Aquatic ecology and resources pdf

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A Statistical Review of Top Cited ISI Papers Regarding the Different Effects of Climate Change on Rivers

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Abstract **– Since, even a minor change in hydraulic variables will lead to tangible changes in water resources system operation, therefore, the effects of climate change on rivers were briefly considered with a conceptual look. In the next step, because the researches in the form of paper have considerably been useful in development and enhancement of climate change effect on rivers, a statistical overview was made superior papers published in this field. Papers related to the current subject have been published in the knowledge database (web of science) of institute of scientific information (ISI) from 1980- 2014. Among all the articles that have been printed in this relation, (N = 763), 100 top papers were classified and considered with the highest number of identifying references and in different statistical opinions such as the number of references, the distribution of time and place, the introduction of top journals and Etc. The results reveal that in the field of climate changes impact, the researchers have considerably focused on respectively the river hydrology (40%), water resources and ecosystem (25%), surface and subsurface water resources (17%), sedimentation and erosion (12%) and the quality of the River (6%).**

Keywords **– Water Resources, River Basin, Land Use, Climate Variability, Climate Change, Hydrological Modeling.**

I. Introduction

The impact of climate change on the river could be one of the crucial challenges faced by hydrologists and water resource planner. Changes in temperature and rainfall patterns have serious effects on the quality and quantity water supply. Because of the increasing requirement for water, studying the possibility of climate change and its impacts on water resources is essential [1]. The surface water of rivers and rainfall amounts have a major role in supplying water required for several activities such as farming, drinking water, industry and electricity generation [2] ,because these two parameters may have a direct effect on the water resources management decisions such as meet the water requirements and prevent flooding [3]. Water shortages directly and indirectly have an effect on sectors such as the control, storage and water supply, planning, conservation operation, factor productivity, and etc. [4]. Water scarcity has become a severe concern, specifically in cities which water resources are usually limited. The limited resources of surface water are not enough to cover the water needs so, in order to meet the demands, underground aquifers are considerably being used to supplement the water desires. Overuse of groundwater resources which have serious impacts on the quality and quantity of aquifers [5]. Also, considering that the most economic-agricultural activities is in places next to the river so some effect on flood management, the right of the river bed, and the economic feasibility of development projects, forecast, warning, rescue operations and flood insurance could be considered [6]. Nowadays, natural events such as floods have been among human problems and hydrologists have always given lot attentions to this concern [7]. The complexity of water resources system makes the analysis of water resources investment alternatives difficult and complex. This leads to increase the application of analysis techniques [8]. So, in this article we have considered the importance of this topic that has introduced the 100 top articles that examines the impacts of climate changes on rivers.

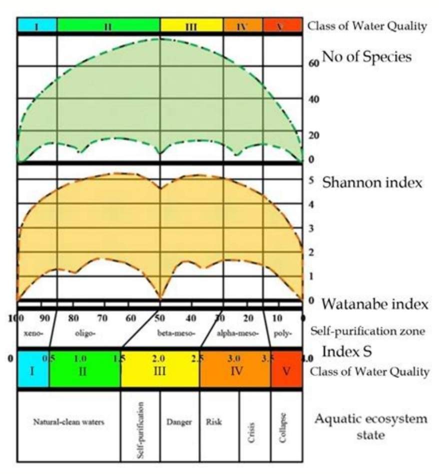
II. Methodology

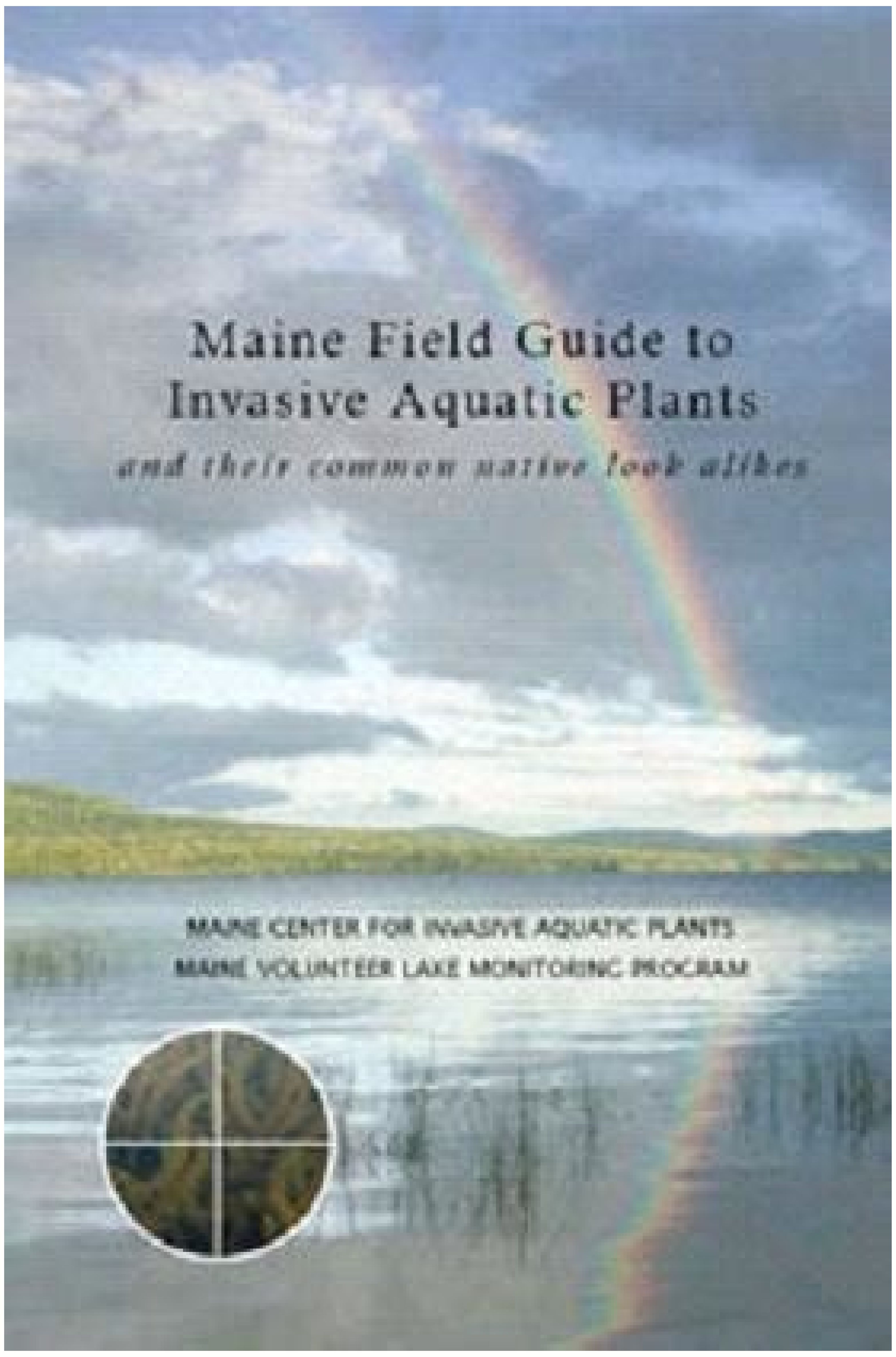
Reviewing the articles is one of the basic principles in the research study. The statistical method used in this research is applying ISI papers from Web of Science website. In this regard, with searching phrases "climate change" and " river" between the years 1980 to 2014. The number of 763 with these phrases were collected and ordered in descending based on their number of citations. Among them, 100 top papers and articles with the most citations were selected and statistical surveys were conducted on them.

III. Results

A. Top papers (papers with the most citations):

Among these articles the minimum and maximum number of citations, were 9 and 150 respectively. The average number of citations for top papers is 44.4. The following table indicates the 10 top papers with the highest number of citations.





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Contribution to the Symposium: 'Gadoid Fisheries: The Ecology of Management and Rebuilding'

Introduction

Gadoid fisheries: the ecology and management of rebuilding

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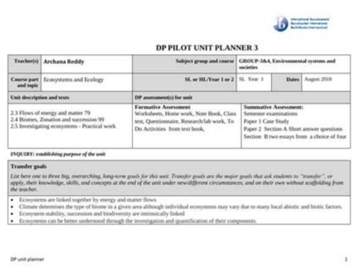
This Symposium issue results from the ICES/NAFO symposium on "Gadoid Fisheries: The Ecology and Management of Rebuilding", held in St Andrews, New Brunswick, Canada, from 14 to 18 October 2013. The aim of the Symposium was to (i) address the historical dynamics and current status of gadoid stocks worldwide, (ii) present new scientific findings on the biology and ecology of these species that can be used to improve fisheries management, (iii) link biological changes to environmental changes that can be used to forecast species distribution and productivity related to climate change, and (iv) present and appraise the effectiveness of management actions before, during, and after recovery.

The Symposium targeted gadoids, namely cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), pollock (*Pollachius* spp.), hake (*Merluccius* spp.), and others. Gadoids remain one of the key groups of exploited demersal fish. The histories of many gadoid fisheries have featured rapid population decline and fishery collapse. Recently, marked improvements in population sizes have occurred in many gadoid stocks spanning their geographic distributions. Many other stocks, however, remain at depleted levels. Given the commercial value and ecological importance of this group of fish, the Symposium was strongly justified. Over 100 participants representing Australia, Brazil, Canada, Chile, Denmark, Finland, France, Germany, Japan, Norway, Russia, Spain, the United Kingdom, and the United States presented empirical data and theories to offer insight into the varied recovery rates of gadoid stocks in 56 oral contributions and 39 posters. Agenda and abstracts from the symposium are available in the Supplementary material (the abstracts of all the oral and poster presentations referred to in this Introduction can be accessed in the Supplementary material).

There has not been an international symposium dedicated to the biology and ecology of Atlantic cod since the early 1990s (those were held in St John's, Canada, and Reykjavik, Iceland). In 2006, a Wakefield-sponsored symposium on the resiliency of gadoid stocks to fishing and climate change was held in Anchorage, Alaska, with the programme heavily focused on North Pacific gadoids. In 2009, an ICES/PICES/UNCOVER symposium on rebuilding depleted fish stocks—biology, ecology, social science, and management strategies—was held in Rostock, Germany, addressing mechanisms of fish stock recovery and how to best implement stock recovery plans. The ICES/NAFO Symposium in St Andrews went beyond these earlier symposia by contrasting gadoid stock dynamics in different ecosystems on both sides of the Atlantic, identifying not only ecological settings and management actions leading to recovery, but also considering management plans after, and in the absence of, rebuilding. The symposium acknowledged explicitly the challenges of environmental change and species interactions, and that gadoid species differ significantly in key biological attributes that influence stock management advice through implementation of suitable management reference points, harvest levels, closed areas and seasons, and fishing gear.

The symposium was structured into six theme sessions:

(i) effects of life history on productivity and stock rebuilding;
(ii) the ghost of fishing past: effects of fishing on recovery potential;
(iii) climate change and stock rebuilding;
(iv) case histories of successful or failed rebuilding;



DP PILOT UNIT PLANNER 3

Home   Research   AQUATIC ECOLOGY Water is a necessity for all living things on Earth and is one of the most important natural resources flowing from our forests. With looming problems like climate change and pressing energy demands, a better understanding of how to conserve freshwater ecosystems is critically important in order to meet our increasing need for freshwater. Freshwater ecology is the interdisciplinary study of rivers, lakes, streams, seasonal bodies of water, underground water deposits, and surrounding riparian areas. Aquatic ecologists study natural populations of organisms in the water, learning about the distribution and abundance of aquatic organisms, mostly fish, their prey and their predators, and their interactions with their environment. FEATURED RESEARCH SCIENTISTS AWAE aquatic ecologists seek to gain a better understanding of the conservation of aquatic ecosystems by studying a broad spectrum of issues, including: the interaction of freshwater fishes with their habitat; the impacts of nonnative species on native fish assemblages and aquatic communities; water quality issues, including elevated stream temperatures); restoration of degraded stream and riparian habitats; and, hydrologic processes. AWAE scientists actively involved in this research include: A cool water stream in Catoctin Mountain Park. NPS/Paradis The Aquatic Ecologist provides technical assistance for management and protection of aquatic resources in both the National Capital and Northeast Regions. These aquatic resources include streams, wetlands, floodplains, riparian corridors, and groundwater systems and the organisms that inhabit them. The aquatic ecologist supports water resource preservation, protection, and management through research and partnerships and provides integration across ecoregions, states, and watersheds, including the Chesapeake Bay. She also supports parks in complying with the Chesapeake Bay Agreement and total maximum daily load limits for nitrogen, phosphorus and sediment. Contact Contact 202-339-8300 for more information. If you need assistance from Resource Stewardship and Science (RESS), you may submit a Solution for Technical Assistance Requests (STAR) request online (NPS Only). Projects Links Phytoplankton are tiny plants that use sunlight and nutrients in lakes to grow. Polluted lakes may host 'algae blooms' which can suck oxygen out of the water and may be toxic to humans and animals. Zooplankton are small animals that drift and feed on small particles and organisims in the water column. Zooplankton are the favorite food of many types of fish and most juvenile fish. Fish, besides being a source of food and recreation for people, are important members of aquatic ecosystems and indicators of water quality. Fish occupy different niches in aquatic environments. In streams, fish like the native Bonneville Cutthroat Trout feed on macroinvertebrates while in lakes similar sized fish feed on both macroinvertebrates and zooplankton. Other types of fish are predators and help regulate the populations of invertebrates and smaller fishes via top-down control. Not all species of fish can survive in a waterbody; temperature and water chemistry determine which species of fish can inhabit a waterbody. For fish, two types of temperatures limit growth and survival. They can survive exposure to warmer temperatures for short periods (hours) but require cooler temperatures over longer periods of exposure. Time of year and age of fish can also affect the temperatures that they require to grow. Top Down Control A healthy aquatic ecosystem contains a good balance of producers (like phytoplankton algae and leaves), consumers (like zooplankton and invertebrates) and predators like fishes. The top consumer in an ecosystem excerpts top-down control on the populations of the consumers and producers. In a lake, bluegill suppress the population of zooplankton via feeding. This then increases the population phytoplankton. This mechanism is known as top down control. image from Historical Overfishing and the Recent collapse Jackson et al These animals, visible to the human eye and lacking a backbone, include many types of insects as well as other animals such as worms, mollusks, and crustaceans. Macroinvertebrates often feed on plants, algae and things that fall into the stream / lake. In lakes they usually live in the shallow-water area around the edge of the pond amongst aquatic plants. Macroinvertebrates are often used as indicator species to determine the health of water. Some species are more sensitive to pollution than others. In the pond, dragonflies and mayflies are indicative of a healthy aquatic community. Click here to learn more about macroinvertebrates Ecosystem in a body of water An estuary mouth and marine coastal waters, part of an aquatic ecosystem An aquatic ecosystem is an ecosystem formed by surrounding a body of water, in contrast to land-based terrestrial ecosystems. Aquatic ecosystems contain communities of organisms that are dependent on each other and on their environment. The two main types of aquatic ecosystems are marine ecosystems and freshwater ecosystems.[1] Freshwater ecosystems may be lentic (slow moving water, including pools, ponds, and lakes); lotic (faster moving water, for example streams and rivers); and wetlands (areas where the soil is saturated or inundated for at least part of the time).[2] Types Marine ecosystems This section is an excerpt from Marine ecosystem.[edit] Coral reefs form complex marine ecosystems with tremendous biodiversity Marine ecosystems are the largest of Earth's aquatic ecosystems and exist in waters that have a high salt content. These systems contrast with freshwater ecosystems, which have a lower salt content. Marine waters cover more than 70% of the surface of the Earth and account for more than 97% of Earth's water supply[3][4] and 90% of habitable space on Earth.[5] Seawater has an average salinity of 35 parts per thousand of water. Actual salinity varies among different marine ecosystems.[6] Marine ecosystems can be divided into many zones depending upon water depth and shoreline features. The oceanic zone is the vast open part of the ocean where animals such as whales, sharks, and tuna live. The benthic zone consists of substrates below water where many invertebrates live. The intertidal zone is the area between high and low tides. Other near-shore (neritic) zones can include mudflats, seagrass meadows, mangroves, rocky intertidal systems, salt marshes, coral reefs, lagoons. In the deep water, hydrothermal vents may occur where chemosynthetic sulfur bacteria form the base of the food web. Marine coastal ecosystem This paragraph is an excerpt from Marine coastal ecosystem.[edit] A marine coastal ecosystem is a marine ecosystem which occurs where the land meets the ocean. Marine coastal ecosystems include many different types of marine habitats, such as estuaries and lagoons, salt marshes and mangrove forests, seagrass meadows and coral reefs, kelp forests and backwaters. Directly and indirectly these provide a vast range of ecosystem services for humans, such as sequestering carbon, cycling nutrients and elements, providing nurseries and fishing grounds for commercial fisheries, preventing coastal erosion and moderating extreme events, as well as providing recreational services and supporting tourism. Marine surface ecosystem This paragraph is an excerpt from Ocean surface ecosystem.[edit] Organisms that live freely at the ocean surface, termed neuston, include keystone organisms like the golden seaweed Sargassum that makes up the Sargasso Sea, floating barnacles, marine snails, nudibranchs, and cnidarians. Many ecologically and economically important fish species live as or rely upon neuston. Species at the surface are not distributed uniformly; the ocean's surface harbours unique neustonic communities and ecoregions found at only certain latitudes and only in specific ocean basins. But the surface is also on the front line of climate change and pollution. Life on the ocean's surface connects worlds. From shallow waters to the deep sea, the open ocean to rivers and lakes, numerous terrestrial and marine species depend on the surface ecosystem and the organisms found there.[7] Freshwater ecosystems This section is an excerpt from Freshwater ecosystem.[edit] Freshwater ecosystem. Freshwater ecosystems are a subset of Earth's aquatic ecosystems. They include lakes, ponds, rivers, streams, springs, bogs, and wetlands.[8] They can be contrasted with marine ecosystems, which have a larger salt content. Freshwater habitats can be classified by different factors, including temperature, light penetration, nutrients, and vegetation. There are three basic types of freshwater ecosystems: Lentic (slow moving water, including pools, ponds, and lakes), lotic (faster moving water, for example streams and rivers) and wetlands (areas where the soil is saturated or inundated for at least part of the time).[9][8] Freshwater ecosystems contain 41% of the world's known fish species.[10] Lentic ecosystem (lakes) This section is an excerpt from Lake ecosystem.[edit] A lake ecosystem or lacustrine ecosystem includes biotic (living) plants, animals and micro-organisms, as well as abiotic (non-living) physical and chemical interactions.[11] Lake ecosystems are a prime example of lentic ecosystems (lentic refers to stationary or relatively still freshwater, from the Latin lentus, which means "sluggish"), which include ponds, lakes and wetlands, and much of this article applies to lentic ecosystems in general. Lentic ecosystems can be compared with lotic ecosystems, which involve flowing terrestrial waters such as rivers and streams. Together, these two ecosystems are examples of freshwater ecosystems. Lotic ecosystem (rivers) This section is an excerpt from River ecosystem.[edit] This stream in the Redwood National and State Parks together with its environment can be thought of as forming a river ecosystem. River ecosystems are flowing waters that drain the landscape, and include the biotic (living) interactions amongst plants, animals and micro-organisms, as well as abiotic (nonliving) physical and chemical interactions of its many parts.[12][13] River ecosystems are part of larger watershed networks or catchments, where smaller headwater streams drain into mid-size streams, which progressively drain into larger river networks. The major zones in river ecosystems are determined by the river bed's gradient or by the velocity of the current. Faster moving turbulent water typically contains greater concentrations of dissolved oxygen, which supports greater biodiversity than the slow-moving water of pools. These distinctions form the basis for the division of rivers into upland and lowland rivers. The following unifying characteristics make the ecology of running waters unique among aquatic habitats: the flow is unidirectional, there is a state of continuous physical change, and there is a high degree of spatial and temporal heterogeneity at all scales (microhabitats), the variability between lotic systems is quite high and the biota is specialized to live with flow conditions.[14] Wetlands This section is an excerpt from Wetland.[edit] A wetland is a distinct ecosystem that is flooded by water, either permanently (for years or decades) or seasonally (for weeks or months). Flooding results in oxygen-free (anoxic) processes prevailing, especially in the soils.[15] The primary factor that distinguishes wetlands from terrestrial land forms or water bodies is the characteristic vegetation of aquatic plants, adapted to the unique anoxic hydric soils.[16] Wetlands are considered among the most biologically diverse of all ecosystems, serving as home to a wide range of plant and animal species. Methods for assessing wetland functions, wetland ecological health, and general wetland condition have been developed for many regions of the world. These methods have contributed to wetland conservation partly by raising public awareness of the functions some wetlands provide.[17] Functions Further information: ecosystem Aquatic ecosystems perform many important environmental functions. For example, they recycle nutrients, purify water, attenuate floods, recharge ground water and provide habitats for wildlife.[18] Aquatic ecosystems are also used for human recreation, and are very important to the tourism industry, especially in coastal regions.[19] Biotic characteristics (living components) The biotic characteristics are mainly determined by the organisms that occur. For example, wetland plants may produce dense canopies that cover large areas of sediment—or snails or geese may graze the vegetation leaving large mud flats. Aquatic environments have relatively low oxygen levels, forcing adaptation by the organisms found there. For example, many wetland plants must produce aerenchyma to carry oxygen to roots. Other biotic characteristics are more subtle and difficult to measure, such as the relative importance of competition, mutualism or predation.[20] There are a growing number of cases where predation by coastal herbivores including snails, geese and mammals appears to be a dominant biotic factor.[21] Autotrophic organisms Autotrophic organisms are producers that generate organic compounds from inorganic material. Algae use solar energy to generate biomass from carbon dioxide and are possibly the most important autotrophic organisms in aquatic environments.[22] The more shallow the water, the greater the biomass contribution from rooted and floating vascular plants. These two sources combine to produce the extraordinary production of estuaries and wetlands, as this autotrophic biomass is converted into fish, birds, amphibians and other aquatic species. Chemosynthetic bacteria are found in benthic marine ecosystems. These organisms are able to feed on hydrogen sulfide in water that comes from volcanic vents. Great concentrations of animals that feed on these bacteria are found around volcanic vents. For example, there are giant tube worms (Riftia pachyptila) 1.5 m in length and clams (Calyptogena magnifica) 30 cm long.[23] Heterotrophic organisms Heterotrophic organisms consume autotrophic organisms and use the organic compounds in their bodies as energy sources and as raw materials to create their own biomass.[22] Euryhaline organisms are salt tolerant and can survive in marine ecosystems, while stenohaline or salt intolerant species can only live in freshwater environments.[24] Abiotic characteristics (non-living components) An ecosystem is composed of biotic communities that are structured by biological interactions and abiotic environmental factors. Some of the important abiotic environmental factors of aquatic ecosystems include substrate type, water depth, nutrient levels, temperature, salinity, and flow.[20][18] It is often difficult to determine the relative importance of these factors without rather large experiments. There may be complicated feedback loops. For example, sediment may determine the presence of aquatic plants, but aquatic plants may also trap sediment, and add to the sediment through peat. The amount of dissolved oxygen in a water body is frequently the key substance in determining the extent and kinds of organic life in the water body. Fish need dissolved oxygen to survive, although their tolerance to low oxygen varies among species; in extreme cases of low oxygen, some fish even resort to air gulping.[25] Plants often have to produce aerenchyma, while the shape and size of leaves may also be altered.[26] Conversely, oxygen is fatal to many kinds of anaerobic bacteria.[22] Nutrient levels are important in controlling the abundance of many species of algae.[27] The relative abundance of nitrogen and phosphorus can in effect determine which species of algae come to dominate.[28] Algae are a very important source of food for aquatic life, but at the same time, if they become over-abundant, they can cause declines in fish when they decay.[29] Similar over-abundance of algae in coastal environments such as the Gulf of Mexico produces, upon decay, a hypoxic region of water known as a dead zone.[30] The salinity of the water body is also a determining factor in the kinds of species found in the water body. Organisms in marine ecosystems tolerate salinity, while many freshwater organisms are intolerant of salt. The degree of salinity in an estuary or delta is an important control upon the type of wetland (fresh, intermediate, or brackish), and the associated animal species. Dams built upstream may reduce spring flooding, and reduce sediment accretion, and may therefore lead to saltwater intrusion in coastal wetlands.[20] Freshwater used for irrigation purposes often absorbs levels of salt that are harmful to freshwater organisms.[22] Threats Further information: Ecosystem § Human interactions with ecosystems, Freshwater ecosystem § Threats, Marine ecosystem § Threats, and Human impact on marine life The health of an aquatic ecosystem is degraded when the ecosystem's ability to absorb a stress has been exceeded. A stress on an aquatic ecosystem can be a result of physical, chemical or biological alterations to the environment. Physical alterations include changes in water temperature, water flow and light availability. Chemical alterations include changes in the loading rates of biostimulatory nutrients, oxygen-consuming materials, and toxins. Biological alterations include over-harvesting of commercial species and the introduction of exotic species. Human populations can impose excessive stresses on aquatic ecosystems.[18] There are many examples of excessive stresses with negative consequences. The environmental history of the Great Lakes of North America illustrates this problem, particularly how multiple stresses, such as water pollution, over-harvesting and invasive species can combine.[29] The Norfolk Broadlands in England illustrate similar decline with pollution and invasive species.[31] Lake Pontchartrain along the Gulf of Mexico illustrates the negative effects of different stresses including levee construction, logging of swamps, invasive species and salt water intrusion.[32] See also Aquatic plant – Plant that has adapted to living in an aquatic environment Hydrobiology – Science of life and life processes in water Hydrosphere – Total amount of water on a planet Limnology – Science of inland aquatic ecosystems Ocean Stephen Alfred Forbes – American naturalist - one of the founders of aquatic ecosystem science Stream metabolism References ^ Alexander, David E. (1 May 1999). Encyclopedia of Environmental Science. Springer. ISBN 0-412-74050-8. ^ Vaccari, David A. 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