History of limnology pdf

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The science of the inland aquatic ecosystems of Lake Ho <2>a, N.Y. Limnology (/lɪmˈnɒlədʒi/lim-NOL-e-jee; from Greek λίμνη, limne, Lake and λόγος, logos, knowledge) is the study of inland aquatic ecosystems. The study of lymphnology includes aspects of biological, chemical, physical and geological characteristics and functions of inland waters (running and standing water, fresh and salty, natural and made by man). This includes the study of lakes, reservoirs, ponds, rivers, springs, streams, wetlands and groundwater. More to this recent subdisciplinary of lymphnology, called landscape lymnology, studies, manages and seeks to preserve these ecosystems through a landscape perspective, by explicitly exploring the links between the aquatic ecosystem and its drainage basin. Recently, the need to understand global inland waters within the Earth system has created a subdiscipline called global lymphnology. This approach takes into account processes in inland waters on a global scale, such as the role of inland aquatic ecosystems in global biogeochemical cycles. Limnology is closely related to aquatic ecology and hydrobiology, which study aquatic organisms and their interaction with an abiotic (non-living) environment. Although limnology has a significant overlap with freshwater disciplines (e.g. freshwater biology), it also includes the study of inland salt lakes. The history of the term limnology was coined by Francois-Alphonse Forel (1841-1912), who created a field with his studies of Lake Geneva. Interest in the discipline quickly expanded, and in 1922 August Tienmann (German zoologist) and Einar Naumann (Swedish botanist) co-founded the International Society of Limnology (SIL, from Societas Internationalis Limnologiae). The original definition of limnology, oceanography of lakes, was expanded to cover the study of all inland waters, and influenced the work of Benedict Dybovsky on Lake Baikal. Famous early American limnologists included G. Evelyn Hutchinson and Ed Deaguey. At the University of Wisconsin-Madison, Edward A. Birge, Chancey Judah and Arthur D. Hasler contributed to the center's development of limnology. The general limnological physical properties of aquatic ecosystems are determined by a combination of heat, currents, waves and other seasonal distributions of environmental conditions. The morphometry of the reservoir depends on the type of object (e.g. lakes, rivers, streams, wetlands, estuary, etc.) and the structure of the land surrounding the body of water. Lakes, for example, are classified by their formation, and lake areas are determined by the depth of water. The morphometry of the river and river system is determined by the geology of the area, as well as the total speed of the water. Another type of water system, limnologists are estuaries. Estuaries are reservoirs classified by the interaction of the river and ocean or sea. Wetlands vary in size, shape and pattern, but the most common types, marshes, marshes and marshes often fluctuate between shallow, freshwater and dry content depending on the time of year. Light zonation light interactions are a concept of how the amount of sunlight entering the water affects the structure of the body of water. These zones determine different levels of productivity in aquatic ecosystems, such as the lake. For example, the depth of a water column that sunlight is able to penetrate and where much of plant life can grow is known as the focal or euphotic zone. The rest of the water column, which is deeper and does not receive enough sunlight for plant growth, is known as the aphotic zone. Thermal stratification, similar to light zoning, thermal stratification or thermal zoning, is a way of grouping parts of the reservoir in the water system based on the temperature of different layers of the lake. The less murky the water, the more light can penetrate, and thus the heat is transmitted deeper into the water. Heating decreases exponentially with depth in the water column, so that the water will be the warmest near the surface, but gradually cooler as the movement downwards. There are three main sites that determine the thermal stratification in the lake. Epilimnion is closest to the surface of the water and absorbs long-wave radiation to heat the surface of the water. During the colder months, wind haircuts can help cool the surface of the water. A termoline is an area within the water column where the water temperature drops rapidly. The lower layer is a hypolimnion that tends to have cold water because its depth limits sunlight from reaching it. In temperate lakes, autumn-seasonal cooling of surface water leads to the turnover of the water column, where the thermal line is disturbed, and the temperature profile of the lake becomes more homogeneous. The chemical properties of water chemistry in aquatic ecosystems depend on natural characteristics and processes, including sediment, underlying soil and rock in the drainage basin, erosion, evaporation and deposition. All reservoirs have a certain composition of both organic and inorganic elements and compounds. Biological reactions also affect the chemical properties of water. In addition to natural processes, human activity strongly affects the chemical composition of water systems and the quality of their water. Oxygen and carbon dioxide Dissolve oxygen and dissolved carbon dioxide are often discussed together because of their joint role in breathing and photosynthesis. Concentrations of dissolved oxygen can be altered by physical, chemical and biological processes and reactions. processes, including wind mixing, can increase the concentration of dissolved oxygen, especially in the surface waters of aquatic ecosystems. Since dissolved dissolved oxygen soluble is associated with water temperature, temperature changes affect the concentration of dissolved oxygen because warmer water has a lower ability to hold oxygen as colder water. Biologically, both photosynthesis and aerobic breathing affect dissolved oxygen concentrations. Photosynthesis of autotrophic organisms such as phytoplankton and aquatic algae increases the concentration of dissolved oxygen, while reducing the concentration of carbon dioxide, as carbon dioxide is insured during photosynthesis. All aerobic organisms in the aquatic environment take dissolved oxygen during aerobic breathing, while carbon dioxide is released as a byproduct of this reaction. Because photosynthesis is limited by light, photosynthesis and breathing occur during daylight hours, while only breathing occurs in the dark or in the dark parts of the ecosystem. The balance between the production and consumption of dissolved oxygen is calculated as the rate of water metabolism. Vertical changes in the concentrations of dissolved oxygen affect both the wind mixing of surface water and the balance between photosynthesis and the breathing of organic matter. These vertical changes, known as profiles, are based on similar principles, such as thermal bundle and light penetration. As the availability of light decreases deeper in the water column, the rate of photosynthesis also decreases, and less dissolved oxygen is produced. This means that the concentrations of dissolved oxygen usually decrease as they move deeper into the body of water due to photosynthesis not replenished with dissolved oxygen, which is snuffed out through breathing. During periods of thermal stratification, water density gradients prevent mixing oxygen-rich surface waters with deeper waters. Long periods of stratification can lead to depletion of the water of dissolved oxygen; when the concentrations of dissolved oxygen are below 2 milligrams per liter, water is considered hypoxic. When the concentrations of dissolved oxygen are approximately 0 milligrams per liter, the conditions are anoxic. Both hypoxic and anoxic waters reduce available habitat for organisms that overextant oxygen, and contribute to changes in other chemical reactions in water. Nitrogen and phosphorus nitrogen and phosphorus are ecologically important nutrients in water systems. Nitrogen is generally present as gas in aquatic ecosystems, but most water quality studies tend to focus on nitrates, nitrites and ammonia. Most of these dissolved nitrogen compounds seasonal scheme with a greater concentration in the autumn and winter months compared to spring and summer. Phosphorus plays a different role in aquatic water because it is a limiting factor in the growth of phytoplankton due to generally low concentrations in the water. Dissolved phosphorus is also crucial for all living animals, often very limited to primary productivity in fresh water, and has its own distinctive ecosystem of cycling. The biological properties of Lake George, New York, USA, oligophrotrophic lake trophic classification Lake One of the ways of classifying lakes (or other bodies of water) with the trophic state classification. Oligophrophe Lake is characterized by relatively low primary production and low nutrient levels. Eutrophic lake has a high level of primary productivity due to very high levels of nutrients. Eutrophication of the lake can lead to algae blooms. Dystrophic lakes have high levels of humic matter and are usually yellow-brown, tea-colored water. These categories do not have rigid specifications; the classification system can be seen more as a spectrum covering different levels of water productivity. Professional organizations People who study lymnology are called lymphnologists. There are many professional organizations associated with limnology and other aspects of water science, including the Association of Sciences of Limnology and Oceanography, Asociaci'n Iberica de Limnology, the International Society of Limnology, the Polish Limnological Society, the Society of Canadian Lymphnologists, and freshwater biological associations. See also Hydrology of the Lenic Ecosystems of the Limnological Towers of the Lothian Ecosystems of Paleolimnology Links - Kumar, Arvind (2005). The basics of lymphnology. APH Publishing. ISBN 9788176489195. a b c d Wetzel, R.G. 2001. Limnology: Lake and River Ecosystems, 3rd. 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