WWF RACER Ecoregion Case Study: Eastern Chukotka (Ecoregion # T 5)

Description of the Eastern Chukotka Ecoregion
by Arkady Tishkov, Russian Academy of Science

Eastern Chukotka Ecoregion stretches over approximately half of Chukotka Autonomous Region, the latter covers the total area of 737.7 thousand km^2. It includes completely the Chukotsk and Providence districts, and partially the Iultin and Anadyr municipality districts; thus the administrative and institutional resources of these four districts could be used for conservation of biodiversity and adaptation of protected areas network to the changing climate conditions.

Ecoregion is located at the extreme eastern limits of north-eastern Eurasia: in includes the Chukotka Sea coast with the Kolyuchinskaya Bay, and in the east and the south is washed by the Bering Strait and the Anadyr Bay of the Bering Sea. Terrestrial boundary goes across the Chukotka plateau, along the Pekulney mountain ridge, and in the south along the Anadyr river.

As a result due to the geographical location this Ecoregion has a unique combination of vegetation types and plant communities that are characteristic for the circumpolar Arctic.

These include:

(1) Real arctic and sub-arctic tundra (typical and southern – with low shrubs, sedge and shrub tundra), as well as the high-altitude mountain analogues of these habitats.
(2) Zonal and intra-zonal (riparian and mountain) shrub thickets (*Salix, Alnus, Betula*) and creeping shrubs (*Pinus pumila*).
(3) Fragments of forest vegetation: *Larix* woodland in the extreme south, creeping shrubs with *Pinus pumila, Juniperus sibirica, Rhododendron aureum,* and *Betula middendorffii* in the central parts, as well as the "islands" of riparian forests with *Chozenia, Populus, Salix,* and *Betula.*
(4) Bogs, marshes and mires (marshes, peatlands, lowland grass and moss fens that are rich in water; these are often man-made habitats), which are often found along the Arctic coastlines and in the lowland areas of the Ecoregion.
(5) Floodplain, coastal, pebble and alpine meadows with *Carex, Leymus villosissimus, Mertensia maritima, Carex ursina, Arctanthemum arctium, Lathyrus japonicus, Rhodiola atropurpurea, Senecio pseudoarnica, Taraxacum lateritum, Papaver radicatum.*
(6) Cryo-arid communities, fragments of steppe vegetation and so called "steppoids" which are found in Eastern Chukotka at the most northern and eastern distribution limits. We list in this group vegetation communities on the bare carbonate rocks with *Bromopsis pumpellianus, Bupleurum americanum, Draba cinerea, Elymus jacutensis, Erysimum pallasii, Potentilla anachoretica* etc.
(7) Finally these are thermophyl vegetation complexes with *Triglochin palustre, T. maritima, Agrostis scabra, Juncus bufonius, J. haenkei, Eleocharis kamtschatica, Comarum palustre, Aster sibiricus, Utricularia vulgaris, Galium trifidum,* and *Mentha sachalinensis* that are found around the hot springs, which are rather abundant within the Ecoregion.

Specific *peculiarities of* the Ecoregion *geographic position* are the following:

- extended and extremely winding coastline, including more than 2000 km coasts of the Chukotka Sea and the Bering Sea (Kolyuchinsk Bay, Bering Strait, Anadyr Bay);
- Inland Ecoregion boundaries follow either the water bodies, or the ridges, plateaus and highlands of the watersheds (the mountains of Chukotka, northern slopes of the Koryak highland, the Pekulney mountain ridge);
- within the Ecoregion the most eastern points of Eurasia and Russia are located: Dezhnev cape at the mainland (169°40' W) and the Ratmanov Island (169°02' W);
- extremely high diversity in terms of plants, overall geographical features, zoogeography and landscapes is determined by the factors of history, i.e. by the fact that the "Terrestrial Bridge of Beringia" was formed between Eurasia and America a number of times during Pleistocene; as a result biogeographic exchange between the continents could take place and areas with relic biota (for example cryophilic steppe) are found within the Ecoregion;
- permafrost exists everywhere (except the narrow coastline along the Bering Sea with only islands of permafrost and average annual soil temperatures about 0 °C) ranging from 150-200 depth with temperatures from -2°C to -6°C at the lowlands along the coasts and inland – to 300-500 m depth with temperatures from 8°C to -12°C in continental mountains.

Specific *peculiarities of the climate and its spatial variability* in the Ecoregion are the following:

- the climate is determined by simultaneous impact of the seas of the Arctic and the Pacific oceans that cause altogether complicated air circulation in atmosphere; Eastern Chukotka is one of the few RACER Ecoregions where in different parts opposing climate change trends are observed in the latest decades;
- air temperatures in winter in the continental parts of Chukotka often drop down to -30°C and even -40°C, and the areas with high atmospheric pressure prevail; strong winds and snowstorms that can last for a number of day are typical along the coast;
- summer is very short, cold and rainy, and the areas with low atmospheric pressure prevail; patches of snow remain along the slopes in the mountains, and patches of ice – at the rivers; snowstorms can also start any time during summer season;
- within the short time period wind direction here can change from north to south; average wind speed reaches 5 to 12 meters/sec, and the gusts could be up to 40-50 meters/sec strong;
- average annual air temperature is negative – down to -7,4°C (in Anadyr); July temperatures range from +4°C to +11°C, January temperatures range from -21°C down to -40°C; amount of precipitation is 300 to 350 mm per year.

Current industrial development in the Ecoregion is characterized by:

- combination of several types of traditional land-use throughout rather restricted territory with prevalence of marine mammals hunt, reindeer herding, commercial game-hunting and fisheries (by Chukchi, Inuit, Koryak, Even, Yukagir, Russian early settlers etc.);
- "patchy" industrial development of the area; main industries are mining (coal, gold, tin and wolfram), oil and gas excavation, fisheries, energy generation (Bilibino Nuclear Station), construction and related infrastructure (the city of Anadyr' and settlements like Lawrence, Egvenkinot, Providence etc.);
- transport infrastructure, especially the road network, is poorly developed; as a result vegetation cover is often very much damaged, especially close to human settlements;

- localized transformation and impoverished productivity of reindeer pastures as a result of overgrazing, fires, and mechanical destruction along winter transportation routes and the routes used by all-terrain vehicles;
- widely spread thermal erosion, especially close to settlements, in the areas used for movement of all-terrain vehicles, particularly at the river crossings and along the slopes, and also expansion of bogs and mires;
- prospective further development of oil and gas industry, mining for coal, gold, tin and wolfram, construction of railroad and auto roads, and intensified navigation along the Northern Navigation Route;
- as the average annual wind velocity at the coast reaches 6 to 9 meters / sec, and also due to the abundance of sites with thermal springs, there are good prospects for development of wind and thermal energy generation;
- a lot of solid wastes have accumulated within the region, first of all metal fuel barrels, other larger cans, and domestic and industrial wastes around settlements and commercial facilities;
- local pollution of the air and tundra areas around settlements where heat power stations and coal and мазут generators are in operation;
- human settlements and commercial facilities at East Chukotka do not have purification systems, also neither at the coasts.
- Specific features of the current nature conservation system in the Ecoregion include:
- insufficiently developed system of specially protected natural areas with strict conservation regime that could guarantee effective and representative conservation of biological diversity in the continental parts of the Ecoregion; at the same time large ethno-natural park “Beringia”(3 053,3 thousand hectares) covers substantial part of the Chukotka peninsula coast;
- a number of rare and threatened species of plants and animals are found in this area in the habitats that have no protection status; these are also and primarily relic and endemic species that are the most vulnerable against climate change and its’ consequences;
- some species from local populations of endangered mammals and birds are included in the list of species that can be subject for traditional game-hunting by indigenous people of Eastern Chukotka (Polar Bear, Walrus and other Pinnipeds, whales, waterbirds, salmons and Coregonus whitefish);
- lacking species conservation strategies (federal or regional) for many threatened species populations of Eastern Chukotka;
- widespread poaching, including also illegal taking of Polar Bears, Walrus and waterbirds, taking of raptors for illegal export to the Arab countries etc.;
- most of larger riparian forests and the islands of forest vegetation in the tundra and forest-tundra zones have no adequate protection against habitat destruction (logging, use of timber as firewood and to heat permanent and temporary houses – that have caused habitat alteration and formation of bogs and shrub tundra in the formerly afforested places).