Land and Environment of the Circumpolar World II

Instructor:	TBA	**Classes:**	TBA
		Time:	TBA
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COURSE DESCRIPTION

The primary aim of this course is to provide students with a more in-depth understanding of the land and environment that defines the Circumpolar North. The course continues the examination the key issues involving interaction between humans and environment that were introduced in modules of NOST 101/BCS 100: Introduction to The Circumpolar World and developed more fully in NOST 326/BCS 311: Land and Environment of the Circumpolar World I. Topics include land, seas, climate, ecology, natural resources, subsistence, contaminants and health of environments, people, flora and fauna.

SHORT BANNER COURSE DESCRIPTION

This course continues the study, begun in NOST 326/BCS 312, of circumpolar lands and environments. Land, seas, climate, ecology, natural resources, subsistence, contaminants and health of environments, people, flora and fauna are discussed.

COURSE OUTCOMES

Upon successful completion of Land and Environment II, students will have:

- A more detailed basic chemical and biological knowledge of the general concepts underlying selected natural resources;
- An appreciation of how scientific methods contribute to the understanding of resource management and human health;
- Insight into the complexity of environmental and human systems, and the effects of change on northern ecosystems; and
- An interdisciplinary understanding of relationships between cultures of the North, stewardship values and scientific knowledge.

COURSE TRANSFER

UARCTIC	BCS 312
UNBC	NORS 312

This course is accepted at all University of the Arctic member institutions. Transfer to non-member institutions will be sought at the earliest opportunity. For more information about transferability, please contact the Arts and Science Division.

COURSE PREREQUISITES

BCS 311. This is an advanced course that develops themes introduced in the first course; students will normally have successfully completed a minimum of 45 credits of university-level coursework. Students may be admitted to the course by permission of the Dean of Undergraduate Studies or the instructor.

COURSE FORMAT

This course has been designed for web-based delivery. It consists of twelve weekly modules, each comprised of a “lecture” or module text, required and suggested readings, and study questions. Students will discuss the module text in online fora. Alternatively, the course may be offered in classroom lectures and with discussions of readings.

COURSE INSTRUCTOR

This is a 3rd-year multidisciplinary natural history course. Suitable instructors would include individuals with an MA or PhD in a related discipline and working/research experience in such fields as are covered by this course (see the syllabus).

ASSESSMENT

The model of student activities and assessment for the distance-delivered version is the following:

- Short-answer tests, during modules 2, 4 and 8, designed to aid the student in remaining current with material as it is introduced into the course (3 x 10%);
- Short essay/report, due during module 6, on a specific problem or issue to acquire in-depth understanding of material introduced in the course (10%);
- Research paper (topics assigned by instructors), due during module 11 (30%);
- Comprehensive final online exam at the end of the course (30%).

Evaluation will normally be done in English. However, students may request, with the approval and support of their site coordinators and with the approval of the instructor, to submit their papers in their own languages.

REQUIRED TEXTS

- BCS 312/NOST 327 course reader, if supplied; and
- Additional readings supplied or suggested.

[NOTE: Copyright difficulties have prevented the UArctic from providing a package of

readings to BCS 312 students. Logistical problems have shown UArctic that a common textbook is impractical, since the national customs and postal systems to many parts of the Circumpolar North are not sufficiently reliable.]

COURSE SYLLABUS

Module 1: Frameworks for Analysis of Land and Environment in the Arctic

This module is developed by Karen Erickson (Associate Professor, Political Science Department, University of Alaska Fairbanks) and Kimberly Ognisty (B.A. Language Studies; Political Science, University of Alaska Fairbanks)

The application of scientific knowledge is essential in order to improve the human condition. This is especially true in the Arctic. Science draws on the wisdom of generations and constantly synthesizes new information in order to explain land and environment relations in the circumpolar North. How do environmental factors affect habitat? What role do human beings play in sustaining the Arctic ecosystem? How is human health linked to environmental change in the Arctic? These and other questions are addressed in this module.

Upon completion of this module, students will

- Understand key applications of science and to use a systematic approach in analyzing land and environment in the Arctic;
- Recognize the processes and functions of the Earth systems and their environmental significance;
- Appreciate the distinctive components and vulnerabilities of the Arctic ecosystem;
- Understand the importance of the relationships between science and policy, with special respect to resource depletion and ecological contamination; and
- Gain knowledge of long-term stewardship and the major principles of ecology and international environmental law.

Selected Readings

- Rachel Carson (1962), *Silent Spring* (Boston: Houghton Mifflin).
- Brundtland Commission (1987), *Brundtland Report: Our Common Future*, World Commission on Environment and Development (Oxford: Oxford University Press), chapters 1 and 2, pages 1-66.
- Conservation of Arctic Flora and Fauna (CAFF 2001), *Arctic Flora and Fauna: Status and Conservation*, Chapter 8: “The Oceans and Seas,” pages 183-209, [online] http://www.caff.is/
- Mark Nuttall and Terry V. Callaghan, eds. (2000), *The Arctic: Environment,People, Policy* (Amsterdam: Harwood Academic), Chapter 20, pages 575-600.

Module 2: Biocomplexity in the North

This module was developed by Lawrence K. Duffy, Associate Dean, Graduate Projects and Outreach, College of Science, Engineering and Mathematics, and Professor, Chemistry and Biochemistry Department, University of Alaska Fairbanks; and Stan Wright, Executive Assistant, Alaska Basic Neuroscience Projects, Institute of Arctic Biology, University of Alaska Fairbanks

Life on Earth is supported by the natural cycling of chemical elements. The availability

and interaction of these elements on multiple scales has both direct and indirect influences on individual organisms and environmental systems. Living systems also depend on energy flow.

Understanding the sources, sinks, transformations, and feedbacks of these essential elements and energy is a critical step in determining their behaviour under specific environmental conditions. The consequences of human perturbations on essential nutrient cycles in soils, sediments, and other systems must also be recognized.

Upon completion of this module, students will be able to

- Explain the significance of positive and negative feedback;
- Give examples of using positive feedback to make desired changes;
- Identify how emergent properties arise from hierarchical organization of systems;
- Describe complex environmental system cycles in terms of material and energy cycling;
- Illustrate the effect of human-induced changes on ecosystem services; and
- Identify bioindicators and biomarkers of human and ecological health.

Selected Readings

- Arctic Monitoring and Assessment Programme (AMAP). 1997. *Arctic Pollution Issues: A State of the Arctic Environment Report*. [Online] http://amap.no/. Oslo: AMAP.
- ———. 1998. *Assessment Report: Arctic Pollution Issues*. [Online] http://amap.no/. Oslo: AMAP.
- ———. 2001. *Guidelines for the AMAP Phase 2 Assessments*. AMAP Report 2001:1. [Online] Oslo: AMAP. http://amap.no/.
- ———. 2002. *Arctic Pollution 2002: A State of the Arctic Environment Report*.[Online] http://amap.no/. Oslo: AMAP.

Module 3: Fisheries

This module developed by Dr. Scott Smiley, Director of the Fishery Industrial Technology Center of the School of Fisheries and Ocean Sciences, University of Alaska Fairbanks, and Associate Professor at the University of Alaska Fairbanks; and Dr. Peter J. Bechtel, a USDA Agricultural Research Service scientist and an Adjunct Professor in the School of Fisheries and Ocean Sciences, at the University of Alaska Fairbanks

This module outlines the history of fishing in Alaska from prehistoric to modern times. There are detailed descriptions of modern harvesting methods including trawling, seining, longlining, pots, and others. Fish is an excellent food and provides many nutrients that are identified and described. How fish are transformed into food and how they are stabilized against degradation through freezing or canning is described, as is the fate of the by-products of seafood processing. There are many rules and regulations by which harvesters and processors must abide. Discussions of these, as well as of sustainable harvesting and the effective monitoring of fish stocks, are also included.

Upon completion of this module, students will be able to

- Describe various methods of seafood harvesting;

- Explain how limited entry permits and individual fishing quotas have affected the overcapitalization of the salmon and halibut fisheries;
- Describe the dietary and nutritional benefits of marine fish;
- Describe the processes involved in making fishmeal from fish by-products; and
- Explain the meaning of “regime shift” and give an example.

Selected Readings

- Alaska Department of Fish and Game (ADF&G). 1998. Harvest statistics. [Online] http://www.adfg.state.ak.us/.
- International Pacific Halibut Commission (IPHC). 1998. Harvest statistics. [Online] http://www.iphc.washington.edu/halcom/commerc/tables/1998breakdown1.htm. IPHC home webpage: http://www.iphc.washington.edu/halcom/.

Module 4: Marine Mammals and Fisheries

This module developed by Dr. Michael Castellini, Director, Institute of Marine Science, and Professor, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks

This module evaluates declining marine mammal populations in Alaska and the causes of such declines, as well as the science involved in counting and protecting these mammals. The module also evaluates the Endangered Species Act and the Marine Mammal Protection Act and how they interact with fisheries in Alaska. Students will identify some of the political, economic, and legal implications of the decline and the subsequent reactions.

Upon completion of this module, students will be able to

- Name the marine mammals in Alaska that are declining;
- Explain how scientists count marine mammals in the field;
- Explain how the Endangered Species Act and the Marine Mammal Protection Act interact with fisheries in Alaska;
- Explain what could cause a marine mammal population to decline; and
- Explain the role of subsistence hunting and marine mammals in Alaska.

Selected Readings

- Freedom of Information Act (FOIA). United States Department of Justice. [Online] http://www.usdoj.gov/04foia/.
- The International Whaling Commission. [Online] http://www.iwcoffice.org/.
- Marine Mammal Protection Act MMPA. [Online] http://www.nmfs.noaa.gov/prot_res/laws/MMPA/MMPA.html.
- National Marine Fisheries Service (NOAA). Steller sea lions website, [online] http://stellersealions.noaa.gov/.
- National Marine Mammal Laboratory (NMML). Graph of the estimated total population of the Steller sea lion, [online] http://nmml.afsc.noaa.gov/

♦ AlaskaEcosystems/sslhome/decline.htm. Home webpage of NMML: [online] http://nmml.afsc.noaa.gov/education/science/nmml.htm.

Module 5: Natural Resources: Chemistry and Environmental Sustainability

This module developed by Lawrence K. Duffy, Associate Dean, Graduate Program and Outreach, College of Science, Engineering and Mathematics, and Professor, Chemistry and Biochemistry Department, University of Alaska Fairbanks; and Stan Wright, Alaska Basic Neuroscience Program, Institute of Arctic Biology, University of Alaska Fairbanks

This module examines the mineral resources of Earth's crust and identifies some metal elements that are extracted from ores. It also evaluates various alternative sources of energy, describes the origin and chemistry of the fossil fuels, and describes the environmental impacts of resource use.

Upon completion of this module, students will be able to

- Identify the mineral resources of Earth's crust;
- List some metal elements that are extracted from ores;
- Describe biomass as an alternative energy source;
- Describe the different types of fossil fuels and their formation;
- Explain how energy use by humans has changed historically; and
- Describe the environmental impacts of resource use.

Selected Readings

♦ Buell, Phyllis, and James Girard. 2003. *Chemistry Fundamentals: An Environmental Perspective*. Second edition. Jones and Bartlett Publishers.

Module 6: Water Supply and Waste Treatment in the Arctic

This module developed by Dr. Dan White, Director/Associate Professor, Environmental Engineering and Environmental Quality Science, University of Alaska Fairbanks; Dan Schubert, School of Engineering, University of Alaska Anchorage; and Dr. Craig Woolard, Associate Professor, Civil and Environmental Engineering, University of Alaska Anchorage

This module discusses water and waste water management options for Arctic communities. The module begins with a discussion of the relationship between clean water and disease in Arctic communities. An overview of how water is collected and treated for human consumption in the Arctic is then presented. Finally, methods for waste water treatment and disposal are discussed.

Upon completion of this module, students will be able to

- Explain why a clean drinking water supply is essential to good human health;
- Explain why improper treatment of waste water can lead to disease epidemics, particularly in the Arctic;
- Describe how water is treated for communities in an attempt to promote good health;
- Describe how sewage, or waste water, is treated to prevent contamination of the environment and potential water supplies;

- List several different types of water sources suitable for supplying drinking water; and
- List several different ways to treat drinking water for human consumption.

Selected Readings

- D. Smith (1996), *Cold Regions Utilities Monograph*, chapters 1 and 2 (Reston, VA: American Society of Civil Engineers).

Module 7: Observations, Sustainability, and the Impacts of Change

This module developed by Anna Godduhn, M.A. Chemistry, University of Alaska Fairbanks; and Lawrence K. Duffy, Associate Dean, Graduate Program and Outreach, College of Science, Engineering and Mathematics, and Professor, Chemistry and Biochemistry Department, University of Alaska Fairbanks

This module evaluates international efforts to address environmental problems in the Arctic and the concept of stewardship. Furthermore, it examines scientific methods and uncertainty; reviews risk assessment; and identifies environmental threats, including pollution, climate change, and contaminants in the Arctic, and their effects on human and wildlife populations.

Upon completion of this module, students will be able to

- Describe the scientific method, its origins and the meaning of uncertainty in real systems;
- Explain the interrelationships between people and ecology, including public perceptions of ecological values;
- Explain the general concepts of environmental health and stewardship;
- Identify the organizations of circumpolar governance involved in environmental policy development; and
- Describe the importance of science to international policy-making regimes.

Selected Readings

- Arctic Monitoring and Assessment Programme (AMAP). 1997. Arctic Pollution Issues: A State of the Arctic Environment Report. [Online] http://amap.no/. Oslo: AMAP.
- ———. 1998. Assessment Report: Arctic Pollution Issues. [Online] http://amap.no/. Oslo: AMAP.
- ———. 2002. Arctic Pollution 2002: A State of the Arctic Environment Report. [Online] http://amap.no/. Oslo: AMAP.
- ———. 2003. AMAP Assessment 2002: Human Health in the Arctic. [Online] http://amap.no/. Oslo: AMAP.
- ———. 2004. AMAP Assessment 2002: Persistent Organic Pollutants (POPs) in the Arctic. [Online] http://amap.no/. Oslo: AMAP.
- ———. 2004. Biological Effects. In AMAP Assessment 2002: Persistent Organic Pollutants (POPs) in the Arctic, chapter 6: 163–193. [Online] http://amap.no/. Oslo: AMAP.

- Emergency Prevention, Preparedness, and Response (EPPR). [Online] http://eppr.arctic-council.org/.
- MacDonald, R., T. Harner, J. Fyfe, H. Loeng, and T. Weingartner. 2002. *AMAP Assessment 2002: The Influence of Global Change on Contaminant Pathways to, within, and from the Arctic*. Oslo: AMAP. [Online] http://amap.no/.
- Nowlan, Linda. 2001. Arctic Legal Regime for Environmental Protection. [Online] http://www.iucn.org/themes/law/pdfdocuments/EPLP44EN.pdf. Gland, Switzerland; Cambridge, UK; and ICEL, Bonn, Germany: International Union for Conservation of Nature and Natural Resources (IUCN) Environmental Law Programme.
- Protection of the Arctic Marine Environment (PAME). Home page. [Online] http://www.pame.is/

Module 8: Food Chemistry, Subsistence Webs, and Nutrition

This module developed by Kriya L. Dunlap, MS, Department of Chemistry and Biochemistry, University of Alaska Fairbanks; and Lawrence K. Duffy, Associate Dean, Graduate Program and Outreach, College of Science, Engineering and Mathematics, and Professor, Chemistry and Biochemistry Department, University of Alaska Fairbanks

In this module, the structure and properties of carbohydrates, proteins, and fats are identified; and the dietary needs for carbohydrates, fats, proteins, and vitamins are outlined. The laws of energy, caloric intake, and energy storage are examined. The presence of food additives and contaminants in the wild and in traditional foods, as well as their effect on nutrition and health, are considered.

Upon completion of this module, students will be able to

- Identify the structure and properties of carbohydrates, proteins, and fats.
- Outline the dietary needs for carbohydrates, fats, proteins, and vitamins.
- Explain the laws of energy, caloric intake, and energy storage.
- Describe the value of subsistence food.
- Describe the potential danger of contaminants and food additives.

Selected Readings

- Arctic Monitoring and Assessment Programme (AMAP). 2003. *AMAP Assessment 2002: Human Health in the Arctic*, x–xiii. [Online] http://amap.no/. Oslo: AMAP.
- Damstra, Terri, Sue Barlow, Aake Bergman, Robert Kavlock, Glen Van Der Kraak, eds. 2002. Global Assessment of the State-of-the-Science of Endocrine Disruptors (WHO/PCS/EDC/02.2). An assessment prepared on behalf of the World Health Organization, the International Labour Organisation, and the United Nations Environment Programme. [Online] http://www.google.ca/search?q=cache:6MzAstYhd1MJ:www.who.int/pcs/emerg_site/edc/docs/global_edc_front_TOC_preface.pdf+%22WHO/PCS/EDC/02.2%22&hl=en. See also home page for the International Programme on Chemical Safety (IPCS), http://www.who.int/pcs/. Geneva: IPCS.
- Egeland, Grace M., Lori A. Feyk, and John P. Middaugh. 1998. *The Use of Traditional Foods in a Healthy Diet in Alaska: Risks in Perspective*. State of Alaska

Epidemiology Bulletin: Recommendations and Reports 2 (1). State of Alaska home page: http://www.state.ak.us/.

- McMurry, John, and Mary E. Castellion. 2003. *Fundamentals of General, Organic, and Biological Chemistry*. Fourth edition. Upper Saddle River, NJ: Prentice Hall.
- United States Department of Agriculture. The Food Guide Pyramid: A Guide to Daily Food Choices. [Online] http://www.nal.usda.gov:8001/py/pmap.htm.
- United States Environmental Protection Agency (EPA). Home page, http://www.epa.gov/.

Module 9: Diet and Mental Health of Circumpolar Peoples

This module developed by Abel Bult-Ito, Department of Biology and Wildlife, and Behavioral and Evolutionary Neuroscience Laboratory, Institute of Arctic Biology, University of Alaska Fairbanks; Ronald J. Tavernier, Department of Biology and Wildlife, and Behavioral and Evolutionary Neuroscience Laboratory, Institute of Arctic Biology, University of Alaska Fairbanks; Dana M. Greene, Department of Biology and Wildlife, and Behavioral and Evolutionary Neuroscience Laboratory, Institute of Arctic Biology, University of Alaska Fairbanks; and Nancy K. McGrath-Hanna, Department of Biology and Wildlife, and Department of Psychology, University of Alaska Fairbanks

The aim of this module is to promote an understanding of a possible link between changing traditional diets and mental health that may have substantial consequences for circumpolar peoples. The people living in Arctic and Subarctic environments have adapted to cold temperatures, short growing seasons, and low precipitation, but their traditional ways are now changing because of increased contact with Western society. The rapid alteration of circumpolar cultures has led to generational changes in diet from traditional foods to the processed groceries common in modern stores.

Upon completion of this module, students will

- Describe the benefits of the traditional lifestyles of circumpolar peoples;
- List and describe key components of a traditional circumpolar diet;
- Outline the changes in the traditional diets of circumpolar peoples;
- List and describe the negative health effects of a Western-style, store-bought diet;
- Describe the mental illnesses related to living in the Arctic and Subarctic regions;
- Explain the connection between diet and its effects on brain development, health, and function; and
- Describe and explain why diet may be an important risk factor for mental health in circumpolar peoples.

Module 10: Food Traditions and Food Systems in Rural Alaska

This module developed by Dr. S. Craig Gerlach, Associate Professor, Department of Anthropology, University of Alaska Fairbanks; Laura Henry, Department of Anthropology, University of Alaska Fairbanks; and Amy M. Turner, University of Alaska Fairbanks

This module examines food systems and subsistence in rural Alaska, the changes they have faced in the past thirty years, and the effects of these changes for Alaska's Indigenous peoples.

Upon completion of this module, students will

- Explain how changes in subsistence integrate with other elements of a regional food system.

- Explain why changes in subsistence have occurred, and discuss whether these changes are favourable for the lives of Aboriginal Alaskans.
- Describe how economic components interact with subsistence and food systems.
- Describe how these economic components have affected the security of regional food systems within which people live and upon which they depend.
- Describe how the system of sharing changed or remained the same, and how it now relates to food security.

Selected Readings

- Alaska Department of Community and Economic Development (ADCED). Community Database Online. 2000 Population and Housing Characteristics for Fort Yukon. Data from 2000 US Census. [Online] http://www.dced.state.ak.us/dca/commdb/CF_BLOCK.htm.
- ———. Community Database Online. Economy, Employment, Income and Poverty for Fort Yukon. Data from 2000 US Census. [Online] http://www.dced.state.ak.us/dca/commdb/CF_BLOCK.htm
- Egeland, Grace M., Lori A. Feyk, and John P. Middaugh. 1998. *The Use of Traditional Foods in a Healthy Diet in Alaska: Risks in Perspective*. State of Alaska Epidemiology Bulletin: Recommendations and Reports 2 (1). Juneau, AK: Alaska Department of Health and Social Services. State of Alaska home page, [online] http://www.state.ak.us/.
- Magdanz, James S., Charles J. Utermohle, and Robert J. Wolfe. 2002. The Production and Distribution of Wild Food in Wales and Deering, Alaska. Technical paper no. 259. Juneau, AK: Division of Subsistence, Alaska Department of Fish and Game. [Online] http://www.subsistence.adfg.state.ak.us/TechPap/tp259.pdf
- Stephenson, Robert O., S. Craig Gerlach, R. Dale Guthrie, C. Richard Harington, Robin O. Mills, and Gregory Hare. 2001. Wood Bison in Late Holocene Alaska and Adjacent Canada: Paleontological, Archaeological and Historical Records. In *People and Wildlife in Northern North America: Essays in Honor of R. Dale Guthrie*. Edited by S. Craig Gerlach and Maribeth S. Murray. BAR International Series 944. Alaska Department of Fish and Game, Division of Wildlife Conservation, [online] http://www.wildlife.alaska.gov/management/game/wood_bison1.cfm.

Module 11: Nuclear Chemistry, Radioecology, and Stewardship

This module developed by Douglas Dasher; Lawrence K. Duffy, Associate Dean, Graduate Program and Outreach, College of Science, Engineering and Mathematics, and Professor, Chemistry and Biochemistry Department, University of Alaska Fairbanks; and John J. Kelley, Professor, School of Fisheries and Ocean Science, University of Alaska Fairbanks

This module examines the science of nuclear chemistry and radioactivity, the effect on health of radiation, and the need for effective stewardship and containment of radioactive waste. The module further investigates the use of nuclear energy and weapons, the effects of this use on northern environments, and related ethical issues.

Upon completion of this module, students will be able to

- Explain the three types of radiation emitted from atomic nuclei;
- Identify radiation as a normal part of the environment;

- Explain what nuclear reactions and equations are;
- Describe how radiation and its effects are measured;
- Define the concept of half-life;
- Explain the process of fission and nuclear waste; and
- Explain atomic bombs and fallout.

Selected Readings

- Kohlhoff, Dean W. 2002. *Amchitka and the Bomb*. Seattle, WA: University of Washington Press.
- Lane, N. 2002. *Oxygen: The Molecule That Made the World*. Oxford Publications, NY: Oxford University Press.
- O'Neill, Dan. 1994. *The Firecracker Boys*. New York: St. Martin's Press.

Module 12: Cancer and Biomarkers of Health

This module developed by Julie La Rocca-Brigham; and Lawrence K. Duffy, Associate Dean, Graduate Program and Outreach, College of Science, Engineering and Mathematics, and Professor, Chemistry and Biochemistry Department, University of Alaska Fairbanks

This module provides a brief background on cancer and its relation to environmental factors, including pollutants and the use of biomarkers in determining environmental carcinogens. The module also offers case studies, in the Arctic and around the world, to help explain incidences and complex processes of cancer.

Upon completion of this module, students will be able to

- Explain what cancer is;
- Explain what biomarkers are;
- Explain what POPs and EDCs are; and
- Explain the relationship between pollutants and cancer.

Selected Readings

- Alaska Department of Health & Social Services, Division of Public Health. 2002. *Healthy Alaskans 2010: Targets and Strategies for Improved Health*. Volume I: Chapter 22: "Cancer," page 22-6. Juneau, AK: State of Alaska. [Online], http://health.hss.state.ak.us/dph/targets/ha2010/volume_1.htm.
- Godduhn, Anna, and Lawrence K. Duffy. 2003. Multi-Generation Health Risks of Persistent Organic Pollution in the Far North: Use of the Precautionary Approach in the Stockholm Convention. *Environmental Science and Policy 6* (4): 341–353.
- Hing, Man Chan, and Amy Ing. 1996. A Database for Environmental Contaminants in Traditional Food in Northern Canada. *Circumpolar Health*: 567–571.
- Klopov, V. 1996. Persistent Organic Compounds in Women Residing in the Russian Arctic. *Circumpolar Health*: 555–560.