

lowed by comments on the germination of 78 species by Andrianova and Berkutenko: which taxa require pretreatments and which kinds of treatments are efficacious. A paper by Kryukov reports briefly on the relative germination success of 27 species following different periods of storage. Haese describes a phytosociological analysis of coastal tundra using the methods of Braun-Blanquet, and provides tables typical of this analysis. Hanno and Oka in a short paper that reads more like a proposal noted that the Sea of Okhotsk affects the climate of eastern Japan. Pachomov and

Sinelnikova present six years of observations on the effect of artificial warming on the growth of four tundra plants at or near the field station described by Sinelnikova (see above). I fear these studies in support of the International Tundra Experiment (ITEX) project will be lost to the ITEX community in these pages; it belongs with others of its ilk.

DAVID F. MURRAY

University of Alaska Museum of the North, Fairbanks, Alaska

ENVIRONMENT

The Russian Far East

By Josh Newell. Second Edition, 2004. Daniel and Daniel, Publishers, McKinleyville, California, USA. 486 pages, U.S.\$59.95. Paper.

This is a massive and thorough compendium. The subtitle reads, "A reference guide for conservation and development." The format is a series of chapters each concerning one of the major administrative divisions of the huge region, abbreviated as "RFE." These divisions are: Primorsky Krai, Khabarovsk Krai, Jewish Autonomous Oblast, Amur Oblast, Republic of Sakha, Magadan Oblast, Chukotsky Autonomous Okrug (Chukotka), Koryak Autonomous Okrug (Koryakia), Kamchatka Oblast, Sakhalin Oblast. There are over 50 maps, and a host of tables, figures and photographs, as well as an index.

Vegetation is organized into the classic Tundra and Taiga formations. This book divides Tundra into two parts: "Arctic Tundra" and "Tundra" (referred to in much Russian ecological literature as "High Arctic" and "Low Arctic.") Taiga is defined correctly as "the large mass of the boreal forest that forms the heart of the RFE." The southern taiga, which in much of Russian ecological literature is known as Ussuri Taiga, is also known as "Dark Taiga" because of the high percentage of spruce and pine.

This division serves to differentiate it from the northern part of the Taiga which is widely known in the Reindeer literature as "Light Taiga" because of the very large percentage of the forest cover of deciduous larch. The Reindeer literature, and much ecological literature, also designates the southern-most tundra, combined with the northern-most taiga as "Forest-Tundra." This recognition of it as a separate entity is undoubtedly because the Forest-Tundra is particularly important as winter pasture for the semi-domesticated Reindeer.

The Ussuri taiga is relatively familiar to English-speaking biologists because of translations of works by such authors as Sdobnikov and Arseniev, as well as Kurosawa's famous 1975 film about Arseniev and Dersu. The number and distinctiveness of the species of plants and animals of the RFE is legendary, especially the Ussuri taiga.

Each of these 10 administrative regions receives a section of the book. Each begins with an overview, ranging from a paragraph or so to a number of pages, followed by extensive entries on: location, size, climate, geography and ecology (including carbon stocks), major ecosystems, protected areas and their problems, biodiversity hotspots, political status, natural resources, main industries, infrastructure, foreign trade, economic importance in the Russian Federation, general outlook.

This latter section is particularly interesting for such items as a full-page table of major environmental issues and problem areas of each of the regions: fishing, energy, timber, mining, agriculture. There are pertinent discussions of the weaknesses of various Russian governmental regulations concerning oil, gas and mining operations compared to the (already-weak) United States and Canadian regulations.

There is discussion of various schemes with potentially-severe effects as well as prospects for a sustainable economy, ENGOs, the UN Global Environment Facility, foreign government aid agencies, other promising sectors such as ecotourism and NTFP (Non Timber Forest Products). There is rather detailed consideration of the degradation of zapovedniks ("protected areas") by tourism, poaching (salmon, caviar), bear killing (for paws and gall bladders).

The forests of Kamchatka are particularly vulnerable and critical for mitigating floods and protection of salmon spawning grounds. (Remember British Columbia?). In the RFE the largest emitter of atmospheric CO₂ is fossil fuels combustion, but second place is deforestation leading to loss of carbon-rich boreal forest and replacement by pioneer types of forests and shrubby vegetation. More than 90 percent of the logging in the RFE is by clearcut. Even plantation-forests do not recover pre-logging stocks of CO₂; managed plantation-forests usually contain only 1/3 to 1/2 the carbon that undisturbed forests do.

Activities to "Save Tropical Forests" are having adverse effects on the taiga of the RFE... "Plywood manufacturers are promoting Russian larch (tamarack) as a green alternative to tropical luan timber and have been steadily increasing levels over the past decade...

More than 98 percent of all Russian larch grows on some form of permafrost (continuous, discontinuous, sporadic) making large-scale logging of the species an unwise proposition" (page 31).

"The sheer size of the Siberian and RFE forests and the diversity of their plant and animal life and habitats make these forests a tremendously important factor in Russia and the world. Loss of habitat, mostly from forest exploitation, fire, disease and inappropriate management is the most serious threat to the unique biodiversity of climax forests. The survival of endangered species, such as the Siberian Tiger ... depends on the maintenance of large, undisturbed forest areas. Fragile permafrost areas must be recognized as environmentally critical and the forests' large contributions to carbon sequestration must not be jeopardized. Such environmental considerations are currently inadequately incorporated in the planning process or not properly addressed in forest management and harvesting activities. As a general requirement for attending to these environmental concerns large forested areas must remain undisturbed and forests outside protected areas need appropriate and complementary management." (page 32)

The Russian Far East has the endangered Siberian Tiger (*Panthera tigris altaica*) while Canada has the endangered Woodland Caribou (*Rangifer tarandus caribou*) (Pruitt and Baskin 2004; Schaefer 2003). Pages 35 – 39 also bring problems in the RFE directly home to Canada: "A major problem is the lack and loss of field scientists and field workers because of dramatic cuts in government funding..." We can compare the situation in the RFE with the massive cuts in scientific staff of Canadian Wildlife Service, National Parks Canada, Canadian Meteorological Service and the Canadian Museum of Nature, beginning with the Mulroney Conservatives and not restored by later governments. In Canada, the problem is compounded by the growing infatuation of university biology, botany and zoology departments with "computer models" or "keyboard ecology" instead of learning about real animals and plants (Ehrenfeld 1993; Futuyma 1998; Noss 1998).

The book is almost overwhelming in its information: history of European invasions, lists (with comments) of major species of plants and animals, lists of endangered species (usually with comments regarding threats to survival), lists of protected areas by type, size, date of establishment, biodiversity hotspots, human economy and environmental impact.

The sections on Indigenous Peoples and their decline in numbers, relations and their problems with "modern"

extractive economy (mining, logging, etc.) is particularly instructive because of the great resemblance to the history of similar Aboriginal groups and their exploitation or rejection by Canadian governments and industries.

We read much in the western press about the widespread pollution and environmental destruction during the Soviet era, but "While the focus has been on nuclear, air, and water pollution and, somewhat less, on the wanton waste of resources caused by inefficient production, scholars have largely ignored what may be the most significant environmental legacy from the Soviet era, and what is Russia's greatest legacy to the planet: wilderness." (page 29).

Although the Russian Far East is well over the shoulder of the world from Canada, the unity of the taiga (so-called "boreal forest") is evident by the similarity of its animals and plants to those in Canada. We can also see in this compendium disturbing similarities to the problems affecting the Canadian taiga (Pruitt and Baskin 2004; Schaefer 2003). Comparison of ameliorating efforts will be valuable. There are many places in Canada which should have copies of this valuable compendium: Federal and Provincial departments of Conservation, Natural Resources, Forestry, Wildlife, Aquatic Resources, Fisheries. All University libraries, the libraries of all ENGOs concerned with conservation and sustainable use of renewable resources, anthropology and aboriginal activists, everyone teaching Field Biology, Ecology, Boreal Ecology, Resource Management, Forestry, Wildlife Management, Fisheries Management or Sustainable Development course or seminar should have access to a copy.

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WILLIAM O. PRUITT, JR.

Department of Zoology and Taiga Biological Station, University of Manitoba, Winnipeg, Manitoba R3T 2N2 Canada