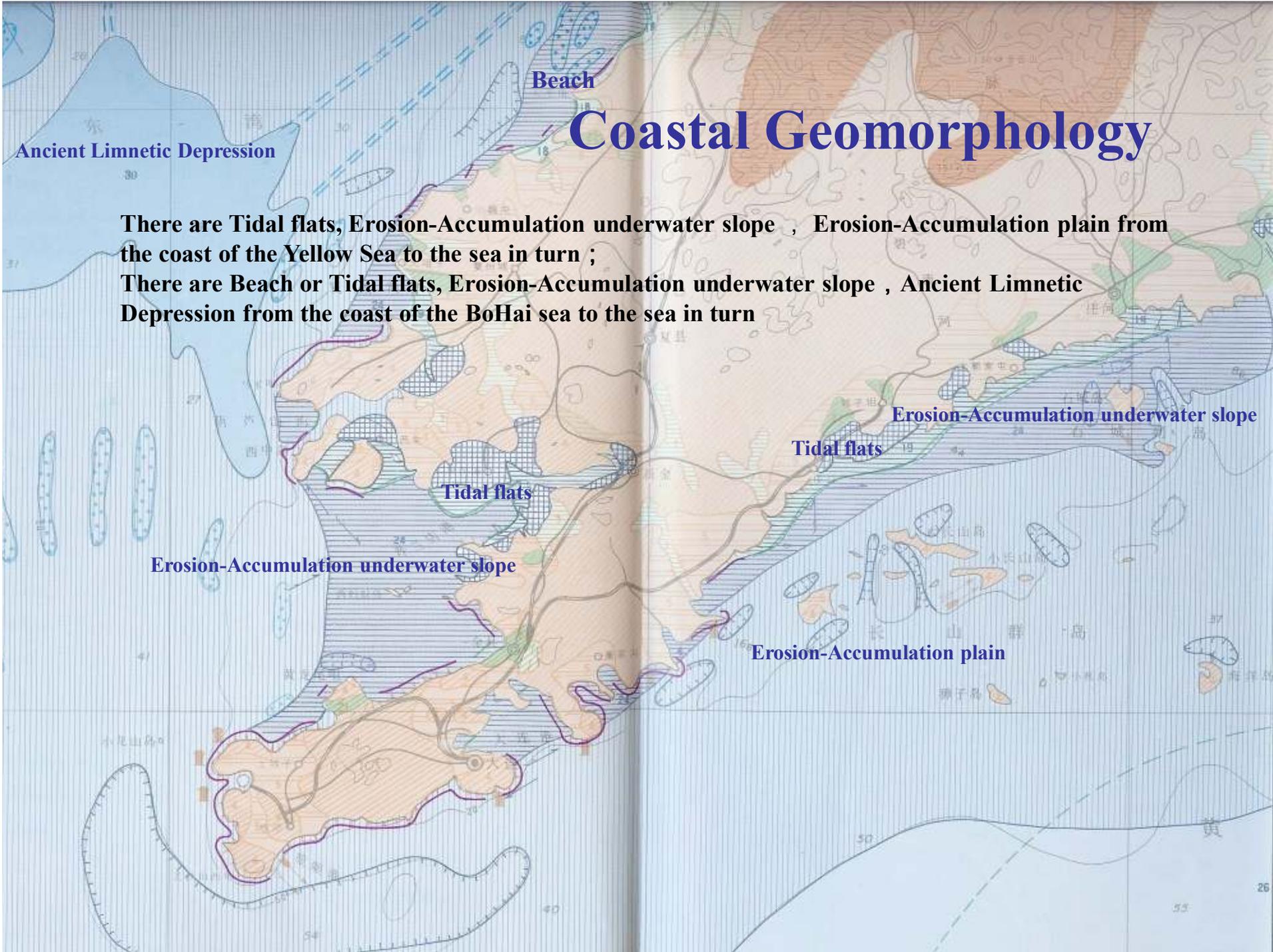


大连市行政区划图  
Dalian Municipality



## Natural conditions of the coastal zone

- Coast, submarine geomorphology, submarine sediment
- Hydrodynamic tidal force, coastal erosion, seawater encroachment, coastal storms, earthquake
- Resources, natural characteristics, environmental conditions



# Coastal Geomorphology

**Ancient Limnetic Depression**

**Beach**

**There are Tidal flats, Erosion-Accumulation underwater slope , Erosion-Accumulation plain from the coast of the Yellow Sea to the sea in turn ;**

**There are Beach or Tidal flats, Erosion-Accumulation underwater slope , Ancient Limnetic Depression from the coast of the BoHai sea to the sea in turn**

**Erosion-Accumulation underwater slope**

**Tidal flats**

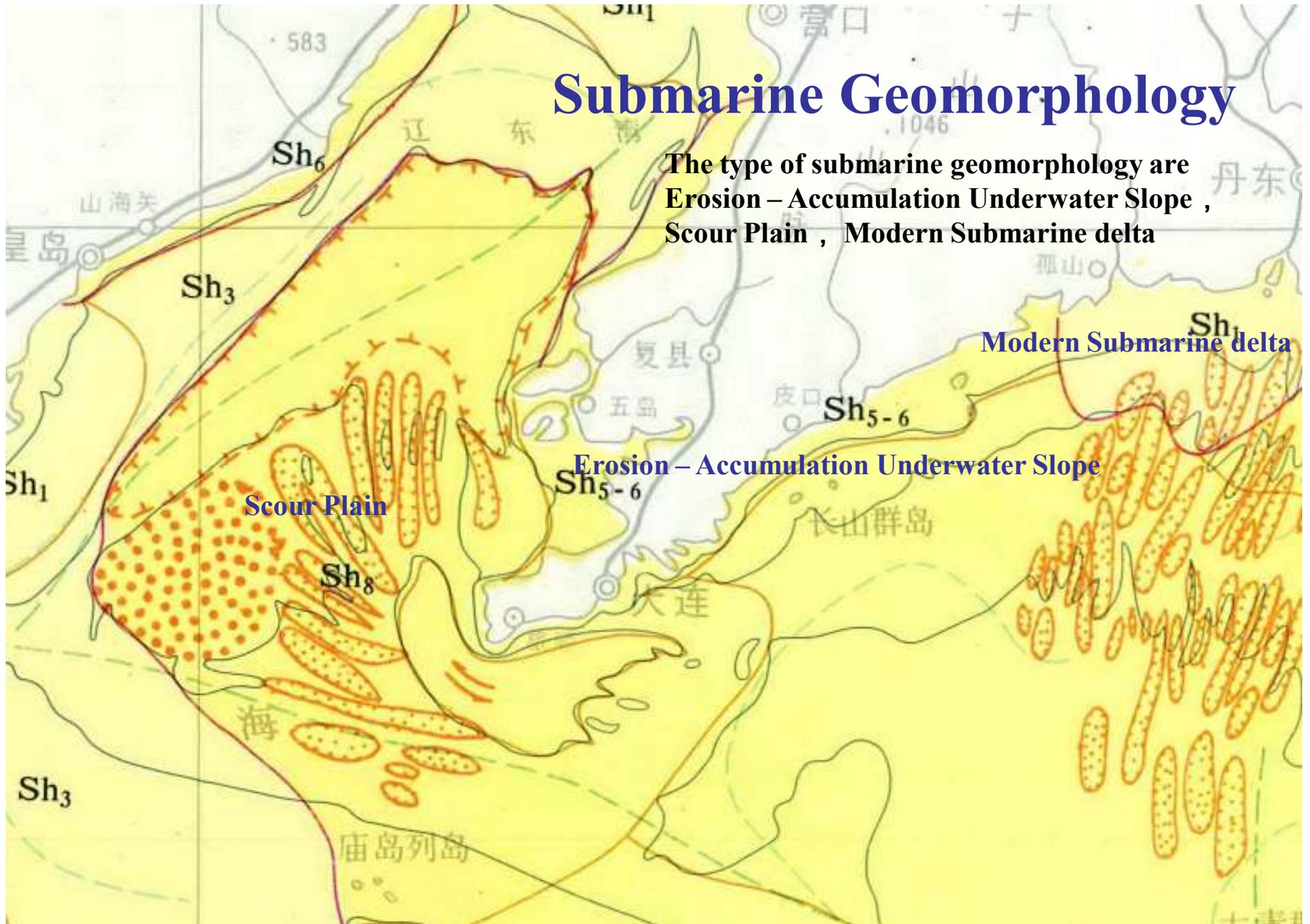
**Tidal flats**

**Erosion-Accumulation underwater slope**

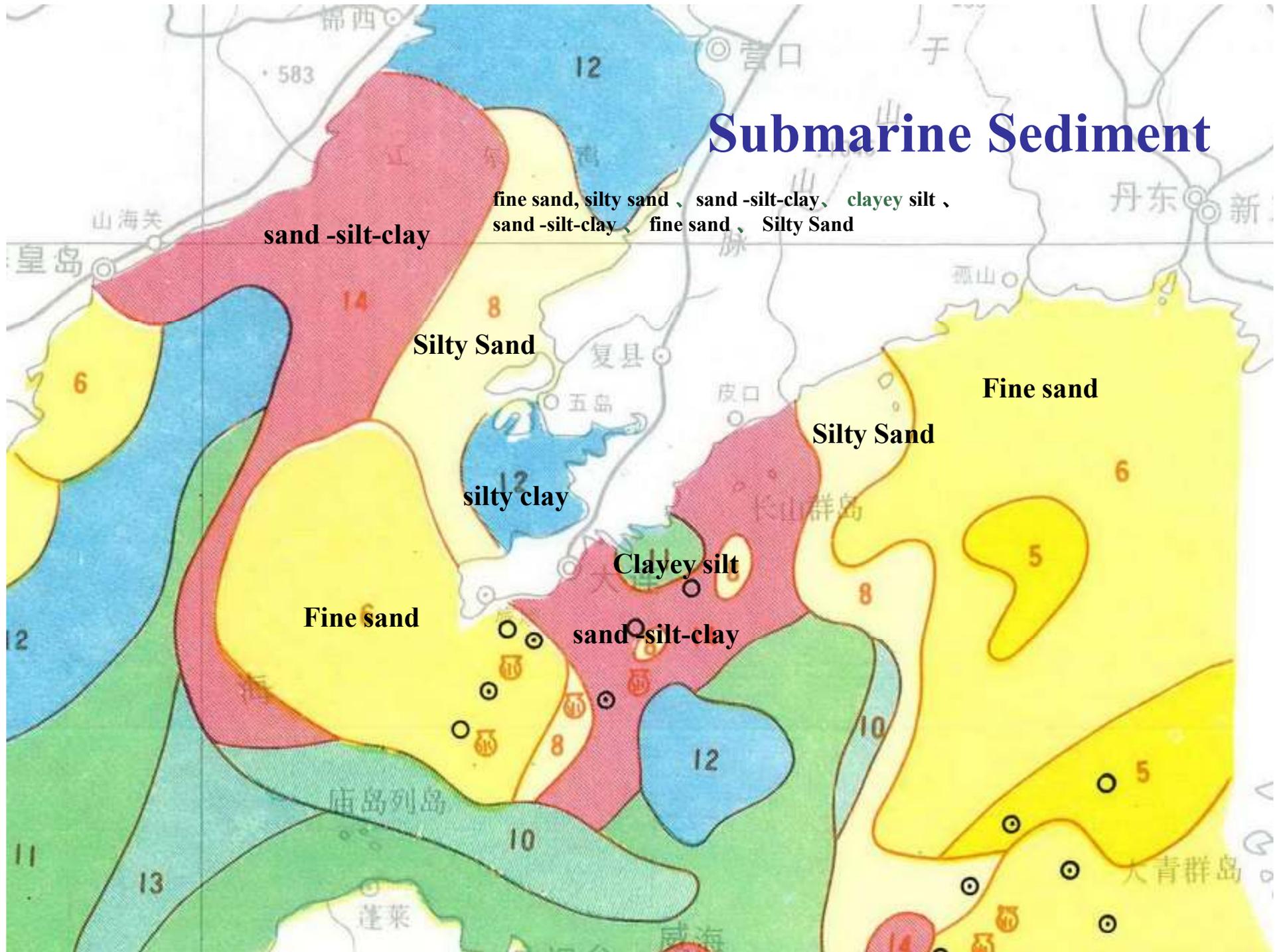
**Erosion-Accumulation plain**

# Submarine Geomorphology

The type of submarine geomorphology are  
**Erosion – Accumulation Underwater Slope ,  
Scour Plain , Modern Submarine delta**



# Submarine Sediment



fine sand, silty sand, sand-silt-clay, clayey silt,  
sand-silt-clay, fine sand, Silty Sand

sand -silt-clay

Silty Sand

Fine sand

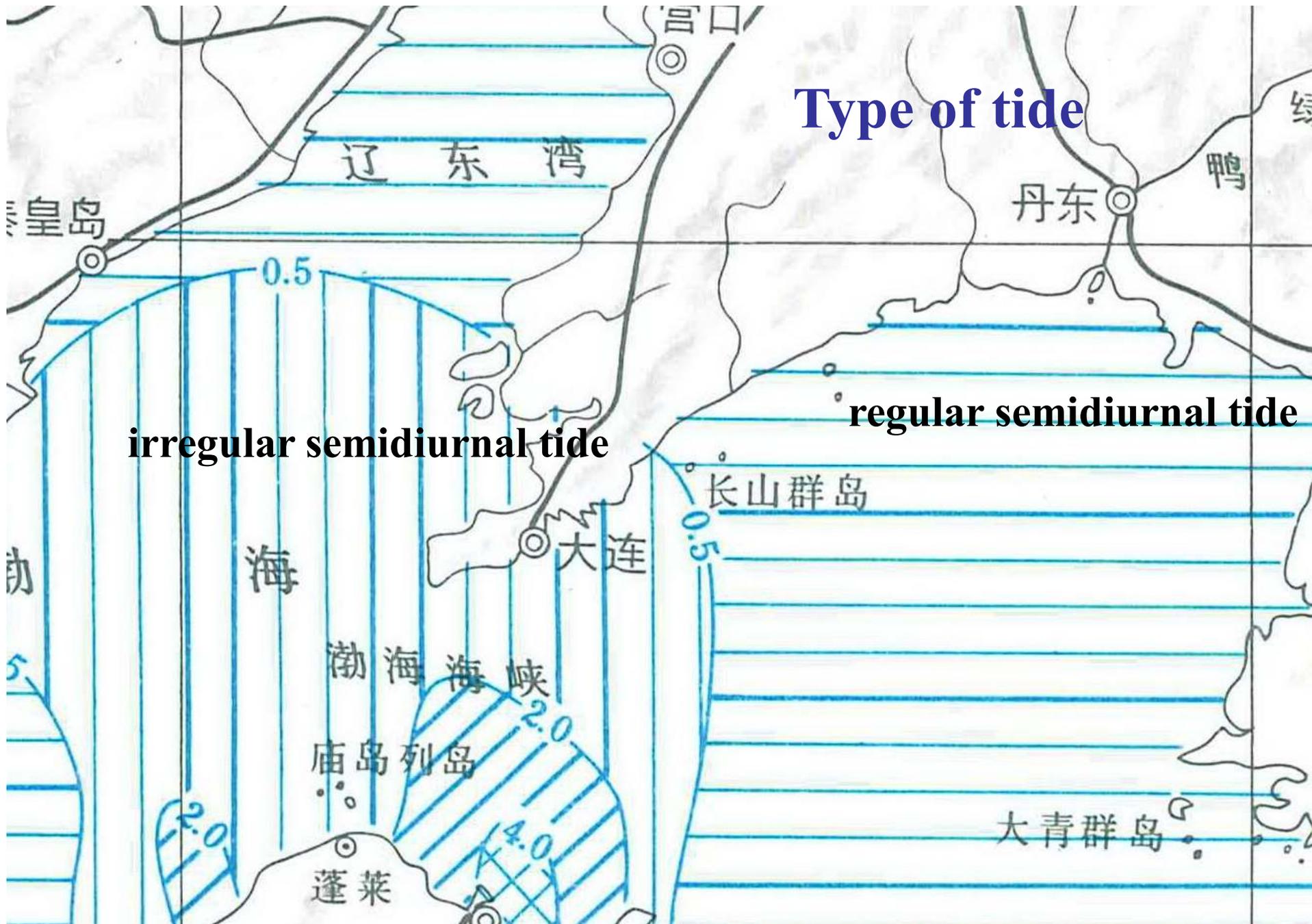
Silty Sand

silty clay

Clayey silt

Fine sand

sand -silt-clay



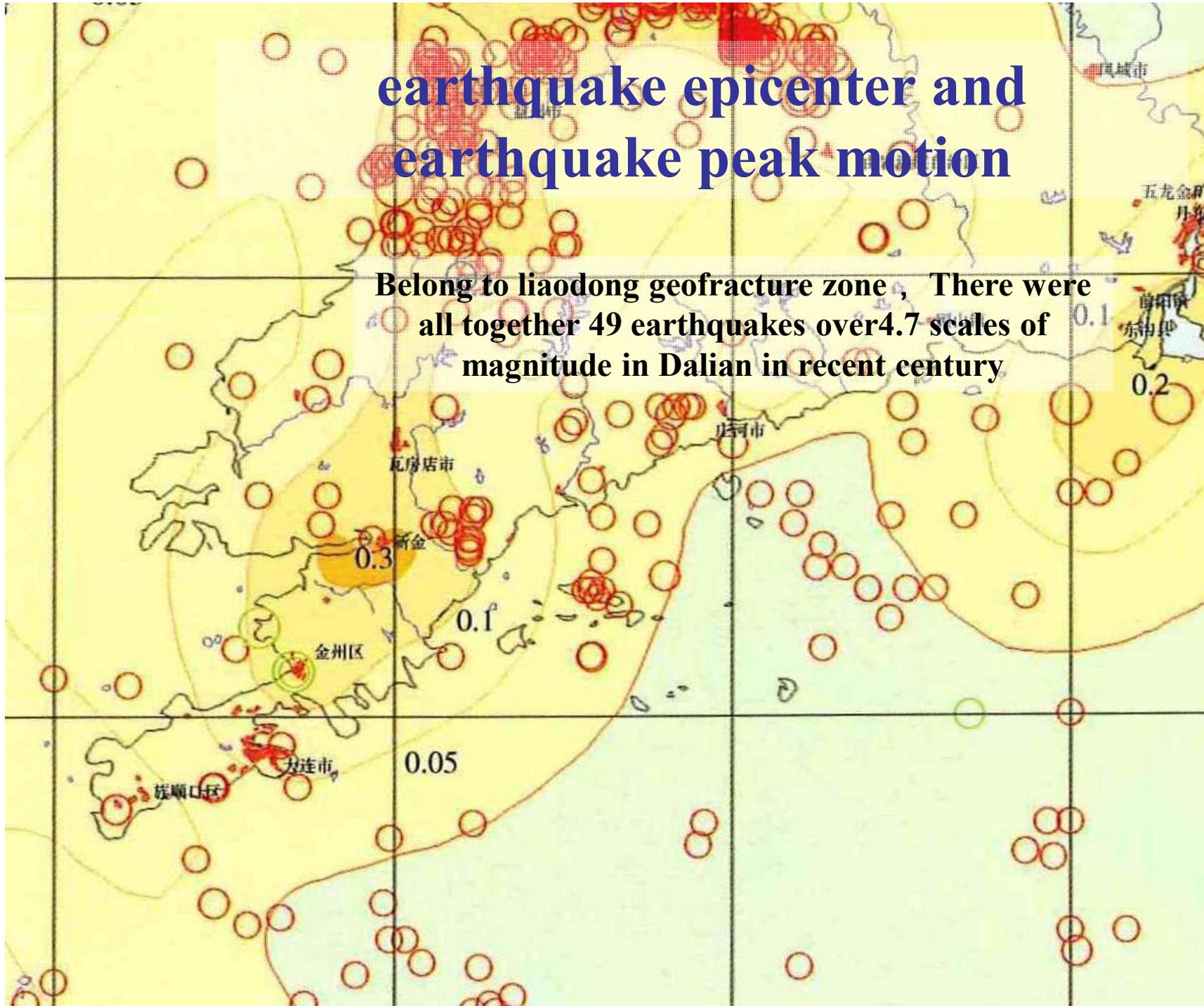
**Type of tide**

**irregular semidiurnal tide**

**regular semidiurnal tide**

# earthquake epicenter and earthquake peak motion

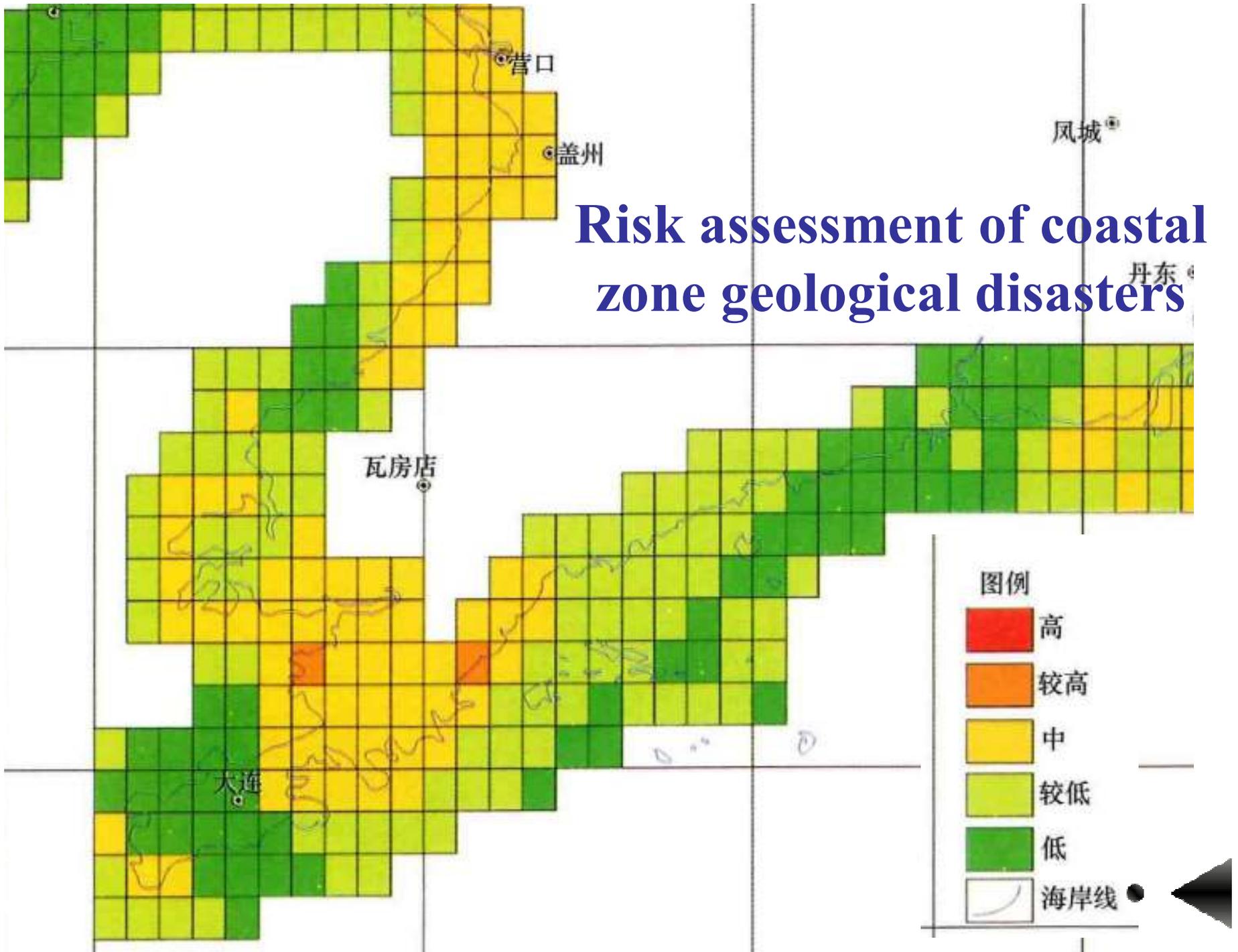
Belong to liaodong geofracture zone , There were all together 49 earthquakes over 4.7 scales of magnitude in Dalian in recent century



# Seawater Encroachment

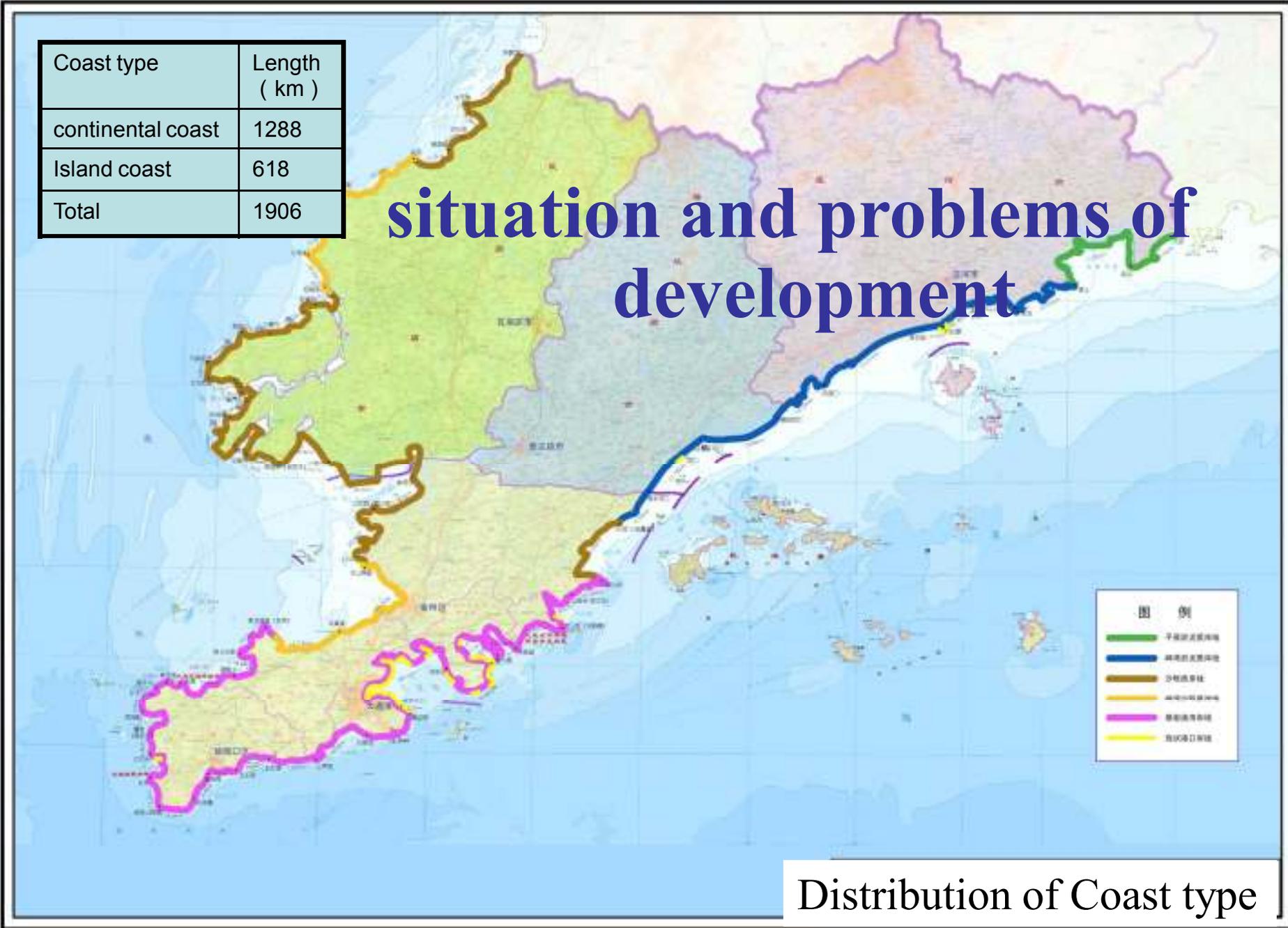


# Risk assessment of coastal zone geological disasters



Coast type	Length ( km )
continental coast	1288
Island coast	618
Total	1906

# situation and problems of development

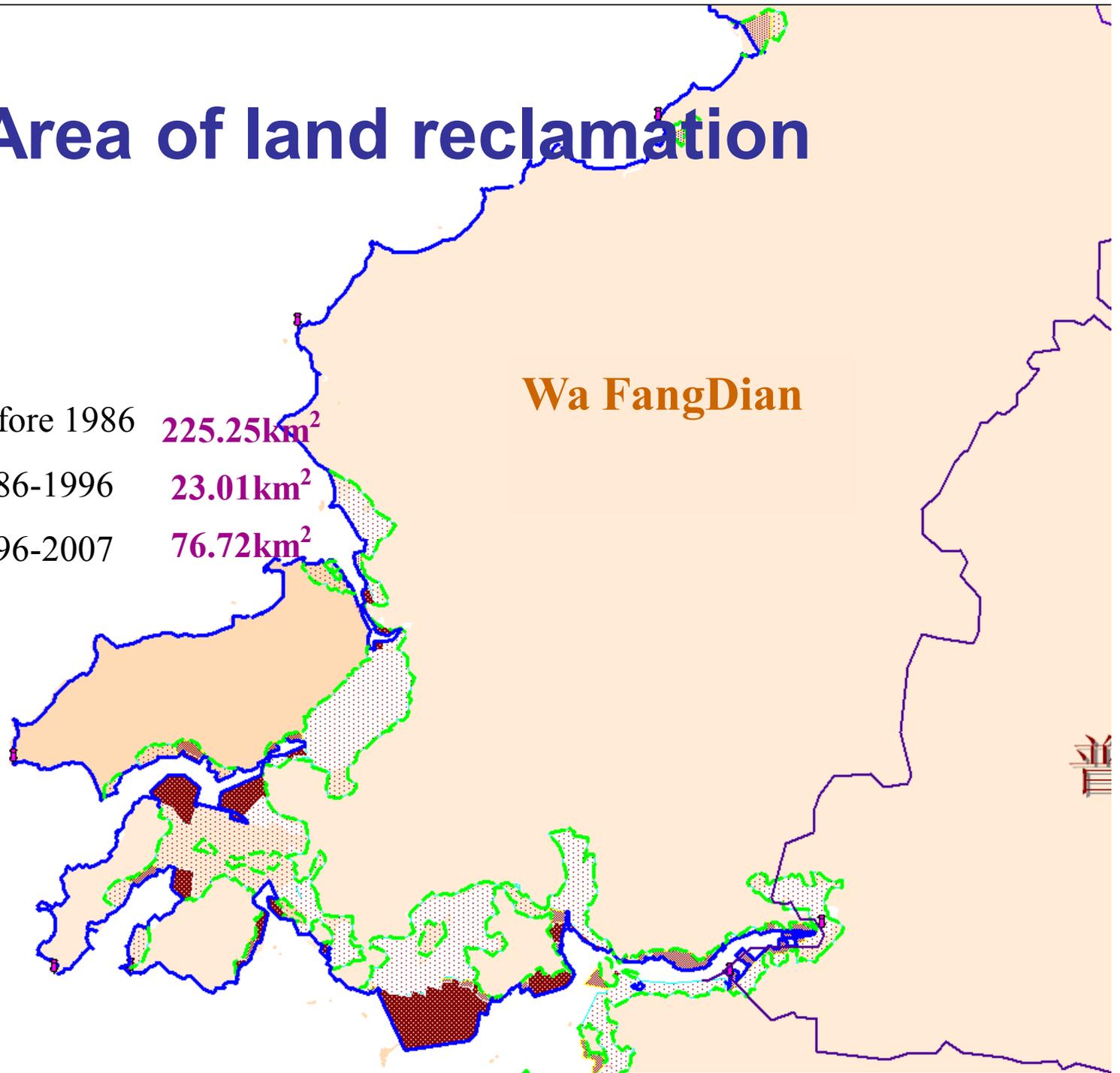


Distribution of Coast type

# Area of land reclamation

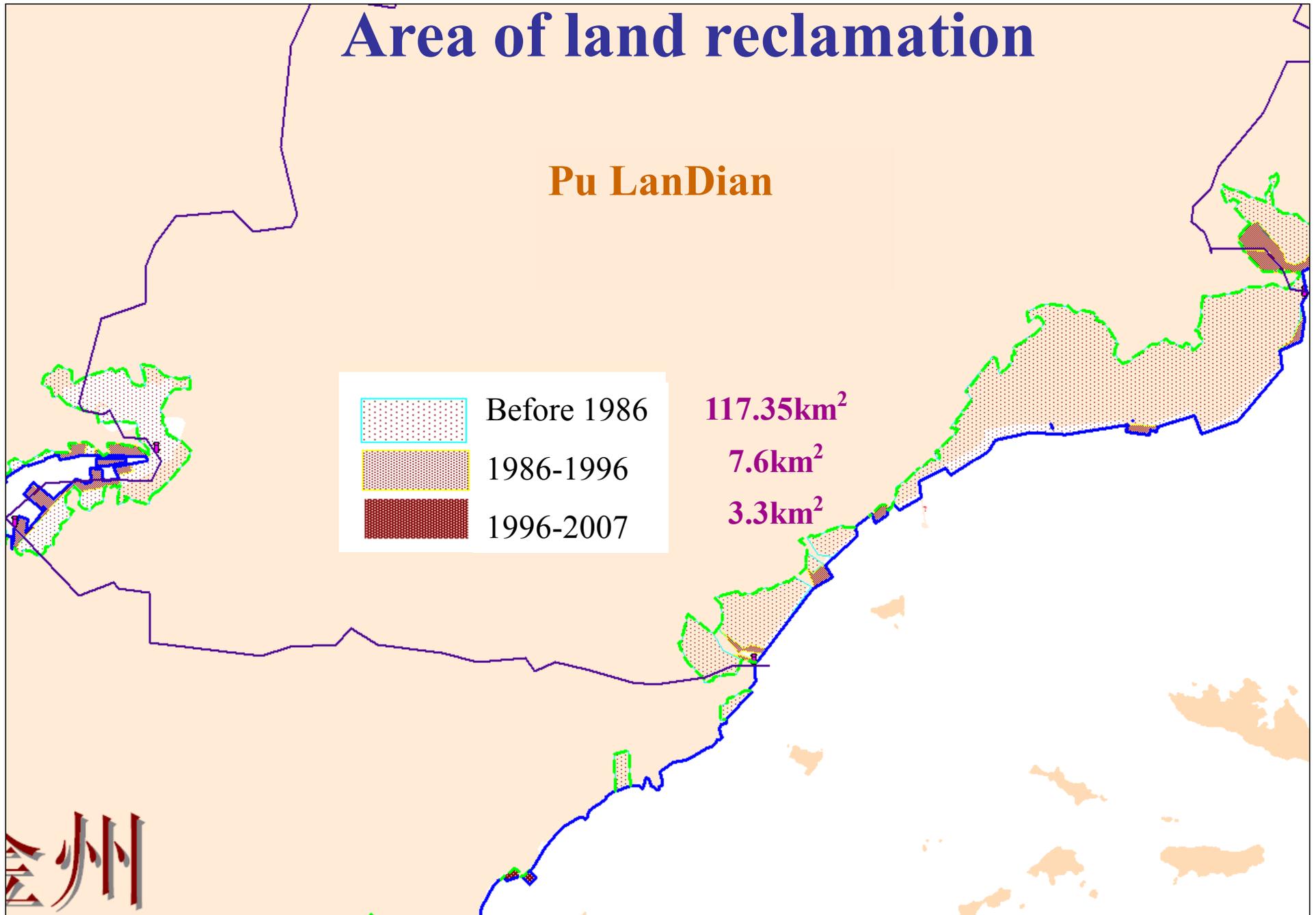
	Before 1986	225.25km <sup>2</sup>
	1986-1996	23.01km <sup>2</sup>
	1996-2007	76.72km <sup>2</sup>

Wa FangDian

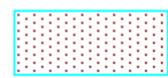


# Area of land reclamation

## Pu LanDian

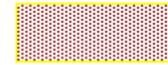


# Area of land reclamation



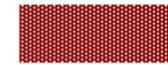
Before 1986

54.31km<sup>2</sup>



1986-1996

9.8km<sup>2</sup>

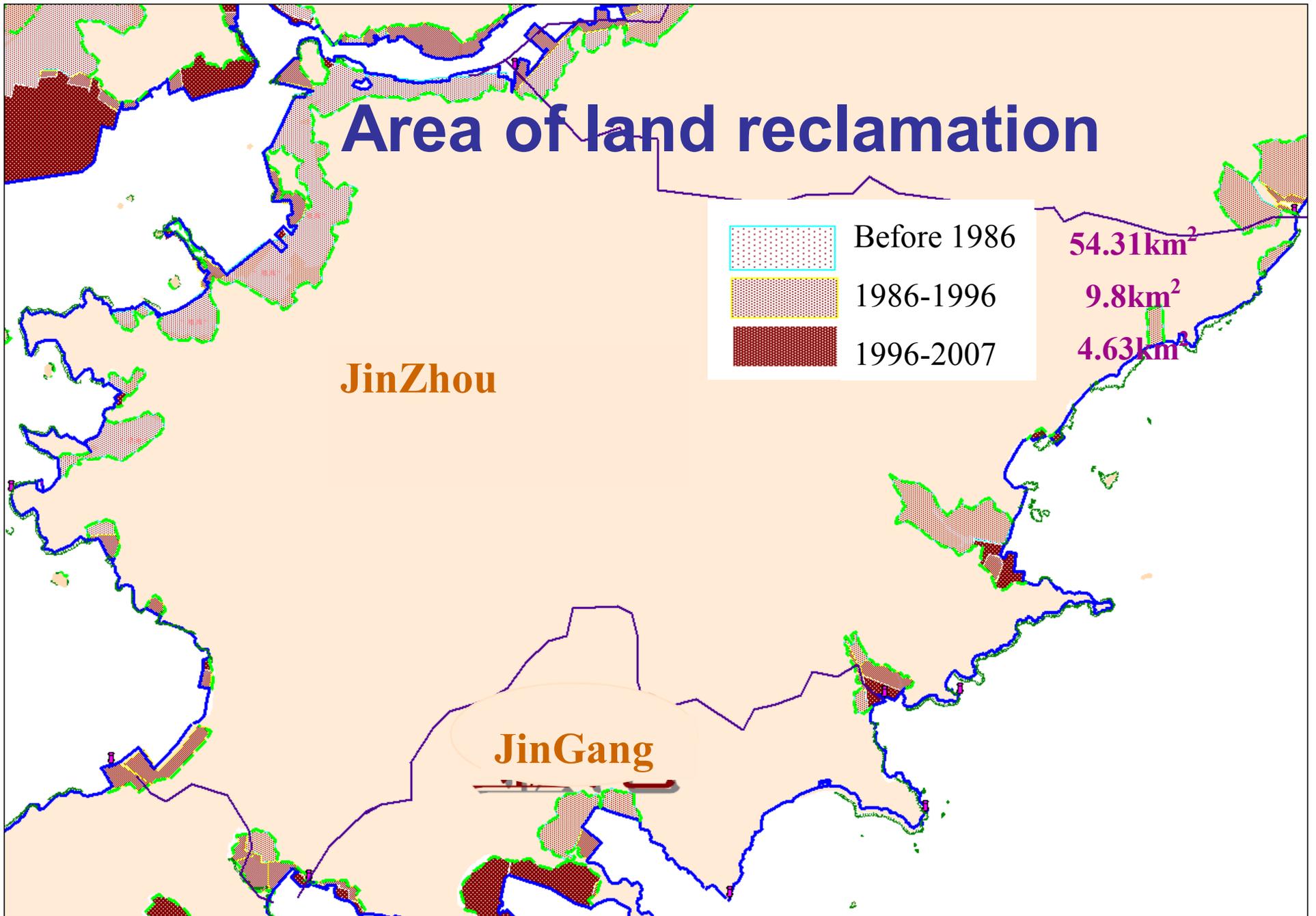


1996-2007

4.63km<sup>2</sup>

JinZhou

JinGang

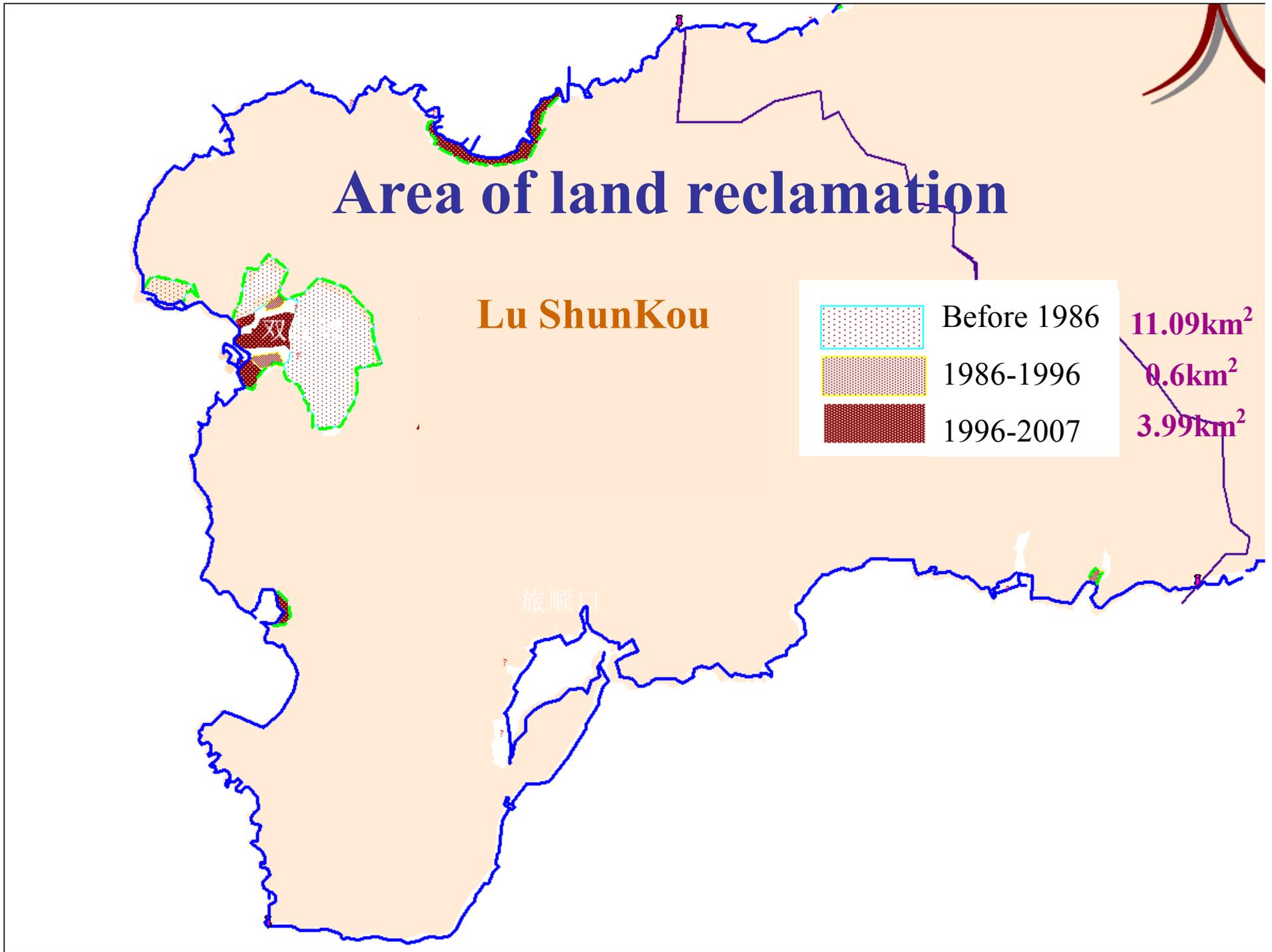


# Area of land reclamation

Lu ShunKou

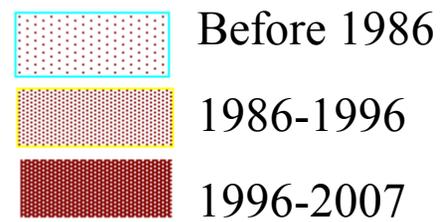
	Before 1986	11.09km <sup>2</sup>
	1986-1996	0.6km <sup>2</sup>
	1996-2007	3.99km <sup>2</sup>

旅顺口



# Area of land reclamation

## Central area of DaLian



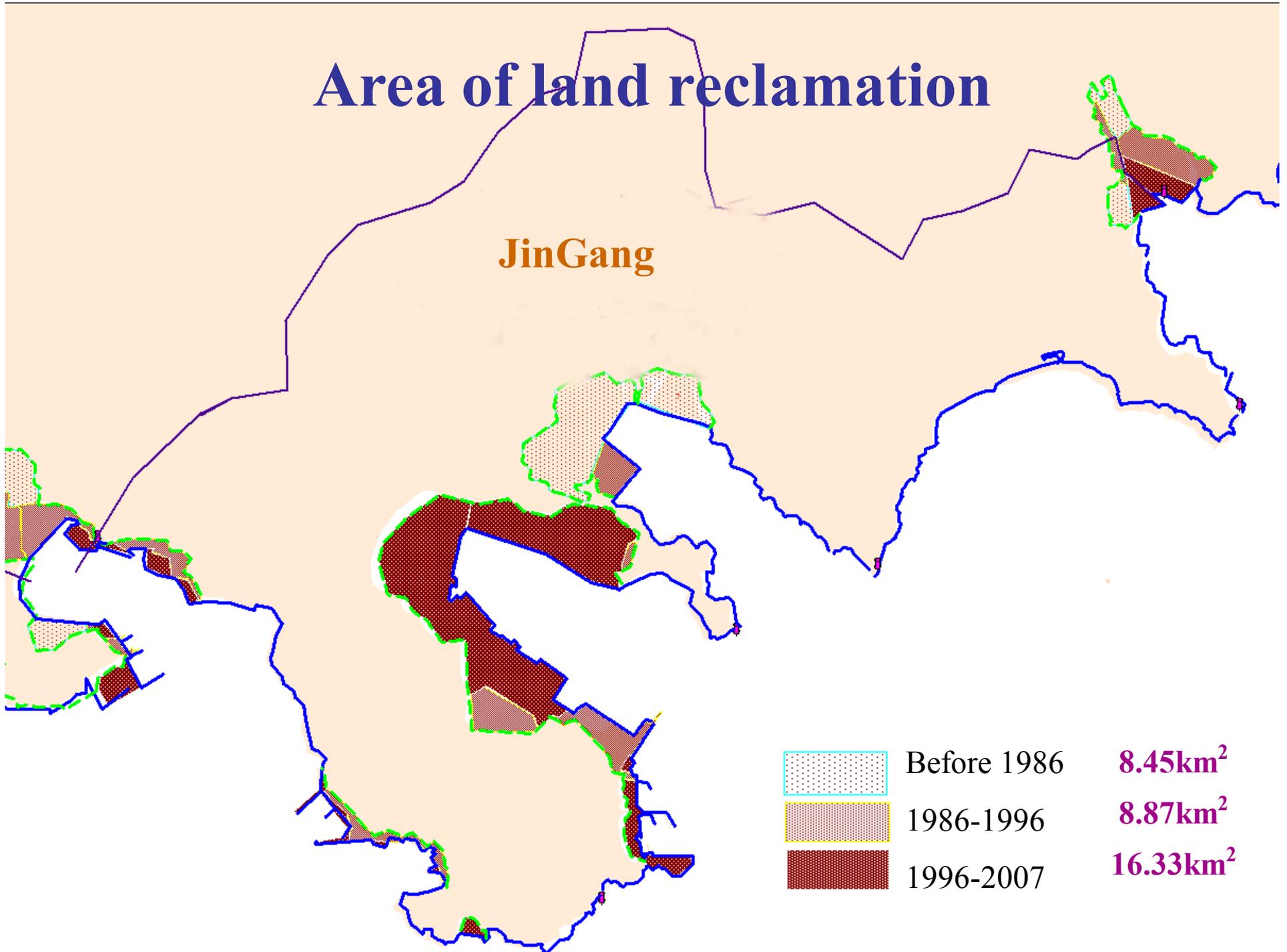
5.72km<sup>2</sup>

8.11km<sup>2</sup>

15.09km<sup>2</sup>

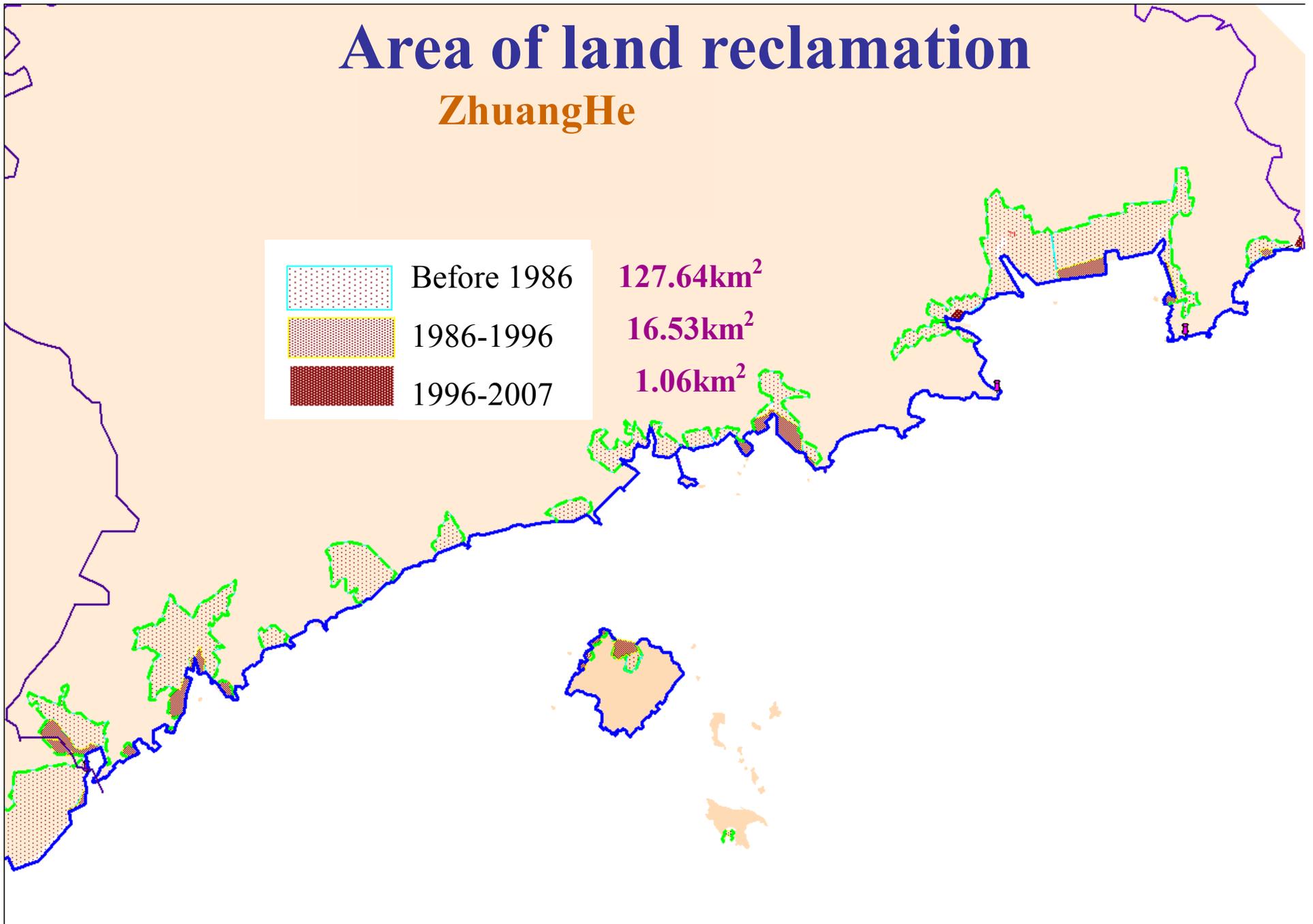
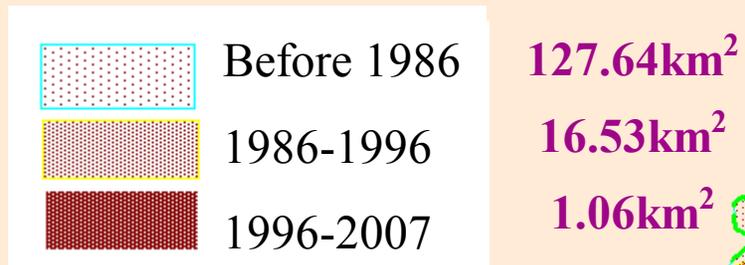
# Area of land reclamation

JinGang



# Area of land reclamation

## ZhuangHe



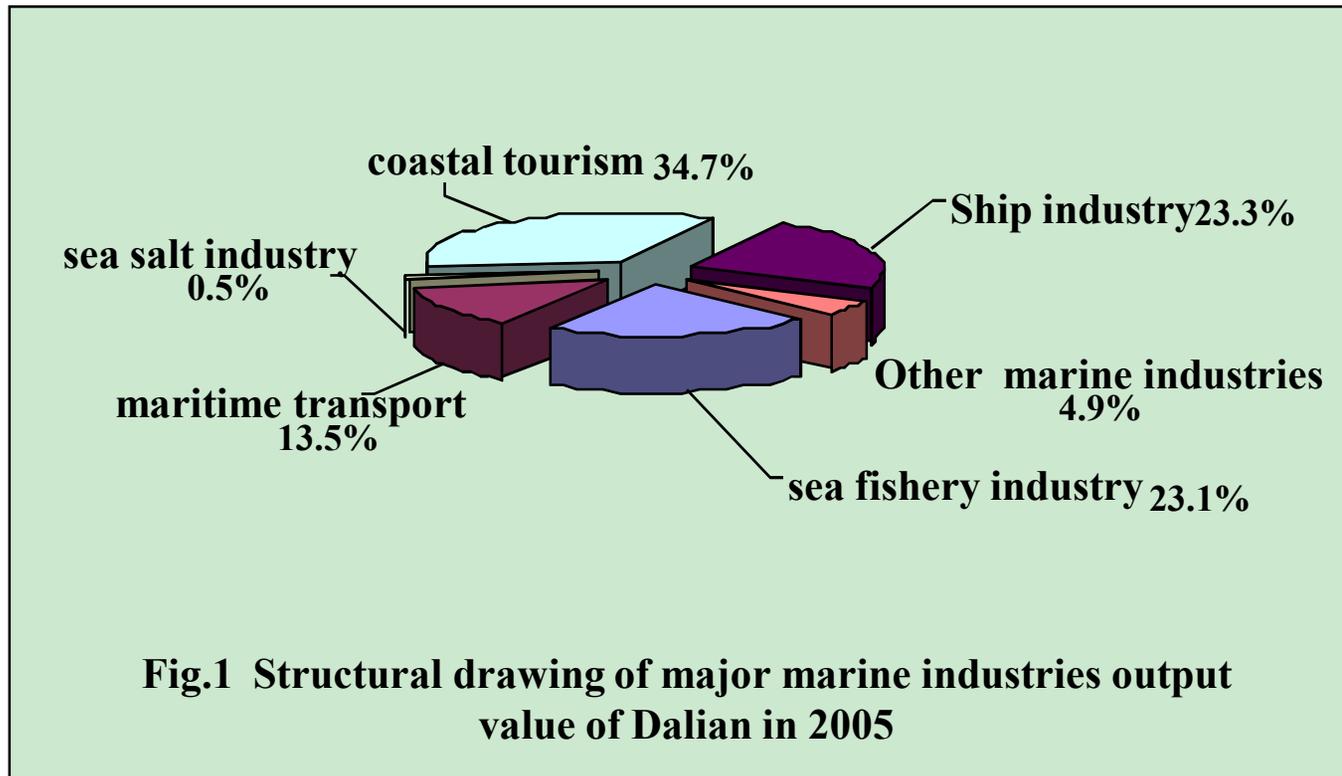
# Area of land reclamation in DaLian

county ( city/district )	1986-1996	1996-2006	Total
Zhuanghe city(km <sup>2</sup> )	16.53	1.06	17.59
Jinzhou district(km <sup>2</sup> )	9.8	4.63	14.43
Central area of Dalian(km <sup>2</sup> )	8.11	15.09	23.2
Lv shunkou district(km <sup>2</sup> )	0.6	3.99	4.59
Wa fangdian city(km <sup>2</sup> )	23.01	76.72	99.73
Pu landian city(km <sup>2</sup> )	7.6	3.3	10.9
Jingan district(km <sup>2</sup> )	8.87	16.33	25.2
Total(km <sup>2</sup> )	74.52	121.12	195.64

# Length of coastline consisting of reclaimed land

County /city	Yellow sea		Bohai		Total	
	continental coast (km)	occupancy rate (%)	continental coast (km)	occupancy rate (%)	continental coast (km)	occupancy rate (%)
<b>Total</b>	<b>607.10</b>	<b>51.5</b>	<b>680.40</b>	<b>43.9</b>	<b>1287.50</b>	<b>47.4</b>
Zhuanhe city	215.00	51.3	--	--	215.00	51.3
Wafangdian city	--	--	423.10	46.7	423.10	46.7
Pulandian city	52.00	97.7	10.00	100	62.00	98.3
Jinzhou district	100.00	45.7	91.00	55.0	191.00	41.8
Jingang district	67.00	46.6	--	--	67.00	46.6
Lushunkou district	54.90	3.3	92.70	14.3	147.60	9.4
Central area of Dalian	118.20	64.6	DUT 63.60	26.8	181.80	53.4

# Marine industrial distribution



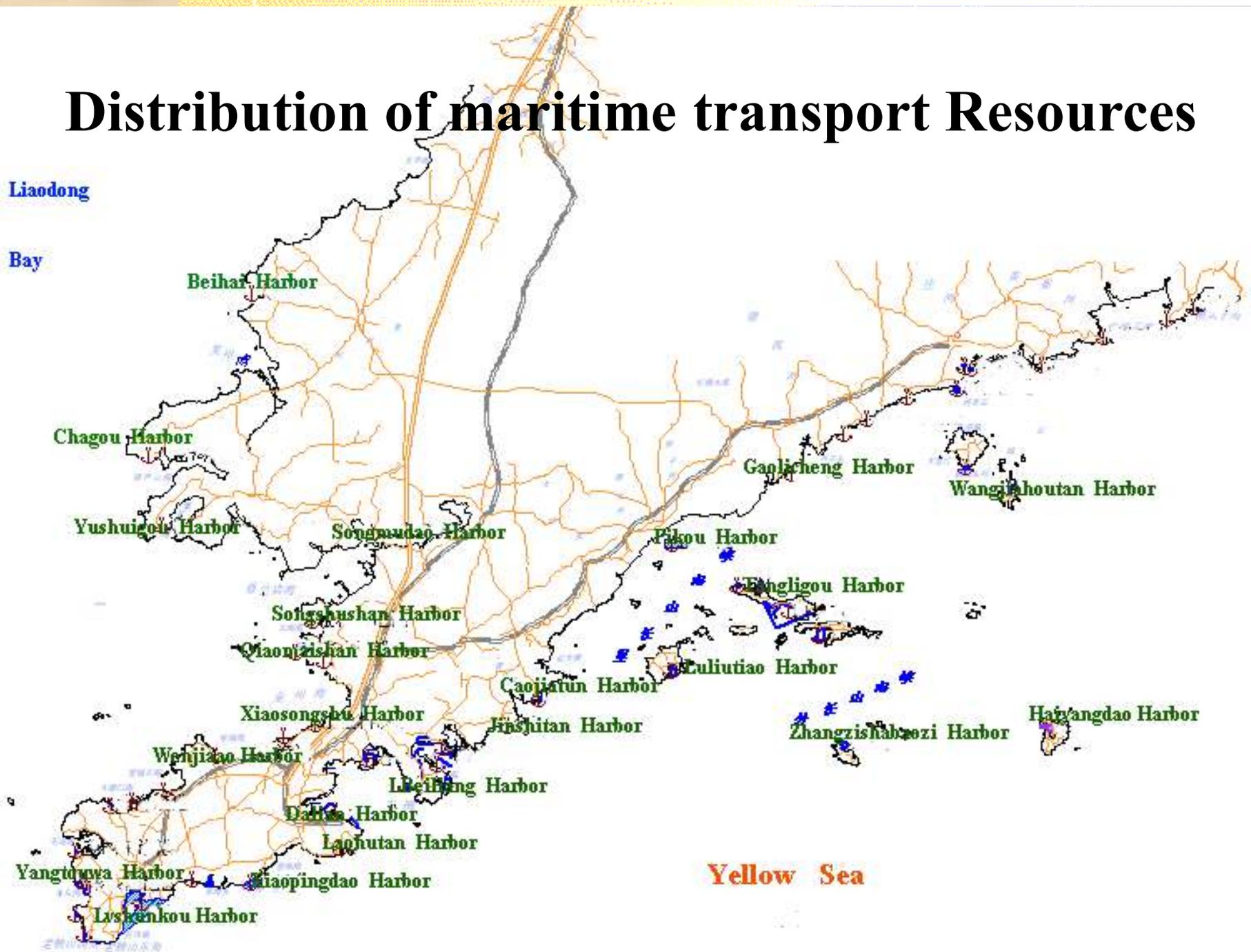
# Distribution of coastal tourism Resources



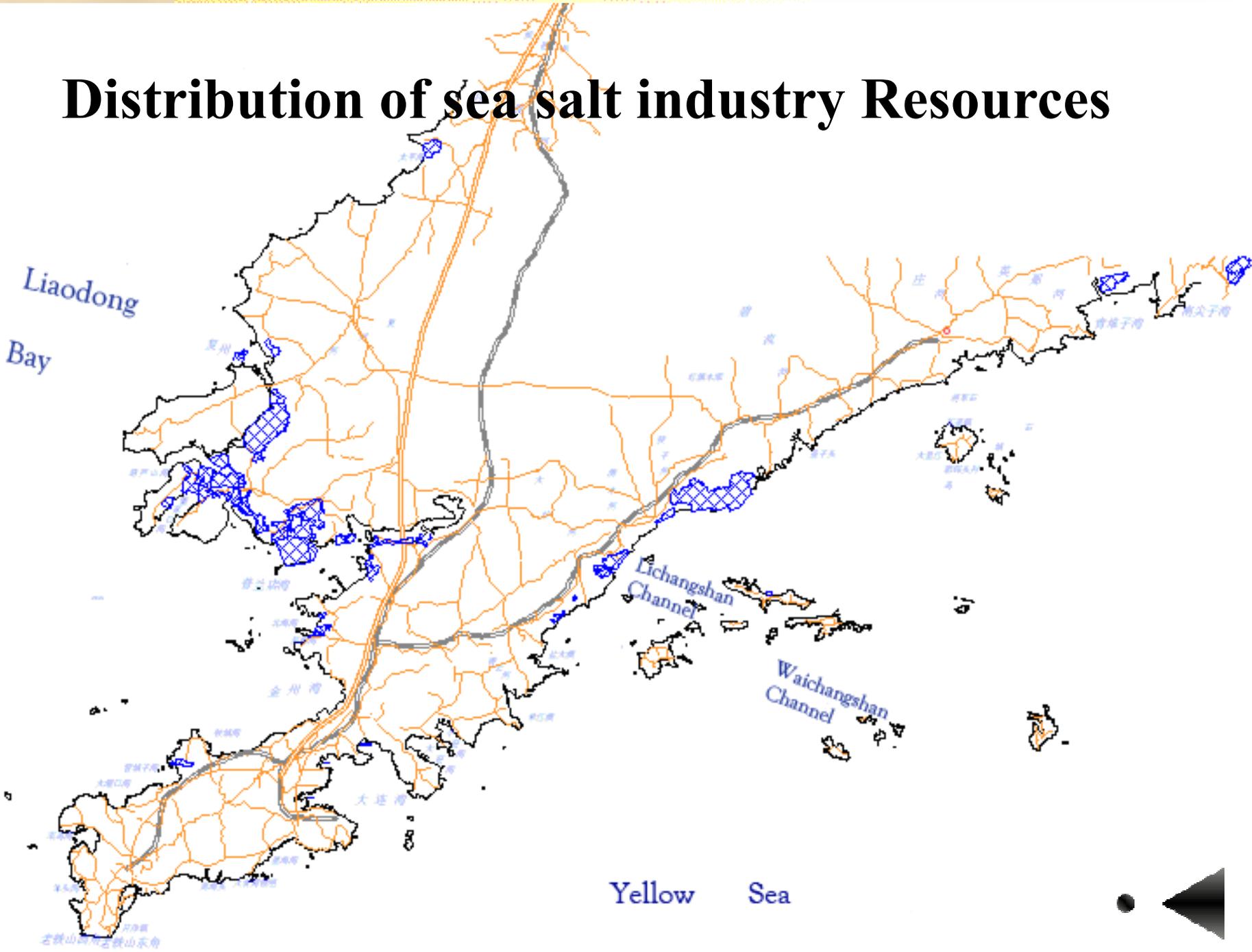
# Distribution of maritime transport Resources

Liaodong

Bay



# Distribution of sea salt industry Resources



# Research into the direction of development and utilization of the coastal zone

- **The principle of coastal zone protection and utilization as follows:**





# **Research into the direction of development and utilization of the coastal zone**

## **■ 1. Resource protection.**

**Strictly controlling the utilization of the coastal zone, protecting the important ecosystem of the natural coast.**

**Saving ecologically sensitive resources such as beaches, everglades etc.**

**Forbidding land reclamation and the exploiting of the natural coastline.**

**Strengthening management and protection for state-level and local-level oceanic nature protection areas.**

**Prohibiting using non-renewable coastal zone resources, destroying unrecoverable natural coastal environment.**



## **2. The coastal zone environmental quality regulation.**

- **It is important to reinforce pollution prevention in coastal waters, such as Dalian Bay; to combine pollution prevention in sea areas with comprehensive rehabilitation in urban environments; to develop local pollution prevention and handling measures.**
- **To minimize the amount of contaminant discharges entering the sea; to restore environmental functions and ecological indicators in polluted sea areas.**



### **3.Coastal Zone Development Regulations**

- **Coastal zone utilization should give priority to the following projects:**
- **Major military installations related to national security;**
- **Energy, transportation, communications and water supply infrastructure construction projects;**
- **Villages, towns and public service facilities construction projects;**
- **Projects in keeping with the advantage of resources and development directions**
- **Significant bank protection projects;**



### **3.Coastal Zone Development Regulations**

- **Projects that promote ecosystem balance;**
- **The introduction of advanced technology and scientific research**
- **The use of aquaculture, proliferation projects;**
- **The island development project;**
- **Wastewater, exhaust gas, solid waste utilization and environmental governance projects;**
- **With regards to the development and utilization projects, cross-site selection, contradictions, eco-efficiency, economic and social benefits of the best projects should be taken into consideration.**



## **4. Coastal land control.**

**The shore sections with the following conditions should be retained:**

- **1) Suitable for harbor construction,**
- **2) Suitable for leisure beaches and tourist areas**
- **3) Suitable for the establishment of coastal defense and military installations**
- **4) Areas with functional disputes and resources utilization potential.**



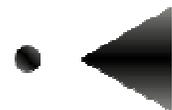
## **5. Coastal traffic policies.**

- **Construct the cross-border roads and highways, which are parallel to the coastline, with reasonable distance between the coastline and hinterland.**
- **Construct a mini branch road perpendicular to the coastline, in order to reduce any negative impact to it.**
- **Do not construct cross-border roads or highways on beaches, lagoons, land not available for development or other ecologically sensitive areas.**
- **Construct a mini branch road connecting the cross-border roads, highways, and coastline in the least environmentally sensitive areas.**



## **6. Coastal disaster prevention plan.**

- **Tightly control the groundwater yield to inhibit sea water intrusion.**
- **Implement coastal eco-environmental restoration engineering.**
- **The emphasis is to solve the problems of quarrying and dredging, coastal erosion caused by groundwater overexploitation, sea water intrusion etc, for the sake of promoting the coastal protection project, restoring and improving the coastal environment.**



## Study on the control index of sea filling coastline

target layer	item level	factor level	index layer
<b>Control index of sea filling coastline</b>	<b>A<sub>1</sub> resource system</b>	<b>B<sub>1</sub> raw materials</b>	<b>C<sub>11</sub> length of available coastal line</b>
			<b>C<sub>2</sub> water area</b>
			<b>C<sub>3</sub> bay connectivity</b>
		<b>B<sub>2</sub> resource utilization</b>	<b>C<sub>4</sub> marine resources utilization ratio</b>
			<b>C<sub>5</sub> natural coastline preserving rate、</b>
	<b>A<sub>2</sub> environment system</b>	<b>B<sub>3</sub> natural disaster</b>	<b>C<sub>6</sub> Coastal Erosion Rate</b>
			<b>C<sub>7</sub> frequency of storm tide</b>
			<b>C<sub>8</sub> rising rate of sea level</b>
			<b>C<sub>9</sub> disastrous geological risk</b>
		<b>B<sub>4</sub> man-made disaster</b>	<b>C<sub>10</sub> area of seawater intrusion</b>

## Study on the control index of sea filling coastline

target layer	item level	factor level	index layer
Control index of sea filling coastline	A <sub>3</sub> social system	B <sub>5</sub> development activity	C <sub>11</sub> the reclamation of land
			C <sub>12</sub> coherence of the using function of neighboring land
			C <sub>13</sub> C <sub>12</sub> coherence of the using function of neighboring tidal flat
			C <sub>14</sub> C <sub>12</sub> coherence of the using function of neighboring waters
		B <sub>6</sub> urbanization level	C <sub>15</sub> the number of the population
	A <sub>4</sub> economic system	B <sub>7</sub> coastal economy	C <sub>16</sub> marine aquatic products output value
			C <sub>17</sub> coastal tourism output value
			C <sub>18</sub> main port cargo throughput
		B <sub>8</sub> basic economy	C <sub>19</sub> Per Capita GDP
			C <sub>20</sub> proportion of the tertiary industry



## **Study on the control index of sea filling coastline**

- These 21 indicators reflect the current conditions of coastal areas and the impact of human activity upon them**
- We hope experts can give us some advice with regards to the indicators. All the indicators will be acted upon.**



*The End*

*Thanks*

