- Russian Federation
- Far Eastern National Technical University
- (Vladivostok)

- SELIVANOVA TATIANA
  - (PhD, geophysics)

Geographical Location of Russia

Geographical Location of Russian Far East

The River Lena

- The River Lena begins in the Eastern Siberia, but it mostly runs on Yakutia, involving move than a half of the republic territory;
- Its total length is 4 400 km;
- The area of the basin is 2,490 thousand square km;
- River flow in the creek is 17 000 cub. м./ sek;
- Average annual flowing is 488 cub.м
- For quantity of the water the River Lena takes the 9-th place in the world and the 2-d place in Russia, being inferior only to the River Yenisei;

- A thickness of snow cover is not great, however an intensive snow thaw and a little absorption of water by the soil result in great spring floods;
- The river system is very brunching: its density is 0.42 km / sq. km;
- Permafrost, mountainous relief and sharply continental climate have a great influence on the water regime of the basin rivers.

The River Amur

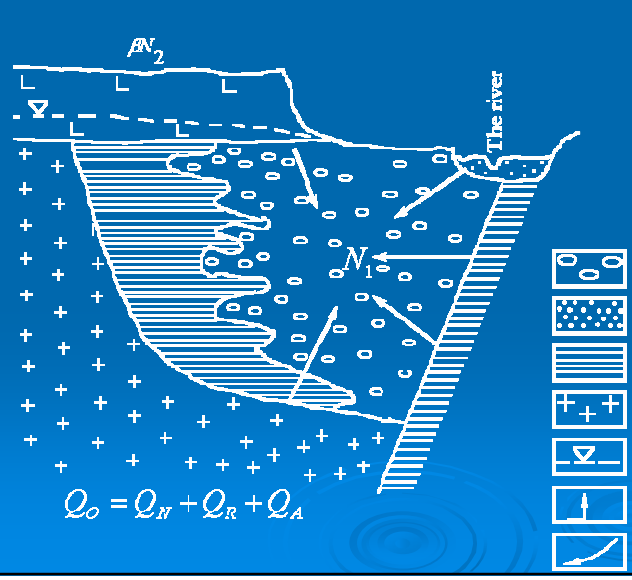
- The River Amur flows out Mongolia, but the most part of the river flows on the Russian territory;
- The Amur river is 4 440 km long, and out of them 2 800 km belong to the Russia;
- The area of the basin is 1 855 000 square km, out of them 1 933 000 belong to Russia;
- The vest part of the water-modular area distributes between China (48 %) and Mongolia (2 %);

- The Amur is one of the largest rivers of Russia;
- The average flow of several years standing of the Amur basin is 1.85 l / sec from 1 km;
- The volume of the annual flow of the Amur in the mouth is 346 cub. m;
- The rivers of the Amur basin are full-flowing, it results from monsoon climate, little evaporation and large woodlands;

- The characteristic features are intensive riverbed processes, riverbed branching in the flat parts of the basin and frequent summer and autumn rainy freshets, connected with summer monsoons;
- More than 550 floods, of which 54 are catastrophic, have been registries on the Amur River for the recent 60 years.

Typical Hydro-geological Sections of Underground Water Deposits Of Russian Far East

Underground-water Deposits of Neozoic Depressions



Q_o -operation capacity of ground water deposit

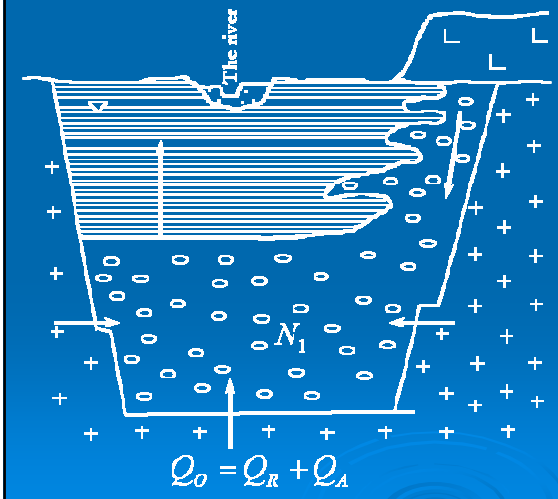
Q_N - - Natural reservoir capacity (water-gravity)

Q_R -natural resources

Q_A -additional quantity of natural water

- Gravel, shingle, sand
- Sand
- Clay KZ
- Rocky breeds
- The maximal summer level of underground waters
- Size of a pressure of underground waters
- Probable direction of underground waters at operation

Underground-water Deposits of Neozoic Depressions



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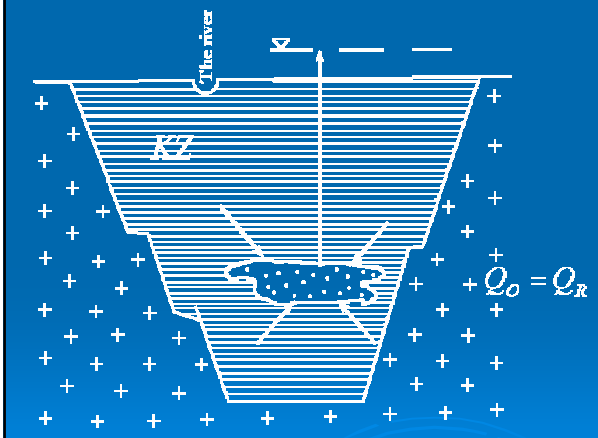

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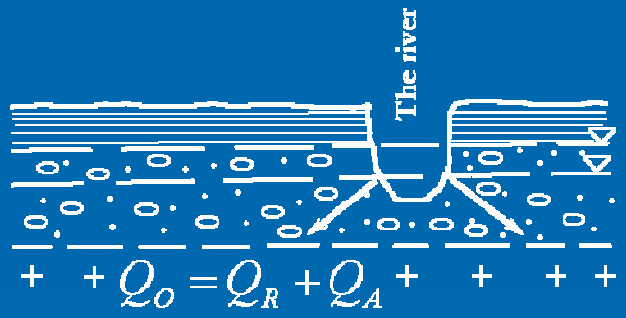
Underground-water Deposits Situated in a River Valley



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- Sand
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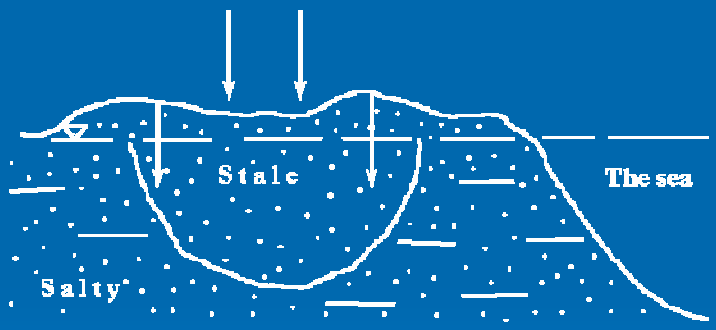
- The maximal summer level of underground waters
- Probable direction of underground waters at operation

Underground-water Deposits Situated Along Seashore

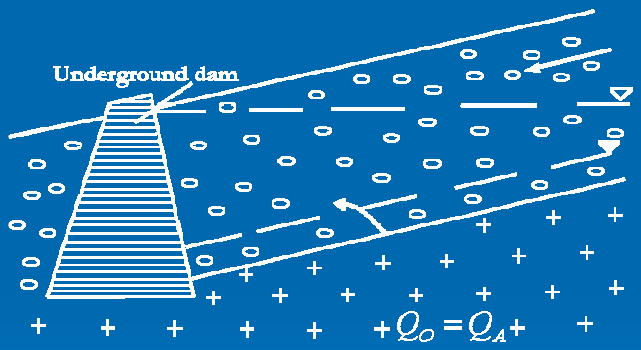


- Sand
- The maximal summer level of underground waters

Q_o - operation capacity of ground water deposit

Q_R - Natural resources

Underground- water Deposits Concerned with All-the-Year-Round Dewatered Underground Water Horizon



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- Gravel, shingle, sand
- Clay KZ
- Rocky breeds
- The maximal summer level of underground waters
- The minimal winter level of underground waters
- Probable direction of underground waters at operation

Criteria of natural division into districts:

- Structure of an earth's crust
- Relief
- Climate
- Ground
- Specific structure flora and fauna

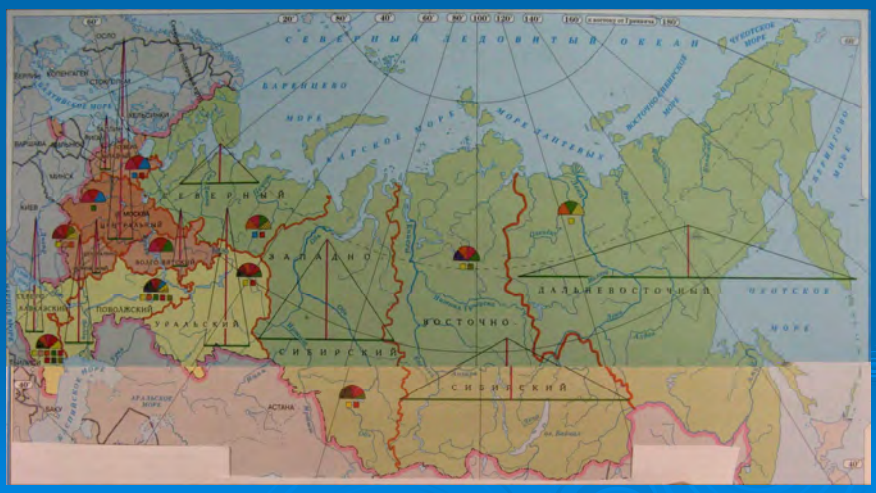
Natural Regions of Russia

RUSSIAN FEDERATION

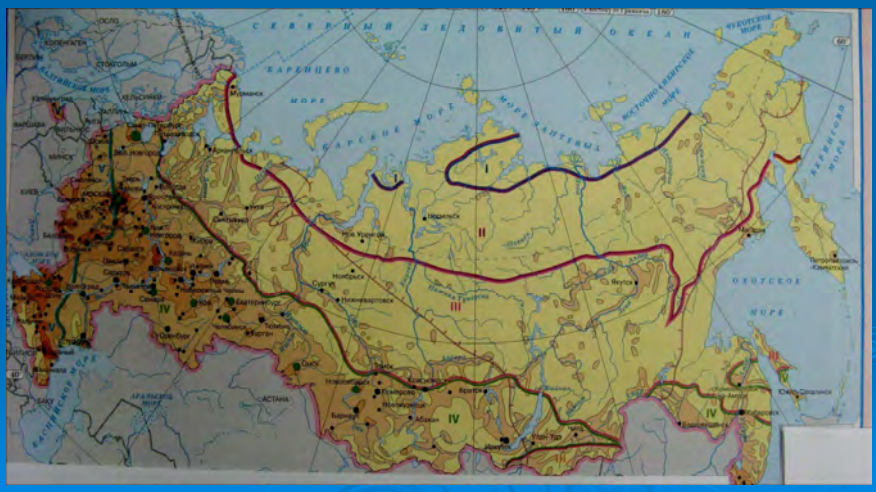
The Structure of the Russian Far East Includes the Following Territories:

Sakha republic (Ykutiy)
Primorskii Krai
Khabarovskii Krai
Amurskay Oblast
Kamchatskay Oblast
Magadanskay Oblast
Sakhalinskay Oblast
Chukotskii Okrug
The Jewish autonomous region

Economic Zoning of Russia



Density of Population of Russian Federation

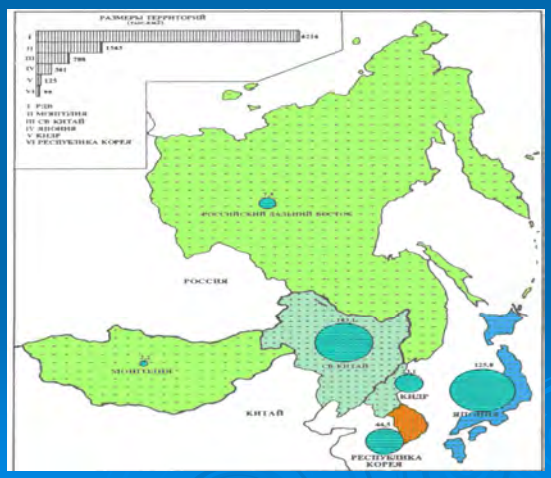


The area of Far East is 6 215 900 sq. km

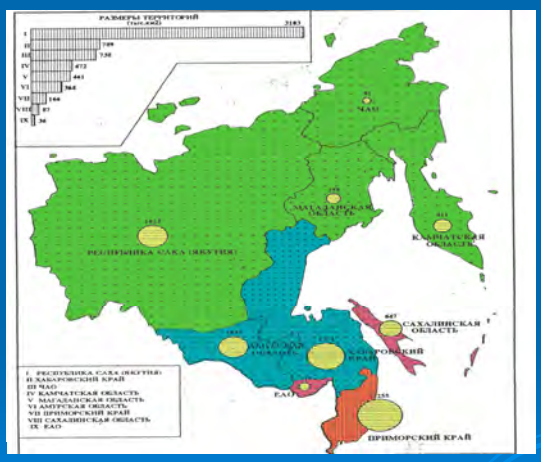
The population of Far East is 6 593 000 (2005.01.01)
Including:

city – 5 011 000
country – 1 582 000

Population of North-East Asia



Population of Russian Far East



Employment of the Population on Branches of Economy

The industry – 19%
Trade – 18 %
Education – 10 %
Transport -10%
Construction – 7 %
Public health services – 7 %
Agriculture – 6 %
Culture and art – 2 %
Science -1 %
Other - 20 %

Natural Resources of Russia

Mineral Resources of Russian Far East

Here are concentrated more than

80 % of diamonds,
95% of tin,
90 % of boron,
88 % of stibium (antimony),
63 % of mercury,
41 % of fluorite,
24. 5 % of tungsten,
8-10 % of iron ore,
4 % of zinc

of the Russian stocks

Diamonds

In republic Saha (Yakutia) 84.1 % of diamond reserves of the Russian Federation are concentrated.

99.7 % of the Russian diamonds are extractedin Yakutia.

The total of the extracted diamonds contains approximately 30 % of jeweller and 70 % technical ones.

Gold

- In the Russian Far East about 70 % of all Russia's gold reserves are concentrated.

In Russian Far East the prospected gold deposits are distributed as follows:

Ykutiy-44 %;
Magadanskay Oblast -17 %;
Kamchatskay Oblast – 16 %;
Khabarovskii Krai – 14 %;
Amurskay Oblast – 8 %;
Primorskii Krai and Sakhalinskay Oblast – 1 %.

Silver

In Russian Far East silver deposits is not present, silver is only a part some polymetallic complex ores.

Distribution of the prospected silver polymetallic complex ores reserves between regions are following:

Magadanskay Oblast -57 %;
Khabarovskii Krai – 24 %;
Ykutiy -9 %;
Primorskii Krai- 8%;
Amurskay and Kamchatskay Oblast – 2 %;

Tin

Practically all prospected and extracted tin reserves of Russia are concentrated in Russian Far East.

Distribution of the prospected tin reserves between regions are following:

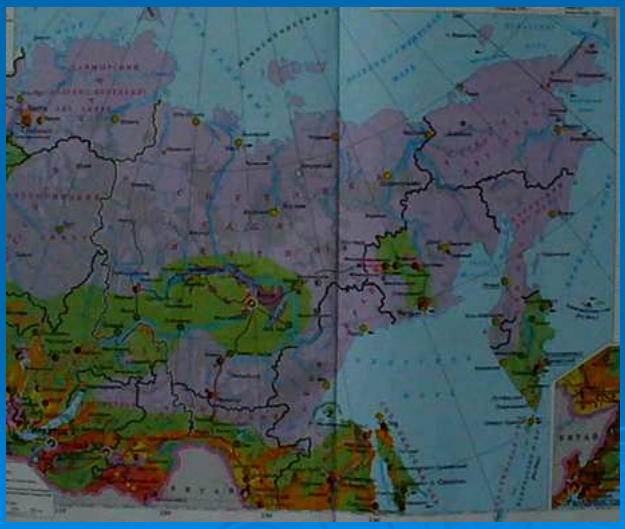
Ykutiy -44 %;
Magadanskay Oblast -21 %;
Khabarovskii Krai – 21 %;
Primorskii Krai- 14%.

Primorskiy Kray's Providing with Mineral Resources

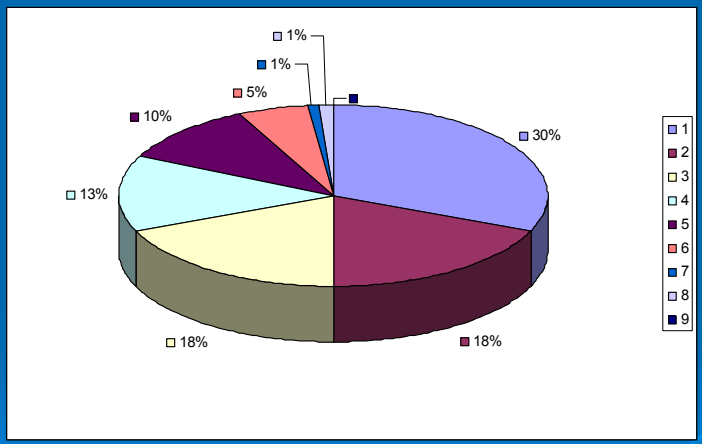
/%, from Resources of Russian Federation or Russian Far East/

Wolfram /W/	Lead /Pb/	Zinc /Zn/	Boron /B/	Fluorit
100 % of RF	81 % of RFE	80 % of RFE	100 % of RF	100 % of RF

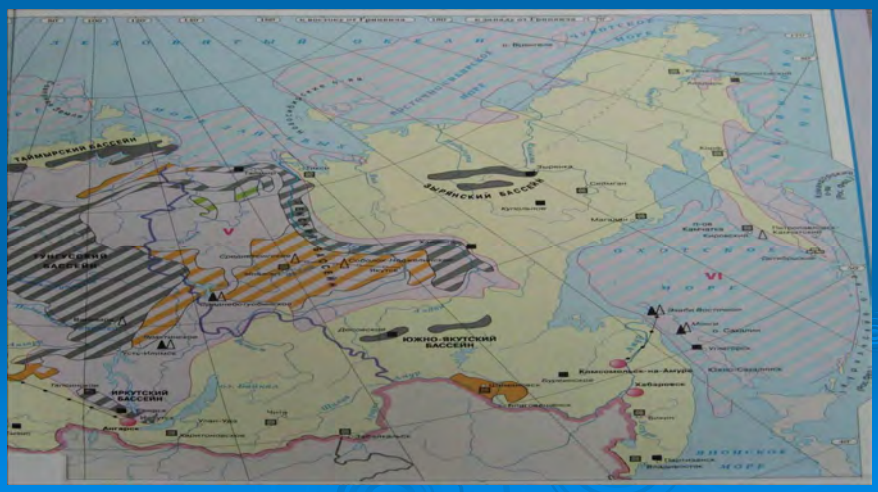
Industrial Mix of Russian Far East



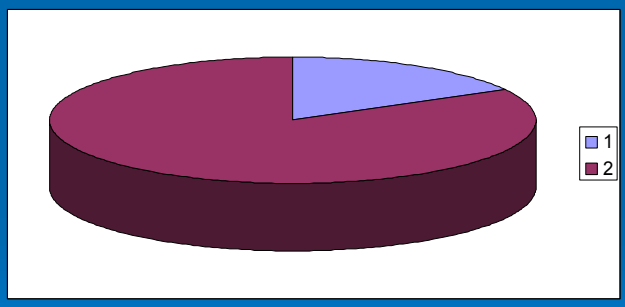
Industrial Structure



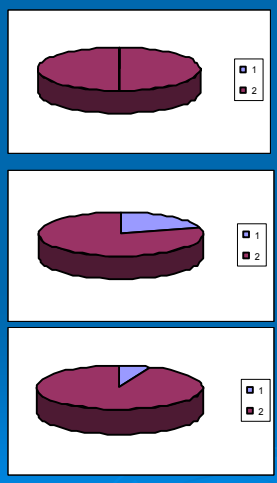
Fuel Industri



Share of Fuel Industry in Industrial Structure of Russia

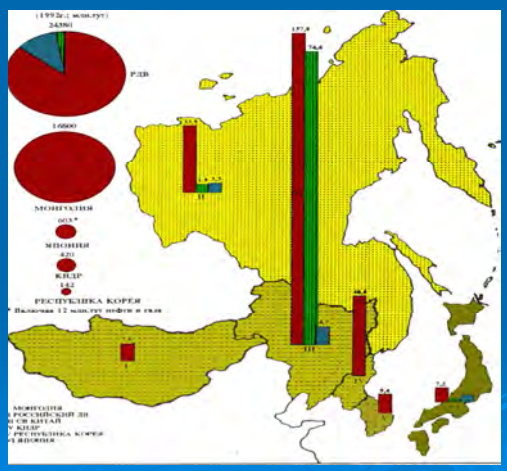


Share of Russia in Global Fuel Production



- 5,5 % - coal
- 24 % - natural gas
- 12% - oil

Oil and Coal Production in the North-East Asia



Extraction of Natural Fuel and Energy Resources in Russian Far East

COAL
(thousand ton)

Ykutiy	11 785
Sakhalinskay Oblast	2 700
Magadanskay Oblast	1 470
Chukotskii Okrug	874
Kamchatskay Oblast	27

OIL
(thousand ton)

Ykutiy	185
Sakhalinskay Oblast	1 724

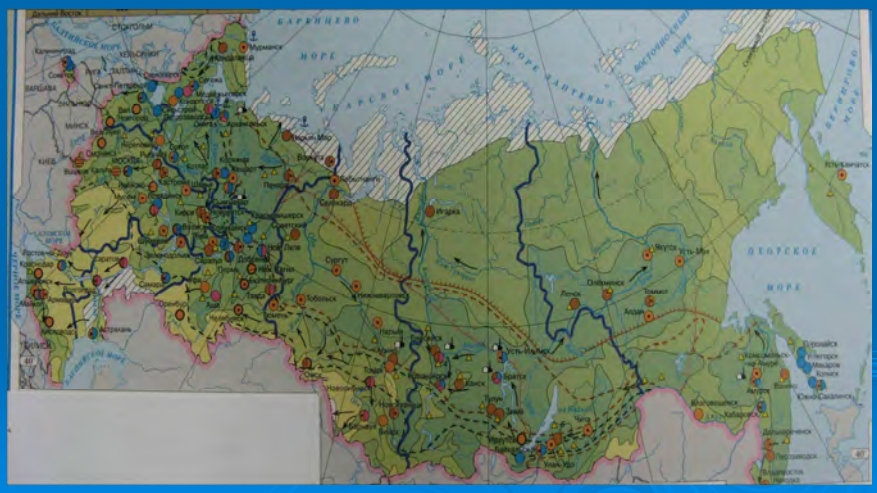
Natural Gas
(million cub. m)

Ykutiy	1 606
Sakhalinskay Oblast	1 637

Electric Power Industry

Machine-building Complex

Wood Industry



Wood Resources of Russia and their Accommodation

Territory	Area, covered with a wood (million hectares)	reserve of wood (%)	woodworking industry (%)
European part	116	25	60
Siberia and the Far East	605	75	40

The Basic Tree Species in Structure of Woods of Russia

Larch-39%

Pine-17%

Birch- 13%

Fur-tree-11%

Cedar-6%

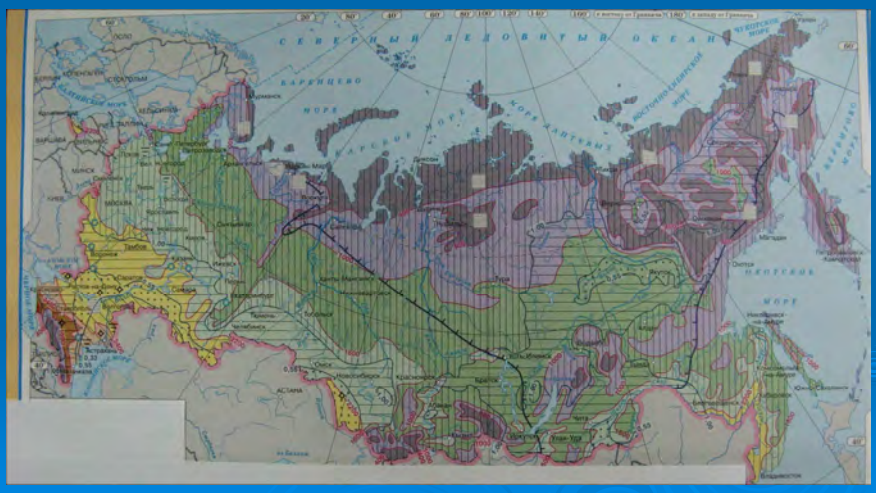
Fir-2%

Oak-1%
Others-11%

Ecological Results of Forest Fires

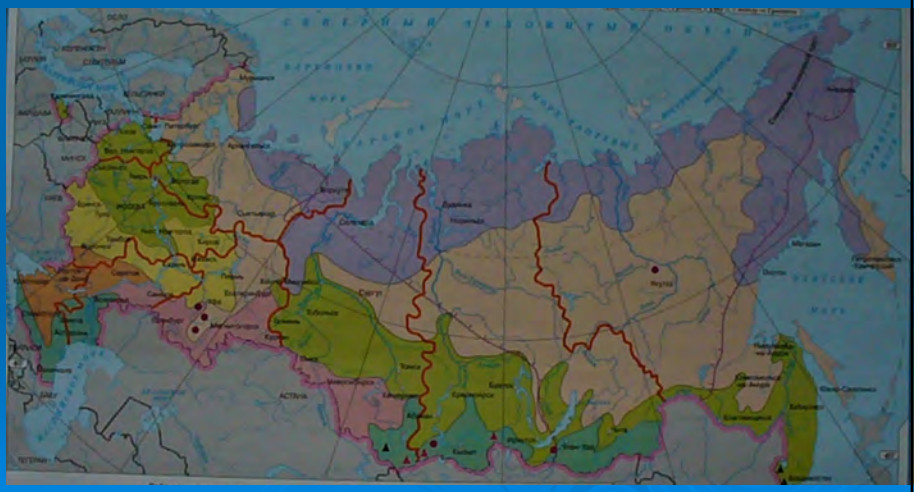
- Destruction of young woods;
- Destruction the top productive layer of ground horizon;
- Formation of taluses and erosion;
- For a year as a result of forest fires 2 million tons of firm substances as a smoke and 50 million gas products of burning is thrown out in an atmosphere;
- The smoke contains poisonous substances.

Agricultural Conditions



Cultivation of Grain Crops

Animal Industries



Some North-East Asia Regions' Providing with Natural Resources /on 1 Km/

Regions	Population	Agricultural ground , hectare	Forests, hectare	Coal, thous. of tons
		Russian Far East		
Primorskiy Kray	13.6	8.5	67.8	24.7
Khabarovskiy Kray	2	0.5	60	2.5
Amyrskay Oblast	2.9	6.7	60.1	10.6
Sakhalinskay Oblast	7.4	1.5	61.5	27.6
		NorthEast Asia		
Mongolia	1.4	0.8	9.7	15.3
NE China	130.8	20.7	21.1	*
PDR of Korea	184.4	18.4	*	*4.8*

** Useing:National Statistical Data; Natural Resources,1995; World Resources,1996;*
"Natural Resources Use Of the Russian Far East and Northeast Asia" /A.S Sheingauz/,1997.

For last 15 years there was a extraction decrease of natural resources on the Russian Far East:

wood – 71.3 %
oil – 27.5 %
coal – 70 %

Change of Natural Resource Potential of the Russian Far East

The reasons:

- Full use of easily available natural resources at the minimal financial expenses;
- Extensive methods of extraction of natural resources (due to increase the areas)
- Environmental problems of natural resources use

Environmental Problems of Natural Resources Use in Russian Far East

- Reduction of fertility of the grounds, erosion and degradation of soil because of extensive use of chemical fertilizers and application of heavy technical equipments.
  For example, annually 1 % of arable lands of Russian Far East become not suitable for use.
- The area of young woods annually increases for 1.2 %.
  The part of deciduous woods annually increases for 0.7 %.

- Reduction of quantity of fresh-water and coastal sea fishes.
  In comparison with 1940 mid-annual catch in a river basin Amur have decreased in 8.3 times, and catch of salmon fishes has decreased in 70 times.
- Pollution of surface water.
  For example, for 50 years of gold extraction in Kolyma river basin more than 200 rivers have lost the fish economical meaning.

Environmental Problems Connected on Development of Mineral Deposit:

- Pollution of superficial waters
- Change of a level of underground waters
- Exit on a day- surface of underground gases
- Infringement of landscapes
- modification of ground quality
- Incomplete extraction of mineral resources,
  for example by development of deposits is taken only 50-60 % of tin, 60 % of copper, 40 % of tungsten, 25-35 % of lead and zinc.

Health and Vital Activity of the Population

- The above factors have direct influence on health and vital activity of the population.
- Drinking water is one of the nutrients which determine the basis of the internal environment of an organism. As for chemical contents, natural waters of the Russian North-East are lightly mineralized and have deficit in calcium, potassium, magnesium with low contents of such important elements as fluorine, manganese, cooper, zinc.
- The misbalance in microelement picture (deficit of Ca, Co,Cu,Mg,Mn,Se,Zn,J) of the North children was differed.

Incidence Changes of Primorskiy Region's Inhabitants

(comparison with 1999,%)

Disease	%
Blood disease	12.2
Heart-disease	10.39
Peptic (round) ulcer	3.29
Mental disease	5.2
Infectious disease	4.11
Endocrine disease	31.29
Skin disease	6.56
Connective-tissue	17.39
Respiratory disease	3.99

- The most important medical problem is the deficit of iodine.

Correlation between Number of Teenagers having Endocrine Disease (goiter, wen)

(total population 100 000)

environmental condition	**number of teenagers**
1.Continental territories	
Critical environmental condition	4844
Good environmental condition	1736
Favourable environmental condition	57
2.Coastal zone	
Critical environmental condition	4243
Good environmental condition	2399
Favourable environmental condition	162

Biodiversity of Primorskiy Region

The Bikin River valley is boundary between the north boreal biota and the southern Manchurian biota, a unique and ecologically special mix in the Far East.

Hasanskii region of Primorskii Krai is a glacial refugium and harbors plants and animals, including many Pleistocene and even tertiary relict species, found nowhere else in all of Russia.

The wetland areas of the Russian portion Of Lake Khanka are included under the Ramsar Convention (UNESKO 1972). Of the 287 species of birds protected by the Soviet-Japanese (1973) and Soviet-Korean (1987) conventions, 225 species inhabit the Lake Khanka.

Biodiversity of Primorskiy Region

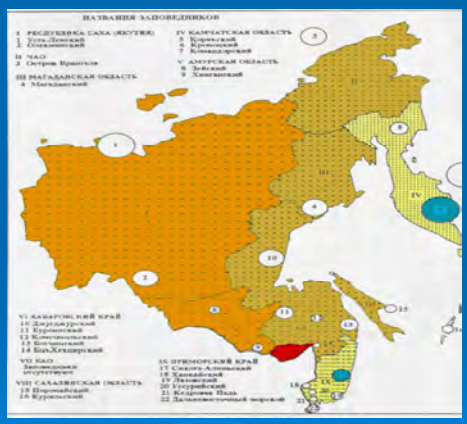
Primorskii Krai containes:

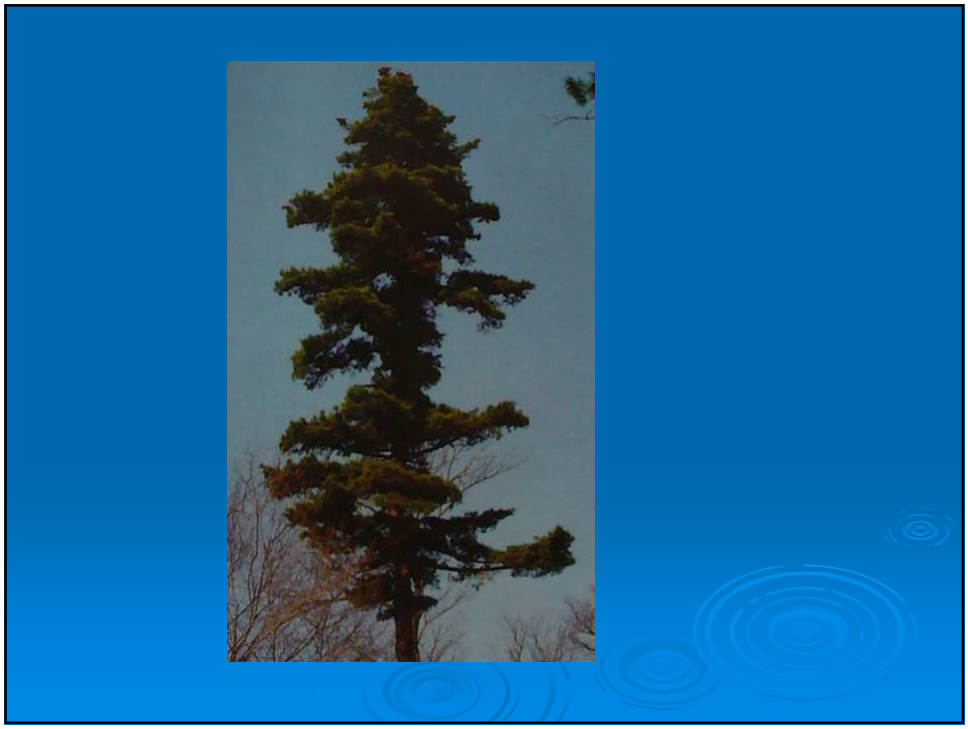
- 25 percent of Russian's biodiversity;
- 10 percent of the world's gene pool;
- 20 percent of Red Book species;
- 77 persent of the fauna of the Far East (over 70 species) are concentrated in the southern half of the Primorye region;
- Primorye is home to 350 bird species;
- The Primorye region is at the northern range boundary for nearly 100 bird species;
- One-hundred species of fish inhabit the rivers and lakes and one-fifth of these are endemic, found only in Lake Hanka / Xingkai and the Amur basin.

The Program of Biological Diversity Preserve

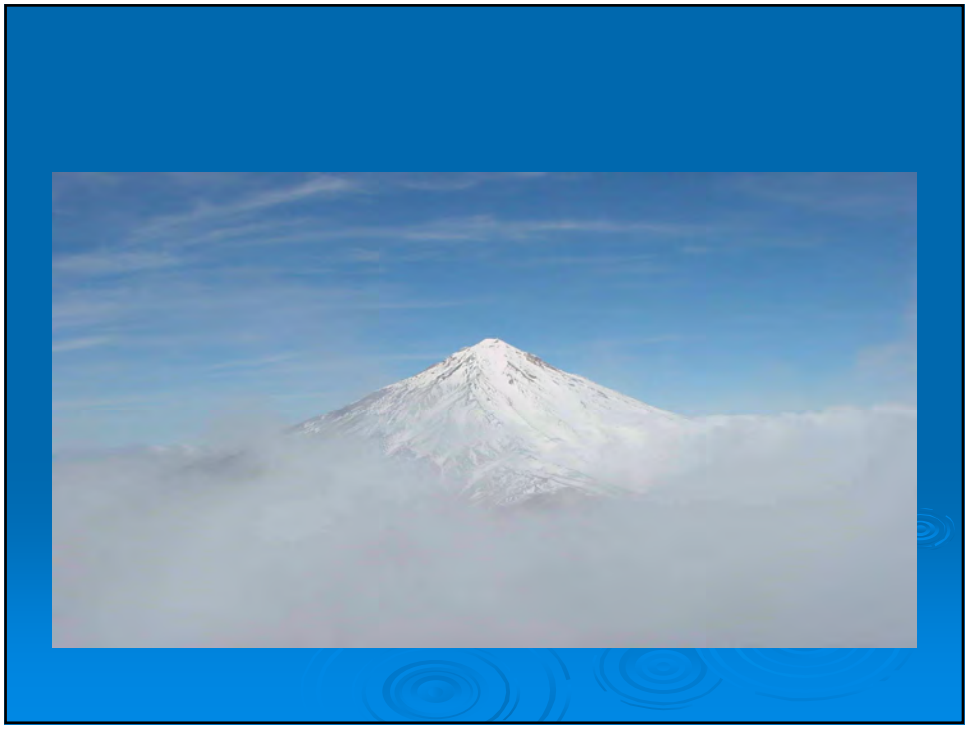
- The Program of preservation, restoration and management will be needed to sustain biological diversity and resource use.
-
- A system of large strategically placed reserves with connective corridors must be designated in the form of national parks, scientific reserves, and other protected areas.
- Protected connective corridors, such as rivers and greenways, allow species migration and genetic exchange.

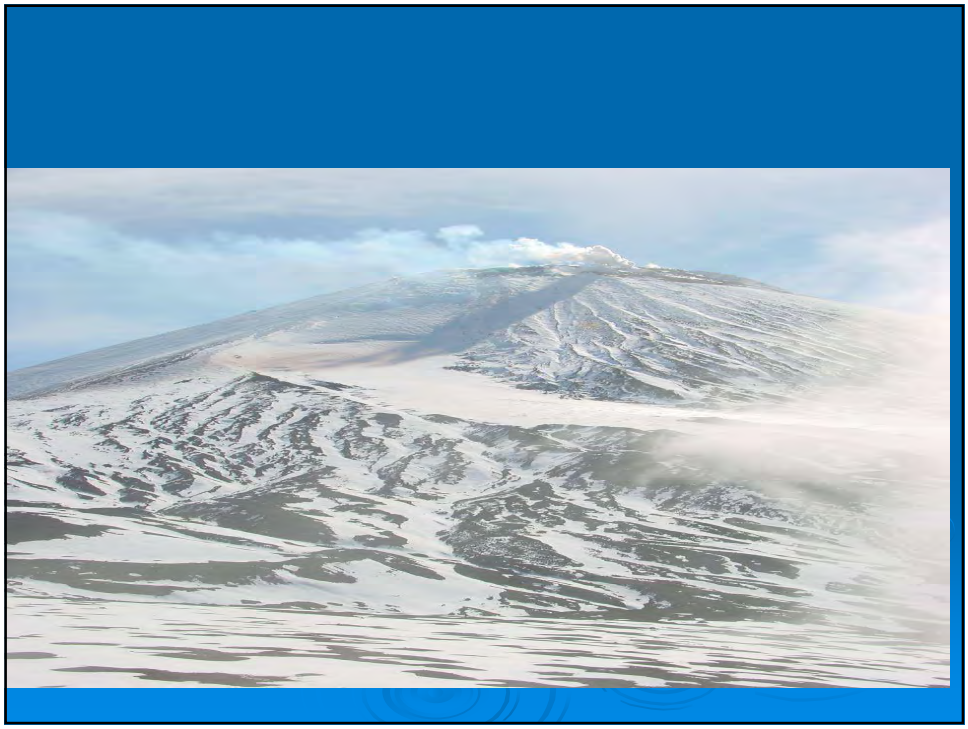
The Reserves of Russian Far East



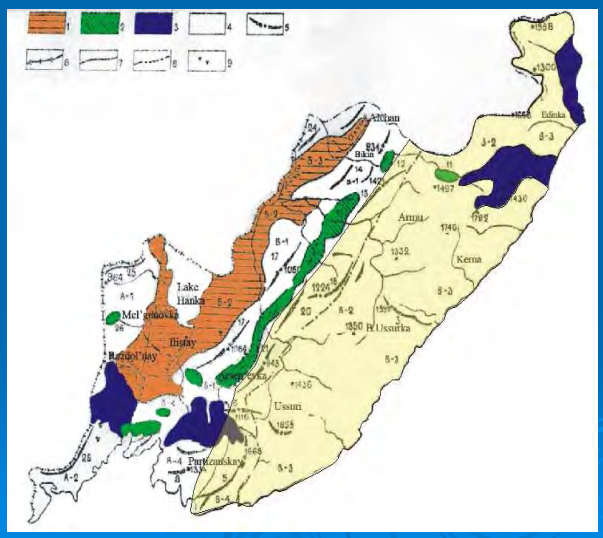


Zoning on the Development of Dangerous Geological Processes in Russian Far East





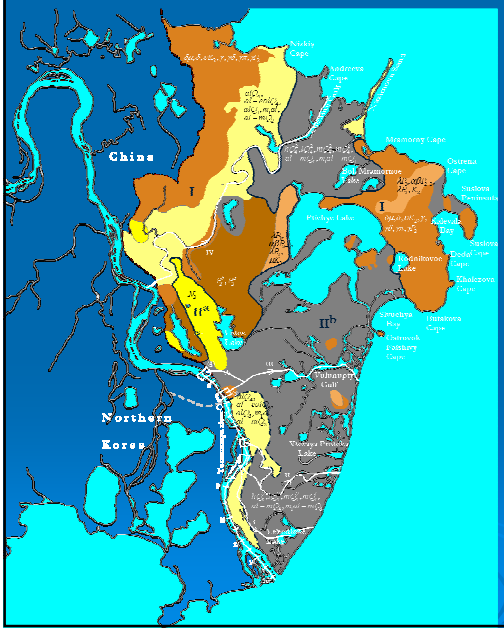
Zoning on the Development of Dangerous Geological Processes in Primorskiy Region



Channel Deformations in the Region are Caused:

- Down gradient of the river channels is not large (about 20 %);
- Presence of easily washed away sediments: sandy loams, loams, clay;
- Increase the volume of water in the rivers during the summer-autumnal period of year, speed of water current increase in 1.5-2 times.

Zoning Map of Ground Water of Tumangan River Basin and Future Change of Tumangan River Channel



Up-Quanternary water-bearing horizon. Sand,loam.

Middel-Quanternary alluvial water-bearing horizon. Sand,loam,pebbles

Pliocene water-bearing horizon. Sand,loam,pebble.

Cretaceous water-bearing horizon. Basalt.

Up-Paleozoic water-bearinghorizon Schistose sandstone,shaly clay,lime stone

Up-Permian water-bearing horizon. Tuff, granite

Boundary of area

Boundary of zone

Geophysical measuring station

Area of geophysical profiles

Scenario of future change of Tumangan River Channel

…

The Future Changes of Tumangan River Channel were Predicted:

- Scenario 1

The river will go with a channel of River Swan, through Lake Swan and then run into the sea.

In this case, Russia will lose 22 sq km of land.

- Scenario 2

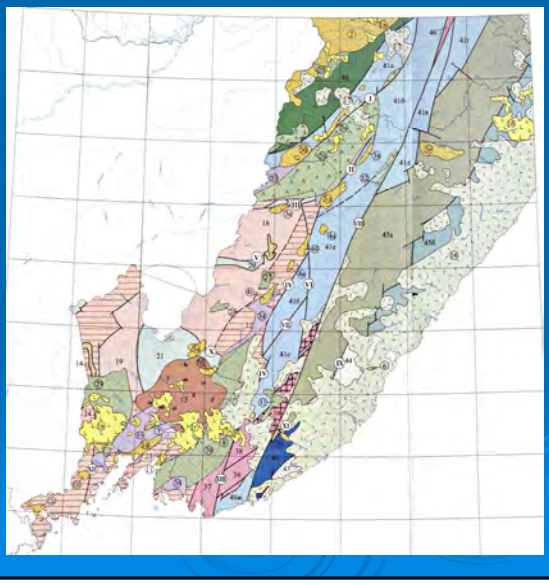
The river will choose a new direction to the channel of the First Channels and sharply turn eastwards.

In this case, Russia will lose 35 sq km of land.

The Reasons of Exist Spreading of the Superficial Marshiness in Russian Far East

- Irregular seasonal precipitations;
- Seasonal frozen subsoil of several years standing or over a long period of time;
- Slow surface flow;
- Heavy mechanical soil structure;
- River floods over a long period of time.

Geological Map of Primorskiy Region



Hankayskiy Region

- In the tectonic meaning the Region represents the **Hankayskiy median massif;**
- The rocks submitted the **terrigene, carbonaceous, granite formations;**
- Cover rocks compose imposed **Cainozoic depressions;**
- **Paleogen-Neogen coaly-terrigene** formations are bedded in the basin of the depressions;
- The top structural horizons of the depressions are formed by **Quaternary lacustrine-marsh, polygenetic formations, alluvial sediments of the flat river.**

Geomorpological Characteristics of the Hankaiskiy Region

- The Region is located on the **Prihankayskay plain and east part of the East-Manchurian uplands edge;**
- The Region's relief is **flat, sloping-wavy, with low hills and mounds;**
- For low hills and mounds is typical:
- *- the steepness of a top part of the hill and mounds is 15-20 degrees, the bottom part of the slopes is 3-4 degrees;*
- *- the horizontal erosive of rocks is 0.2-0.4 km/sq km*
- *- the depth erosive penetration is 200 m*
- *- ravined erosion is widely distributed*
- *- absence of outcropping of rocky beds*
- *- products of chemical weathered sharply prevail in the zones of rock distruction*

Underground Water of the Hankayskiy Region

- **The water of Quanternary sediments and artesian aquifer waters** are widely distributed;
- The capacity of the water horizons is **5-20**m;
- The filtration factor changes from **3 up 50 m/day;**
- The capacity of the covered clay, loams layers is **2-3 m;**
- Chemical compound of water is **hydrocarbonate, mainly calcic;**
- The water mineralization is **75-680 mg/l;**
- The waters have **leaching aggression.**

The Factors Determining Dynamics of the Channel Erosion in the Hankayskiy Region

- Litological structures properties (prevalence of well washed away loamy, sandy, clay, sandy-argeillaceous sediments);
- Rather stable the tectonically condition of the region (weak lowering) in a combination gently sloping biases of the river channel causes the big tortuosity (1.6-3) of the rivers;
- Often and long time floods at which speed of water current increase in 1.5-2 time.

That all promotes development of lateral erosion.

Piedmont Region

- The Region includes **Southern Sikhote-Alin, spurs of the East-Manchuria upland;**
- The Region cavers **South-Primorskiy, West-Primorskiy, Arsenevskay, Alchanskay, Bikinskay zones;**
- **The depressions with precise borders** distribute there;
- **Low mounds, tableland (basalt plateaus), river and coastal valleys** are most distributed in the Region.

Low- Mound Area of the Piedmont Region

- Incidental demonstration of the **landslide-taluses** phenomenas;
- About **an equal ratio of products of physical and chemical weathered** in total amount of the material of the rocky destruction zones;
- A value of the horizontal erosive is **0.4-0.8** km/sq km;
- The depth of the erosive processes is **200-300** m;
- Small quantity of **rock outputs**.

The Tableland of the Piedmont Region

- The tablelands borrow in the South (Shufanskoe and Shkotovskoe plateaus) and small territories in the north of the Region;
- The tablelands have **equal surface, lightly lopsided aside the sea**;
- For the tableland **hollows with small lakes, bogs, turbaries** are characteristic;
- The tableland break abrupt rocky ledges in a direction to valleys of the rivers and sea coast;
- The decay crust clay-structure has areal distribution;
- The water-separate spaces have equal low lopsided surface;
- Wide development **creep and landslide-taluses processes** in the regional parts of the plateaus and on boards of the erosive valleys.

The River Valleys Area of the Piedmont Region

- The valleys have an **equal surface**, frequently with the **ramified network of ravines**;
- Clay structure of sediments;
- Prevalence in the section the rocks **underdoed long transformation and strong physical and chemical processing**;
- **Channel, inundated, former river-bed phases** allocate among alluvial sediments;
- **Marsh sediments** considerably distribute;
- **Channel deformations** are observed.

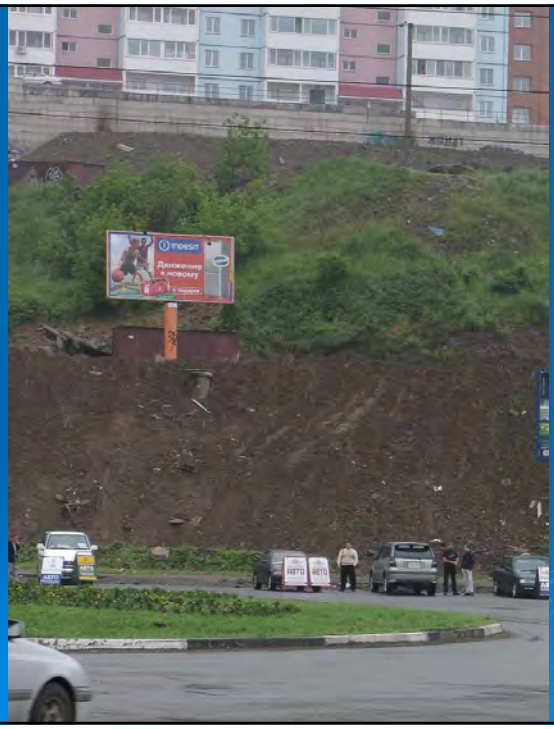
Hydrogeology of the Piedmont Region

- Presence **23 small artesian basins** framing the Hankaiskiy massive;
- Presence **bedded-fractured subsoil waters neogen basalts**;
- **Alluvial water horizons** have widespread;
- **Waters of top fractured zones** have insignificant distribution;
- The water horizons are dated to **gravel, gravel-pebble, sand-gravel, sand sediments**;
- The clay streaks causes formation several **water horizons hydraulicly connected among themselves**;
- The filtration factor is **1- 344 m/day**;
- The chemical composition is **hydrocarbonate, less often chloridical, calcic, natrium**;
- Waters have **leaching aggression**;
- The water horizons of the sea and alluvial-sea sediments located below of the sea level have **mineralization up to 25.7 mg/l, acidic aggression, less often leaching aggression**.

The Use of Slopes for Construction

1. Slopes of 30% (17 degrees) or more have high erosion hazard and severe development constraints;
2. Slopes of 9 % (5 degrees) to 30 % have moderate disturbance hazard characteristics that restrict their use to timber harvest and low density housing. Careful design and construction practices must be followed;
3. On slopes exceeding 15 % (9 degrees), structural should be undertaken only with special care.
4. Normally roads should not be constructed across slopes exceeding 30 %.

By Ministry of Agriculture of USA,1971



A Sustainable Land Use and Allocation Program for the Ussuri / Wusuli River Watershed and Adjacent Territories (Northeastern China and the Russian Far East)

A Cooperative Project of:
Ecological Sustainable Development, Inc. (USA)
FEB-RAS Institute of Aquatic and Ecological Problems (Russia)
FEB-RAS Pacific Geographical Institute (Russia)
Heilongjiang Province territory Society (PRC)
National Committee on United States-China relations (USA)

Land Use Policy Development and Subsequent Land Allocation

1. The concept of land use policy is base on use zoning.
   Use zoning is simply the placing of limits on how land can be used

The specific limits should be determined by:

- the land's characteristics,
- the use of surrounding land,
- the demand for resources,
- cultural norms.

2. A basic of use zoning of his Program is that landower, private or public, should have the right to use land in a way that will degrade the environment of others.
3. Changes in land use should be subject to the expressed approval of society.

   The process of generating such approvals should be in two stage:

   a) a use zoning plan should be formulated by a government agency with extensive public involvement,

   b) that plan should incorporate a permit process where by new land uses are reviewed for environmental impact, sustainability, and compatibility with the zoning plan, again with full public involvement.

4. All aspects of administration should be characterized by open meetings, scientific forums, and opportunities for legal appeal

5.Economic policy include:

- Taxation of ecologically undesirable activities include excessive use of water and nonrenewable energy;
- Dumping fees for waste products;
- Economic incentives for protective measures benefittingthe atmospheric, land, and aquatic environment;
- Strengthening economic sanction for violations of environmental laws.

USSURI'S / WUSULi'S WATERSHED

- The Ussury / Wusuly river forms part of the border between Russia and China
- Two-thirds of the watershed ecosystem is in Russia, one-third- in China
- The region consists of approximately 26,000,000 hectares and 1,100 kilometers is Russian-China state border
- Ussury / Wusuly is the tributary of Amur / Heilong River
- Ussuri's watershed melds two different ecosystems: boreal and subtropical

Endangered Species in the Ussuri Region

The Chinese portion of the Ussuri region:

- 4 mammals, 12 species of plants, and 11 birds national endangered;
- 10 mammals, 4 species of plants, and 41 birds nationally endangered;
- 10 mammals and 40 birds locally rare and unique species;
- As an example, the population of wild Amur tigers in the Chinese portion of the Ussuri region change from about 76 in 1975 to 12 in 1991 and probably less today (HLJPC 1994).

The Chinese Portion of the Ussuri Region

- On the western part of the river, comprising a third of the watershed, is Heilongjiang:
- The population of the province is about 36 million;
- There are extensive forest, deposits of coal, oil, minerals;
- Globally significant remnants of the nation's largest wetland-
- (Helongjiang's Sanjiang –Three Rivers Plain)

The Russian Portion of Ussuri Region

Primorskii Krai:

- 15 species of vascular plants;
- 3 species of mammals;
- 10 species of birds;
- 2 species of reptiles and amphibians

Are listed as endangered in the Russian Red Book.

Khabarovsk Krai:

5 vascular plant species are endangered and 57 – rare.

50 vertebrate species of animals have become extirpated, endangered or rare (Amur tiger, Himalayan bear, Amur horol, Far Eastern tortoises, cranes, storks)

The Russian Portion of the Ussuri Region

- On the eastern side of the Ussuri / Wusuli, two-thirds of the watershed lies within two territories of Russian's Far East: Khabarovsk Krai (south part) and Primorskii Krai (western part), together about twice the size but a tenth the population of Heilongjiang
- The Russian portion of the Ussuri region is made up of the mountainous Sikhote-Alin in the east, and the Priussuriisky Amur plain and Prikhankaisky plains in the west
- The watershed lies between two climatic zones: the oceanic monsoon and the moderate continental(умеренный).Air masses are displaced from the ocean onto the continent in summer, and vice versa in winter

- Approximately 60 percent of the Russian Ussuri basin is forested
- Forest resources are estimated to average(в среднем) 150 cubic meters per hectare
- Less than 10 percent of the region's land is used for agriculture
- The Ussuri basin contains most of the Primorskii Krai's 2.4 billion tons of coal reserves, with the main deposits at Bikinskoye (coal) and Pavlovskoye (lignite)