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Напечатано: PRINTED B SPAIN - PRINTED B SPAIN Эта книга была напечатана с органической бумагой и inkwww.FreeLibros.orgResumen содержания Первая часть Введение и справочная информация 2 Глава 1 Природа экологии 4 Глава 2 Адаптация и эволюция 17 Часть вторая Физическая среда 44 Глава 3 Климат 46 Глава 4 Водная среда 68 Глава 5 Наземная среда 87 Третья часть Организм и окружающая среда 106 Глава 6 Адаптация растений к окружающей среде 108 Глава 7 Адаптация животных к окружающей среде 139 Глава 8 Образец жизненного цикла 172 Часть 4 Население 194 Глава 9 Свойства населения 196 Глава 10 Рост численности населения 215 Глава 11 Внутриспецифическое регулирование народонаселения 235 Глава 12 Целевой 255 Пятый Взаимодействие между видами 270 Глава 13 Межспецифическая компетенция 272 Глава 14 Предтеча 299 Глава 15 Тунеядство и взаимность 327 part of his Community Ecology 348 Chapter 16 Community Structure 350 Chapter 17 Factors, Affecting Community Structure 370 Chapter 18 Dynamics Community 391 Chapter 19 Landscape Ecology 416 Seventh Part Ecosystem Ecology 442 Chapter 20 Ecosystem Energy 444 Chapter 21 Nutritional Breakdown and Circulation 470 Chapter 22 Biogeochemical Cycles 496 Eighth Part BiogeographicAl ecology 518 Chapter 23 Terrestrial Ecosystems 520 Chapter 24 Aquatic Ecosystems 546 Chapter 25 Ground Water Transitions 569 Chapter 26 Large-scale Biodiversity Models 585 Ninth Part Ecology 598 Chapter 27 Population Growth, Resource Use and Sustainability 600 Chapter 28 Habitat Loss, Biodiversity and Conservation 630 Chapter 29 Global Climate Change 653www.FreeLibros.org-Summarycontainment vww.FreeLibros.orgContenidoPreface xviii 2.4 Genetic variation is an important ingredient for natural selection 28First batch Introduction and 2.5 Evolution is a modification in laantecedents 2 gene frequency 29Capition 1 Nature Ecology 4 2.6 The concept of species based on genetic isolation 30 1.1 Organisms interact with the environment in the context of ecosystem 4 2.7 The process of species includes the development of reproductive isolation 32 1.2 Ecosystem components form a hierarchy 5 2.8 Geographical differences in the form provides information on the process 1.3 Ecology has complex roots 5 species 34 1.4 Ecology has links 2.9 Adaptation reflects the obligations and disciplines of 7 constrictions 35 Profile researchers Beren W. 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From an example to define the collective dynamics of the population that moment, Ecology evolved into La Kinta parte develops our exhibition from an inter-in-textbook designed for use in the course of actions between individuals of the same kind to inter-guidance to the ecology of the semester. populations of different species (the interaction is mainly focused on students of sta-inter-specific). In these chapters we expand our biological, in writing this text we guide the vision of adaptation to the environment in terms of the belief that ecology should be part of the educational physical environment, to the role of interaction between humanists lastions. We believe that students who study species in the natural selection process and in the dynamics of dediscliplination are as diverse as economics, sociology, inge-populations, inerai, political science, law, history, philology, idiocy- The sixth part explores the topic of eco-mas and similar communities should have a logical basic understanding. This exhibition is based on themes covered in ecology for the simple reason that it affects the life parts from third to fifth to explore the factors left by each. affect the distribution and abundance of species through environmental gradients, both spatial and structural and temporal. The seventh part combines the explanations of the structure and content of this text are guided by our ecological communities (Sixth part) and the physical environment the basic belief that: 1) Fundamental unity in (Second Part) to develop the concept of ecosystem ecology study is the individual organism and 2) ma. This part focuses on the flow of energy and the subject of adaptation through natural selection pro-through natural systems. The eighth part still provides the basis for combining research with community and ecosystems at higher levels of the organization: the population is the context of biogeography, by studying lag, communities and ecosystems. One of the issues of the distribution of aquatic ecosystems and in the text in bulk is the concept of commitment: large-scale series, as well as regional and global patterns of adaptation (characteristics) that allow organized diversity biológica.mo survive, grow and reproduce in accordance with the set of the Ninth Part focuses on environmental interactions, inevitably imposing restrictions between people and ecosystems. At the moment in their functionality (survival, cultivation and study of important environmental issues bred) in the same way in different current conditions related to population growth, the environment. These environmental conditions include both the use of sustainable resources, the reduction of physical environments, and the diversity of organisms (biodiversity and global climate change. Vo of these chapters is the study of the role of the hundred-This basic scheme lays the foundation for understanding cia ecology both in understanding and aerodynamics of the population as in terms of treating these critical environmental problems, demographic and evolutionary. Throughout the text we explore this range so the text is divided into nine parts. The first pair, based on ongoing research from different fields, represents the science of ecology and explores ecology processes, offering examples that allow the reader to combine natural selection and evolution. It develops an understanding of the natural history of part of Seguanda examines the limitations that the species environment, the ecology of the place (specific ecosystems), and elphysic, both aquatic and terrestrial. impose on the basic ecological process science.mos is alive. The third part explores the adaptation of organisms to the physical environment and takes into account both the novelties of the sixth edition, which receive their energy from the sun (autotrophy), and those that receive it from the consumption of plant tissue Those who are familiar with the fifth edition of decomposing animals (heterotrophs). This text will find a wide range of changes in thisThe fourth part examines the properties of the population-new edition of ecology. In addition to updating the lair, and emphasizes how the characteristics expressed in many examples and themes to reflect the researchthe level of individual organisms (recent characteristics and their results in ecology, www.FreeLibros.orgxviii We prefaciohemos made a large number of changes in the organ- Decay and circulation of nutrients), in the world and content Part seven: Ecology of the Ecosystem. We reorganized the sixth edition in nine parts, which in the sixth edition, we added a new chapter that reflects two major changes in the presentation of the fourth part: The population that presents for the study of materials related to the environmental community and the application of tes growing ecology metapopulation ecology in current environmental issues. In nes (Chapter 12: Metapopulation). This new chapter is the fifth part, an explanation of the population (the fourth review of the models and basic concepts that are based part: Population) followed the fifth part: Communions to study the fragmented population. The Undaunted, which included themes related to the topic of interaction, the importance of which increases both for ecolo-interspecies (competition, predation, parasitism and landscape (chapter 19). In the sixth edition, the explanation of inter-preservation (Chapter 28). The inclusion of this nue-interspecific action is presented in Part 5: vo a theme unique in this tutorial that complements and com-interactions between species. This new part follows on the face of the representation of more traditional population explanation structure themes (Fourth part: Population) structure, population growth and regulation, in the past discussion of ecology of the community (Sixth chapters 9 to 11, part: Community ecology). Presentation in the sixth edition we reorganized and the community of capaciadoecology in the sixth part was reorganized the theme of biogeography, explaining the distribution in three chapters, which relate to models of ecosystem structure on a large scale, and the model of community diversity (Chapter 16: Structure of communide-biological. , Chapter 23: Terrestrial Ecosystems, Community Heads), and Community Dynamics 24: Aquatic Ecosystems, and Chapter 25: Transitions (Chapter 18: Community Dynamics). Then terrestrial waters (coastal ecosystems and wetlands). Chapter three, landscapes are designed 26: Large-scale models of biodiversity spans (Chapter 19: Landscape Ecology). Biodiversity materials discussed in the chapter-historical feature of ecology text Tulo 24: Biogeography and Biodiversity of the Fifth Edition, our intention to apply the science of ecology Changes in the organization and contentthemes of the ecological current that provides chapters, the sixth edition includes other functions-for students immediate understanding of the world is important. Each of the nine sections begins in relation to ecology in relations between the population - with a two-page introduction. The purpose of man is these and the natural environment. The fifth edition of the introduction is twofold: (1) The development of outlines of topics related to conservation, sustainability and epithets it contains, and (2) connecting different levels of climate change discussed over several chapters that are environmentalists observe and study on-text systems. In the sixth edition we reorganized this ma-turales, therial into the new ninth Part: Human Ecology. This other new feature of the sixth edition consists of three chapters: Chapter 26: The Rise of Fourteen Profiles of Researchers Related to Each Population, Resource Use and Sustainability; The chapter is one of the chapters. These are the researchers' profiles 27: habitat loss, biodiversity and conservation; and perform two functions. First, enter Port 29: Global Climate Change. This new section of students to a new generation of environmentalists whose topics included materials that were previously in the studies, directly related to Chapter 18: Human Interaction with Concepts Discussed in the Chapter. Secondly, I function natural coats and chapter 23: Human Invasion of Nan as research, allowing presentation plus biogeochemical cycles in the fifth edition. detailed methods, analyses and results. Each profile In addition to a broader redesign of the theme integrates the work of certain research papers related to the ecology of communities and ecology, which together deal with a more applied topic of research, in the sixth edition we did quite a lot. While they start their careers, work-change and supplement. We have reorganized the chapter included in the scales of each researcher repress-lo 4: Abiotic Environment, and Chapter 5: Soils, New Frontiers of Environmental Research.Fifth Edition to form two new chapters: Chapter We have restructured and expanded the section quant-4: Water Environment and Chapter 5: The Earth Environment. ficating ecology, which was part of the text in edli-We eliminated chapter 7: Previous decompositions and tions. Although rich in terms of the Fifth Edition, and we found conceptual, it's quantitative science. The material in the extended chapter covering the quantitative ecology section now serves to pro-composition and nutrient circulation (Chapter 21: rationing students' vision of how they quantum-www.FreeLibros.orgPrefacio 12fy concepts covered in chapters. In many of his familiarity with today's environmental issues, his chapters, quantitative ecology tables focus on both his years of international travel and go up to help the reader interpret the graphics, experience in teaching ecology in both crowded university classes and in small groups of mathematical models, or the quantitative methods of students have provided him with a valuable insight into how to make ecology sting a sitting subject in the main body. To get more mulative for students.help, students can use our new activities and on the website (www.ecology-place.com). In addition to the section quantitative ecology, we have relevant materials during our presentation matem'ti-model (websites, additional material, etc.) fundamentals for understanding the dynamics of the population in Chapter 10: Growth - Director of Printing (0-8053-4834-4) population, Chapter 11: Intraspecificial Regulation - Guide to The Teacher's Population Study/14 Exam. The processing of issues of exponential growth, capacity (0-8053-4831-X) load, logistical growth and functional reaction of the bank computerized expertise Chapter 15 (0-8053-4833-6) predators was expanded to include current acetate transcripts (0-8053-4832-8). Regarding Only Knowledge - Additional website Place Ecology is a major algebra, the purpose of this new material is to demystify these models by guiding the reader through (www.ecologyplace.com) logical development equations, starting with the Laboratory's Guide to Ecology on campus (the eco-basic concepts on which these logy on campus are built) (0-8053-8214-3) models. While we have combined most of the topics related to human interaction with the environment in the new ninth part: Human Ecology, each chapter also contains a brief essay entitled Cues-tiones de ecology. Replacing the previous environmental issues of the fifth edition, the purpose of these brief essays is to link the basic environmental concepts presented in the chapter with the current environmental issues that depend on understanding Main. In other cases, we manipulate the use of basic environmental concepts in the management and conservation of natural systems. CourseCompass (All CourseCompass™ courses and Blackboard offer pre-designed content by Robert Leo Smithred, including exams, tests, and more.). Readers will notice that the author who leads the 6th edition of Ecology has moved from Robert Leo Smith to Thomas M. Smith, who was previously the second author. For more than 40 years I have devoted two deecological texts: Ecology and Field Biology and Ecology. Although the fundamentals of the 6th edition of Ecology remain the same as in previous editions, the ecology has changed significantly over the years. It's time to hand over the witness to my son, Tom. Although he co-wrote the 5th edition, he made significant contributions to previous publications. Over the years, it has literally grown with thetexts. The most important changes in terms of discord and organization of this publication, the development of research profiles and new boxes of quantitative Eco-logic reflect their fresh contribution to text.wwxx Prefacwio .FreeLibros.orgEngrading Richard Lutz, Rutgers University Richard McMillen, UCLA's textbook Irvine is the product of the author alone. Ken Marion Stuff, University of Alabama at Birmingham from this book presents the work of hundreds of people studied - Deborah Marr, Indiana University in the South Bendres area of ecology, who spent most of their Chris Migliaccio, Miami Dade Collegelife in the field and in the laboratory. The results of experi-Sherry Morris, Bradley Universitymentes published by them, their observations and their thoughts-Steve O'Kane, University of Northern Iowa conceptualization made up the raw material with Matthew Parris, University of Memphis, that this text was created. Our special recognition and Rick Relyea, the University of Pittsburgh is also for fourteen environmentalists Carol Rhodes, College of San Mateopublic illustrate the profiles of researchers. Thank you-Eric Ribbens, Western Illinois University let's greatly focus on your collaboration by providing Robin Richardson, Winona State University, your illustrations and photos. Rowan Sage, University of Toronto Thomas Sarro, Mount St. Mary's College Review textbook relies heavily on the Copper-Maynard Shaus, Virginia Wesleyan Collegeda for the contributions of readers who point to Eric Scully, Towson Universityerrors and Opportunities. We took your referrals with Wendy Sera, University of Maryland very seriously and included the vast majority Mark Smith, Chaffee Collegeellas. We deeply appreciate the following reviews - Paul Snelgrove, Memorial University of Newfoundland for their valuable comments and suggestions about Amy Sprinkle, Jefferson Community Collegehow to improve this edition: Southwest Peter Alpert, University of Massachusetts Barbara Shoplock, University of Florida John Anderson, Atlantic College Christopher Swan, University of Maryland Morgan Burrows, Saddleback College Alessandro Tagliabue, Stanford University, University of West Ontario , University of Connecticut Evert Brown, Casper College Neil Voelz, St. Cloud State University Mitchell Cruzan, Portland State University Joe von Fisher, Colorado State University Robert Curry, Villanova University, David Webster, University of North Carolina Richard Deslippe, Texas University of Technology Lauchlan Fraser, University of Akron, University of Tennessee E. O. Garton, University of Idaho Frank Gilliam, University of South Carolina , Texas Lutheran University specialized in development, photography, graphic design, Greg Haenel, Elon University Illustration, Review and Production, to name a few. William Hallahan, Nazareth College of Oversight for this team of specialists was at Douglas Hallett, University of Northern Arizona, hand man in charge of coordinating everything. This is Gregg Hartwigsen, New York State University man was Alyssa Anderson, Assistant Editor. His efforts, his organization, and his soothing effect during the fre-rhythm in the production of unethical Geneseo not only made Michael Heithaus, the Florida International University project ultimately possible, but made him a diver-Jessica Hellman, of Notre Dame University of Tido. There are no words to express our appreciation-Jason Hoeksema, UCLA merit and respect. In Santa Cruz Throughout this time, all our families, Floyd Hayes, Pacific Union College and especially our wives Nancy and Alice, was John Jahoda, Bridgewater State University suffering from the process of producing the book. His love, Com Steven Johnson, William Penn University inclination and support has provided us balancing the environment of Jeff Klein, the University of Iowa to do so allows our work. Ned Knight, Linfield College Frank Kuserk, Moravsky College Thomas M. Smith Keith Lajtha, University of Oregon Robert Leo Smith Vic Landrum, Washburn Universitywww.FreeLibros.orgPrefacio xxiFirst Introduction and Reference Chapter 1 Nature Ecology P. 4 2 Adaptation and evolution of P. 17 Color photograph of The Dawn of Earth (Earthri-se), taken by astronaut William A. Anders from Apollo 8 on December 24, 1968, is an impatient and eloquent image. An important environmentalist rightly described it as the most influx of environmental photography ever taken. Inspired by photography, the economist Kenneth E. Boulding summed up the finite nature of our planet, as seen in the context of the vast expansion of space in his spaceship Earth metaphor. What has been perverted in the history of mankind as an unlimited frontier has suddenly turned into a tiny atmosphere: limited in its resources, overflowing with ever-expanding human populations and threatened by our use of the atmosphere and oceans as deposits of our consumer waste. Just over a year later, on April 22, 1970, about 20 million Americans participated in military, demonstrations, and other media events on Earth Day. The New York Times commented on the surprising increase in environmental con-science, and said that growing concerns about the environmental crisis are now neglecting the country's campuses with a nuisance that could overshadow the discontent student about the Vietnam War. The basis of social development was the belief that we need to rethink our relationship with nature, and that the specific area of research that will provide the guiding principles of this new line of action is ecology. With the growing environmental movement of the thin earth dawn, taken by the astronaut Delles of the 60s and early 70s, ecology, with Apollo 8 William A. Anders on December 24, 1968, w.FreeLibros.orgcual until now, the only complex option mentioned by Darwin as a small number of scientists and applied biologists were familiar, the sudden conditions of the struggle for the existence of the first plant. Haeckel's emphasis on people's attitude to the environment Is an important haeckel emphasis on rela-environment, ecology has been transformed into a family word for ecology with revolutionary new ideas that have appeared in newspapers, magazines and books, although presented in the Origin of Darwin Speciesthe term is often abused. Still (1859). The theory of natural selection proposed by him, people confuse it with such terms as Darwin medium (which Haeckel called the struggle for the environment and ecology. Teh it's activity with the goal of a hundred-gia. It provides a mechanism to improve the environment. This environmental activity goes beyond describing histo-often taking the form of natural state educational programs and ensures the processes that control the district, support, legislation and treaties. and an abundance of organisms. So what is ecology? Ecology has been a hundred since its introduction in the 1960s to perform elcia. By conventional definition, ecology is a central intellectual role in the environmental movement, scientific research into the relationship between organisms and its ecology suffers from a surprising trans environment. This definition is satisfactory as long as it is prepared. It is not striking that the scientific discipline to consider relationships and the environment in the sense of ca, so broadly defined in its field, is produced broadly. The environment includes not only the con-tion of a wide range of subdisciplines: physical de-supplements, but also biological components or physiological ecology, which deals with the living functioning that make up the body's environment. Relaxing individual organisms, even the prospect of delta involves interacting with the physical world as well as the earth's environment as an integrated system that is also with members of it and other species. is the backbone of the global ecosystem. The purpose of this text is to provide the reader with the introduction and perspective-term ecology derived from the general tiva Greek words of this diverse discipline, as well as alsooikos, which means home and logos, which means to explore the sense of the continuing importance of science frets. It has the same root as the economy, which means ecology as a guide to human relations with on-home administration. Indeed, the zoologist Turaleza, the German Ernst Haeckel, who originally invented ter-mino ecology in 1866, made a clear reference to this We will begin our study of ecology in larelation when he wrote: Part one of the study of the nature of ecology as a science (Chapter 1: Nature Ecology We Understand the Ecology of Body Knowledge) and its history, scopes and relationships with other disks-ment, mentioned in the economics of nature. Next, we will focus our attention on the study of the common relationship of the animal subject of adaptation and natural selection (chapter - both inorganic and organic. sas models and processes with those animals and plants with which we will explore at hierarchical levels of eco-research- comes into contact directly or indirectly, in topical - logical: organisms, populations, communities and eco-word, Ecology is the study of these related topics.www.FreeLibros.or3 qCaptulo 1 Nature Ecology1.1 Organisms interact with the environment in the context of the ecosystem1.2 Ecosystem components form a hierarchy1.3 Ecology has complex roots1.4 Ecology has close links with other disciplines1 .5 Ecologists use scientific methods1.6 Experiments can lead to predictions1.7 Uncertainty is an integral part of science1.8 is the main unit of ecologyOrganism interacts with the environment on many levels. The physical conditions surrounding the body, such as the ambient temperature, humidity and intensity of light, affect the basic physiological processes that are crucial for survival and growth. The institution should strive to acquire basic environmental resources that corrode and at the same time be protected from becoming the food of other organisms. He must set aside a friend from the enemy, distinguishing between potential and potential fellow predators, all in an attempt to succeed in the ultimate goal of all living organisms: to pass on their genes to later generations. The environment in which each organism forms a unit. The engine of the car is an example of its struggle for existence is the location, location of the system; components such as a physical detention system in time and space. It can be both a large ignition and a feed pump, work together and steadily as an ocean or as small and transient in a wider context than an engine. Like a puddle in the soil after a shower pri-like, the ecosystem consists of components that are interac-mavera. This environment includes both the operating conditions of the tuan and the unit. In genealogical-physical terms, such as the diversity of organisms that coexist den-rales, the ecosystem consists of two components of its boundaries. This essence is what deno-core ecologists interact with: a living component, or a biotic and eliminating ecosystem. physical, or abiotic. Take, for example, a natural ecosystem such as forest (Figure 1.1). The physical (abiotic) component 1.1 Organisms interact with the forest, consists of atmosphere, climate, soil and water, with the environment in the context of the Biotic component includes many different organisms of the ecosystem of rent, plants, animals and microorganisms that inhabit the forest. Teh complex, as each organism interacts with the environment in the body not only reacts to the physical environment, but also from the context of the ecosystem. The echo part of the word also changes and, in doing so, turns into partrefating to the environment. Part of the system implies that ecos are the same environment. The trees on the roof of the detema plant function as a set of related parts of the forest to intercept sunlight and use their energyww4 w.FreeLibros.org1.2 Ecosystem components form a hierarchy of different types of organisms inhabiting our bos-ce population. The term population has many uses and meanings in other disciplines. In economics, the population is a group of individuals of the same species occupying a certain area. Plant and animal populations in the ecosystem do not work independently of each other. Some populations are linked to other groups with limited resources, such as food, water or space. In other cases, one population is the food resource of another. Two populations can benefit each other, and each one works better in the presence of the other. All populations of different species that live and interact in the ecosystem are collectively called the community. Now we see that the ecosystem, made up of a biotic community and physical environment, has many levels. At the first level, individual organisms, including humans, react to and influence the physical environment. At the next level, individuals of the same species form populations, such as white oaks or forest gray squirrels, which can be described in terms of cyst-tion, growth rates and age distribution. In addition, Figure 1.1 The inner part of the forest ecosystem on the coast of these populations interacts with each other and southeastern Alaska. Notice the vertical structure inside it with individuals of other species to form a coma. Sitka burning trees (Picea sitchensis) form nity. Herbivores consume plants, sebaceous predators that intercept direct sunlight and hemisphere consumers of herbivorous animals. Plants and various species feed on prey, and humans compete for re-mosses to cover the surface of dead branches that are limited sources. When people die, others oga-extend from vault to earth. Various shrubs and mists consume and destroy their remains by processing waste from herbaceous plants to form undergrowth and another layer of nutrients contained in their dead tissue again so mosses cover the forest floor with access to the soil. Ecology is the study of all these relationships, nutrients, Bacteria and fungi complete a network of interactions between organisms and functions of decomposition on the surface of the soil. In addition, this forest is home to a wide variety of habitats, vertebrates and invertebrates, including large species such as bald eagle, Deer Kolanegra and Alaskan grizzly bear. 1.3 Ecology has complex roots for the development of photosynthesis. In doing so, trees change the environment of plants Genealogy of most sciences is direct. It's relaxing that they're below them, by reducing sunlight and going down so hard to trace the roots of mathematics, from the temperature of the air. Birds are looking for insec-chemistry and physics. The science of ecology is different. cough in a layer of soil covered with fallen leaves reduce Its roots are complex and intertwined with a wide number of insects and change the environment to the variety of scientific advances that have taken place for other organisms that depend on this resource all-other disciplines in biological and physical sciences.shared menticio. By reducing the population insec- Although the ecology of the term appears until the mid-deltos which they feed, birds also affect the nineteenth century, it takes another century to engage in len-indirectly on interactions between different guaje, the idea of ecology is very older, the kinds of insects that inhabit the jungle soil. Ex-Can argue that ecology goes back we will alplora these complex interactions between organisms and environment in the ancient Greek scientist Theofast, a friend of Aristotle, living and physical bientes in more detail in the following who wrote about the relationship between capipal organisms. and the environment. On the other hand, ecology, as well as www.FreeLibros.org-Chapter1 Naturedelaecology 5 we know today has its first roots in countries with physical environments. Some, specialty-plant geography and in natural history. Frederick E. Clements, they were looking for some kind of system for the Oga-In the early nineteenth century, botanists began to gnaw at nature. He proposed to study and map the vegetation in the world. Behaves like a complex organism or super organismFirst plant geographers like Carl Ludwig Will- that grows and develops through cycles up to stage dedenow (1765-1812) and Friedrich Heinrich Alexander's background maturity or climax (see chapter 18). His idea was to take-Humboldt (1769-1859) noted that yes regions and developed by other environmentalists. However, some worlds with similar climates had similar vegetation to ecologists, such as Mr. Tansley (1871-1955) did not compare its shape, although the species were different. He recognized that view. Instead, he proposed the concept that the shape and function of plants in a holistic and integrated ecological that combines the org-region reflects the narrowing imposed by living nystos and their physical environment in the system, the physical environment paved the way for a new generation - which he called ecosystems (see chapter 20). Plant geography (see part 8). Particularly concerned about terrestrial vegetation, ain this new generation of scientists was Johan-group of European biologists was interested in worried (1841-1924) of the University of Copenhagen-between aquatic plants and animals and their environment.gue, who studied the tropical vegetation of Brazil. He wrote They proposed ideas on the processing levels of the first text on plant ecology. Plantesam organic nutrients and feeding using the term food. In this book, Warming integrated morphology, physio-us manufacturers and consumers. His work had the influence, taxonomy and biogeography of plants in general on the young lymphologist Raymond A. Lindeman, a local researcher. This book had a huge impact at the University of Minnesota. Lindeman drew early development relations from ecology. energy availability in the lake community. Meanwhile, some activities performed in others along with Tansley's writings, the Lindemaneras article of natural history take on import-Trofiko-dynamic aspects of ecology. When he developed his theory of toxic-dynamic evolution of ecology, written in 1942, he pointed to the eltion and origin of the species. Charles Darwin (see the beginning of the ecology of ecosystems, or study of chapter 2) found the writings of Thomas Malthus (1766 - all living systems.1834). Malthus, an economist, presented the principle that the ecology of animals originally developed in the form of populations grew exponentially, duplic'n-very independent of the early events of ecolo-dose on a regular basis, just until they exceeded the plant recur-gi. The beginning of animal ecology can be food. Finally, the population will be limited from starting with two Europeans. A. Hesse, from Germany and Char-by powerful force, with a constant effect like Enfer-le-Elton, England. The ecology of Elton's animals (1927) and premature death. From this concept, Tiergeographie auf Grundlage (1924) Hesse, Darwin developed the idea of natural selection, translated from English as the Ecological Geography of Animals, a mechanism that guides the evolution of new species (see the impact on the development of animal ecology in StatesCapituu 2). United. Charles Adams and Victor Shelford were two peonies- At the time an unknown Austrian monk and ecology in the US Adams published the first for Darwin, Gregor Mendel (1822-1884), studying in his book on animal ecology, a guide to the study of AnimalgardIn transmission of characteristics of the genus-ecology (1913). Shelford wrote animal communities notion pea plants to another (see chapter 2). published Moderate America (1913).Mendel's work on the heritage and work of Dar-Shelford captured a new course on Alvin ecology on natural selection, laid the groundwork for emphasizing the relationship between plants and animals, studying evolution and adaptation, and the ecology of community science and genetic populations. Some previous European ecologists, especially the biolo-Darwin theory of natural selection, the combined sea go of Carl Mubius, developed the concept with a new understanding of genetics, means knowing generals. In his essay The Bank of Oyster Shield conveyed the characteristics of the generation of biocenosis (1877), he explained that the oyster bank, the next, provided mechanisms for understanding, although it dominated the same animal, is actually the flow between organisms and the environment: pun was a complex community with many central in the heart of organisms ecology. tormented. He suggested the word biocenosis for such first-time environmentalists, especially vege-munidad ecologists. The word comes from the Greek and means vidatals, they were busy observing the models that it had something in common, in the same region. Later, is related to the emergence in 1949 of the encyclopedic principles of Ophrome formed and supported by inter-animal ecology of five members of the second generation-www.FreeLibros.org-6 First Part Of The Introduction and Understanding of The Ecologists of the University of Chicago (W.C. Allee, 1.C. Allee, 1.4. E. Emerson, Thomas Park, Orlando Park, and K. P. Schmidt) with other disciplines marked the direction of modern ecology was to take. She stressed that the nutritional relationships and complex interactions that take place in the energy budget, population dynamics and the chosen ecosystem include all kinds of physical processes and natural bioscience and evolution. gicos. To study environmentalists should resort to other sciences. This dependence makes the writings of economist Thomas Malthus, who had interdisciplinary science.ron so much influence on the development of Darwinanecera ideas about the origin of the species, they also stimulated Although in the following chapters we will apply the research of natural populations. The study of what are usually subjects of disciplines such as the bio-population in the early twentieth century was divided into two cam chemistry, physiology and genetics, we do this onlypos. One of them, the ecology of the population, is engaged in understanding the interaction of organisms with dryness (including fertility and mortality), the environment. Exploring the influence, variance and interaction of plants with the population. Carbon dioxide and water loss (see chapter 6), porotro, evolutionary ecology, is engaged in natural selection, refers to the physiology of plants. The ecology of the population. Closely related to the day, how these processes respond to changes in the energy of the population and the evolutionary ecology of echo-precipitation and temperature. This community information, which engages in interaction, is critical to understanding the distribution and abundance of species. One of the most important goals of plant populations and the structure and function of the ecology of the community is to understand the origin, human ecosystem on earth. Similarly, we need the effects of diversity in resorting to many physical sciences, such as geology, environmental communities. hydrology and meteorology. They will help us to fix at the same time there was a physiological ecology. Other forms of interaction of organisms and reactions of each organism to the temperature and environment are used. For example, when plants take water, moisture, light and other environmental conditions. The impact of soil moisture and the structure of the flowO observations of natural history are also generated by surface water. When they release water, they increase the ecology of behavior. Studies of water in the atmosphere and the impact on 19th century transport included the study of regional precipitation patterns. The geology of the non-combustibility of William Wheeler and the South American monkeys influences the availability of nutrients and water by Charles Carpenter. Later, Conrad Lorenz and plant growth. In each example, other discs-Nico Tinbergen gave the area a strong boost with its scientific plins crucial to understanding how pioneers about the role of cutting out and individual organisms respond to the environment and lotinto in the social life of animals, in particular, changing fish and birds. As we moved from the twentieth century to the 21st century, ecologyConscionable biology, physics and chemistry crossed a boundary that requires the expansion of ours in the second half of the twentieth century, there were new areas of vision of ecology, which include the dominant role of elk in ecology. The development of aerial photography, and human about nature. Among the many pro-late satellite launches in the U.S. environmental blem space program, it gave scientists a new perspective on identifying four major broad areas of the Earth's surface using interconnected data collected: human population growth, through remote sensing. Environmentalists have begun to study biodiversity, sustainability and climate change, spatial processes related to communities and global ecosystems. As humans have grown from areas across the recent emerging field- approximately 500 million to more than 6 billion, landscape ecology. A new assessment of the last two centuries, radical changes in the use of land use in the soil have changed the surface of the earth. Deforestation of natural bos-ecosystems has led to the development of ecology, which has destroyed many habitats for agriculture, which applies the principles of many natural fields, producing the rate of extinction of species, from ecology to economics and sociology, unprecedented in the history of the Earth. In addition, the population to maintain biodiversity. Expanding human applications uses the resources of the principles of the development and functioning of natural ecosystems to unsustainable levels. Due to the increase in the volume in the management of damaged land has created a demand for fossil fuel energy, necessarysepy restoration. On the other hand, the understanding to support economic growth, the chemistry of the Earth as a system is the approach to more atmospheric discipline shifts in ways that can change the need for environmental research: global ecology. Earth's climate. These environmental challenges from on-www.FreeLibros.org-Chapter1 Naturedelaecology 7 Ecology Issues Human FactorAcsesses a tendency by which ecologists find it harder to study the natural world without fundamental ecology sciences (study of inter-consideration influence-action organisms with their environment) and the application of huma-catothocy environmental activities to understand nas interactions, past and present, superhuman with the environment. The first normal - ecological systems, which are the center of our research, is associated with the study of the natural world, ambition. For example, forests in eastern North America, in addition to humans, while the latter were cut down for settlements and agricultural production, have had the impact of human activities on (grain and/or pastures) in the second half of the nineteenth century. This distinction extends to journals Many of these lands were not abandoned until experts in which the results of the 30s and 40s reported when agricultural production moved from research. Research of the natural world is located in the west, allowing reforestation (growth published in journals such as ecology (ecology) Socie-forests) in eastern North America. America's environmental nodad eco-reports are the only ones in the world to do so. The U.S. and journal Ecology (Diary can study these ecosystems without considering the explicit ecology) of the British Environmental Society, while taking into account their history. We cannot understand the distribution of the impact of human activities on the environment and the abundance of tree species throughout the ecological region appears in environmental applications. USA and magazine. We cannot study the circulation of nutrients in the applied ecology of Socie-tree reservoirs without understanding the speed in the British Ecologicaldad. However, this distinction between nitrogen and other nutrients stored dynasted is becoming increasingly difficult to maintain as in atmospheric pollutants (see chapter 22). There's a theory, as in practice. Since this distinction is one of the understood reasons for the decline in the population becoming diffuse, ecologists should expand the very tion of the species of birds that inhabit the forests in the east dedefinition about what constitutes the natural world. North America, not realizing how the fragmentation of wooded land rural and urban development has limited- Our species has an increasing influence on the model of movement, susceptibility to de-environment land. Human population predation and habitat availability. Some of the current exceeds six billion, and like our main problems currently facing people, our collective impact on the environment Environmentalists are directly related to the fact that the influence of the planet continues to grow. We use more than 50 potential human activities in ecosystems of percentage of freshwater resources and our terrestrial and aquatic activities, as well as with the diversity of life that shee-dads have turned between 30 and 40 percent off so. Throughout the text, we will point to these terrestrial surface issues for food, fuel and environmental issues in order to illustrate zebras (see chapter 27). While air pollution is the importance of ecology science to understand has long been a concern, improving human relations with the environment: unobiums in the atmosphere produced by the burning of fossil com-bustibles today can change the climate environment of which we are a part. Earth (see Chapter 29). 1. How would you define nature? Does your definition include in your 1989 book, The End of Nature Ecologist Hill's Human Species? Why? McKibben announced the end of nature. The central theme of his speech was that people changed. What would you consider the very environmental problem thus the environment of the earth as important natu-of-his time? What role can desempe-raleza, a remote and wild province, a world other than the science of ecology (as you know, this is a man, no longer existed. to better understand its consequences (see Environmental Issues: Historical, Social, Legal, Political and Ethical Aspects. Without a broader framework it is known as the media science am-www.FreeLibros.org-8 FirstPart Introduction and Party. Environmental science examines the thesis the effect can be based on observation in the field or on the human environment and as such a laboratory or on previous studies, it includes a wide range of topics including agronomy, edafiology, demographics, agriculture, energy and, for example, the ecologist might assume dehydrolia to name a few. nitrogen as a nutrient is a major factor in limiting growth and production1.5 Environmentalists use plant techniques in the North American prairie. For demo scientists to bring this hypothesis, the ecologist can gather different ways. The first approach would be field research. To study the relationship between organisms and the environment, the ecologist will study the relationship between the available surrounding nitrogen, ecologists should conduct experimental studies and production of prairie in a certain number of dementals in the laboratory and on the ground. All these places. Both factors vary depending on the soil. Sidios have something in common, include nitrogen collection control of prairie production, pro-data to demonstrate hypotheses (see quantitative eco-ducia should increase with nitrogen. Ecology 1.1: Classification of environmental data). One hypothesis would measure the availability of nitrogen and production based on an informed assumption that the scientist represents a meadow in some parts of the region. Later, to explain the observed phenomenon; must be the mind, the connection between these two variables, nitrogen and the cause and approval of the effect can be evaluated. Hypo-production can be expressed graphically (see quant-fifa Ecology 1.2: Visualization of environmental data: Histograms and scatter charts). A quantitative assessment of ecology 1.1 Environmental Data ClassificationAll environmental studies include the collection of data that are commissioned by them-porting, such as an example (observations and measures by which it can be used by a reproductive state. The use of the term population in this con- in the case of the presence or absence of a trait, datatext refers to the statistical population. It is very obscene - categorically they are called binary. Both nominal data that the researcher can collect observations and orders can be binary, about all members of the general population, so that the proportion of the population that actually observed is denoted-with numerical data, objects can measure mine sample. Based on the data in this se' sample, depending on certain quantitative traits. The study's findings are a set of numbers, such as height, in general. However, not all data is long or weight-heavy. Numerical information can be subdivided into the type and type of data collected in the study, affecting two types: discrete and continuous. For discrete data and directly in the view form, types are only possible certain values, such as in the analysis of the numbers that can be performed and theros interpretation or counts. Примеры включают количество де-де-, которые могут быть выполнены. cendients, number produced by the plant or the number of flower visits at the general level, the data can be classified as hummingbirds during the day. With data c-(1) categorical or (2) numerical. The categorical data call, theoretically, any value is possible within the framework of qualitative deposits, which are divided into categories of range, only limited by the ability of the dis-individual and easily distinguishable. The resulting positive measurement data. Examples of this type of data include labels or categories such as hair color or plow-mas, gender or reproductive status (pre-player, yen height, weight or concentration. Categorical data, in turn, can be divided into two types: nominal and residency- 1. What data is available nitrogen. such as previous examples of hair color or gender. For 2. How can you turn this variable (nitroge-opposite, ordinal data into inaccessible data) into categorical data? Will it be considered order or nominal?www.FreeLibros.org-Chapter1 Naturedelaecology 9 Quantitative Ecology 1.2 Environmental Data Visualization: Histograms and Scattering ChartsIn depending on the type of data, That collects observation - With continuous data, the frequency of each value is often one case, yador (see Ecology quantification 1.1), a process that multiple measures are unlikely to accurately begin with visualization-equal. Thus, continuous data are usually graphically sown from a set of observations. The most grouped method into individual categories, and each suppression category to display a single data set is a certain range of values. Each category should not have a frequency distribution. One distribution overlaps the other, so that each frequency observation is a calculation of the number of observations - has only one category. For example, data (frequency) with a determined body length or value can be grouped into two categories. For example, consider the following set of cretes as follows: observations regarding the color of the flower in a sample of 100 pea plants. Length Body Number (ranges, see) facesColor flower purple pink WhiteFrequency 50 35 7.00-7.99 2 8.00-8.99 4The data are categorical and nominal, as the categories - 9.00-9.99 7 fat are not of an inalienable order. 10.00-10.99 5 11.00-11.99 Frequency distributions are also used continuous data. The following data set Once the observations have been grouped into a category, continuous represents the length of the body (in centimeters) as a result of the distribution of frequencies can display 20 lunar fish taken as a sample of the pond. histogram (bar chart type) (Figure 1a). The X-axis represents discrete ranges of 8.83; 9,25; 8,77; 10,38; 9,31; 8,92; 10,22; 7,95; The body and axis represents the number of persons whose 9.74; 9,51; 9,66; 10,42; 10,35; 8,82; 9,45; 7,84; Body length belongs to each of the intervals.11.24; 11,06; 9,84; 10 758 85.07 80.06 75.05 70.04 65.03 60.02 55.01 50.0Partinal Body Weight (g) 0 7.00- 8.00 - 9.00 - 10.00 - 11.00 - 4 5.07.0 8.0 9.0 10.0 11.0 12.0 7.99 8.99 9.99 10.99 11.99 (b) Body length (see) Body length (see)Figure 1: a) example of a gistogram showing the number of persons belonging to different body length categories(see) Body length (see)Figure 1: a) example of a gistogram showing the number of persons belonging to different body length categories, Sampling, taken from the lunar fish population. (b) Scattering of the site with bodily length (x-axis) and body mass (at the axis) for a sample of lunar fish, submitted on (a.www.FreeLibros.org-10 First Part Introduction andEfectively, continuous data has been converted 10 yy and 8 10 into categorical data for the purposes of graphic visualization. , 6, how would the pattern represented in the histogram in figure 1a change if the intervals were in units 1, but 4, with 7.50 (7.50-8.49, 8.50-9.49, etc.)) 2 However, the researcher often examines the relationship between two variables or sets of observations. 00 2 4 6 When both variables are numerical, the most common method of graphic data display is non-graphic scattering. A scattering (a) section has been built to define two axes (x and y), each of which retains one of the two variables studied. For example, we hypothesized that a researcher who collected observations about the body length of a lunar fish caught in the 8th also measured their weight in grams. The study may be interested in whether there is a 6 link between the length and body weight of the lunar fish. 4 In this example, the body length will be x-axis, independent ovariate (section 1.5) and body weight 2 will be at the axis, or dependent variable. Once the two axes are protected, each person (moonfish) can be drawn 00 2 4 6as dots on the graph, determining the position of the xdicho point by their respective length and diagonal weight values (figure 1b). b) Scatter charts can be described as 10pertenecent to one of the three common paintings repressed by three figures in Figure 2. In graph (a), 8there is a common trend for the u increase with creasing values x. In this case the ratio between x and u is 6denomine positive (as exemplified by the bodily length and weight of the lunar fish). In chart (b), pattern 4 is reversed and y decreases with an increase in values x.In this case, the link between x and y is called negative 2o reverse. In graph (c) there is no obvious connection between x and y. 00 2 4 6 x Many types of graphs are presented throughout the text, but most of them will be histograms and dis(c)persion diagrams. Regardless of the type of chart shown, you should ask the same questions as in Figure 2: Three common patterns to help you interpret the results. Browse the scatter charts, this group of questions, applying them to charts in 3. How y values (dependent variable) change: Figure 1. What are you watching? x (independent variable)?1. What are the observations? Go and www.ecologyplace.com learn more about how to graphically display the2. What variables each of the axes represents and what data. your units (see, g, color, etc.)?www.FreeLibros.org-Chapter1 Naturedelaecology 11Th to www.ecologyplace.com work with histograms and scattering charts. The graph in figure 1.2 shows the presence of nitrogen on the horizontal axis or x and the production of the plant on the vertical axis or y. The scientist suggests that nitrogen is a lacaudus and plant production is an effect. Because the cause is nitrogen (x), we call it an independent variable. Because the hypothesis is that plant production (y) depends on the presence of nitrogen, we call it a dependent variable. (Go to www.ecologyplace.com if you want to consult a tutorial to read and interpret files). In the study of observations grouped in Figo-ra 1.2, it is clear that the production of grass effectively increases with the increased availability of nitrogen in the soil. However, although the data show that elnithogen controls the production of prairie, it is not de-showing it. It may happen that another particular factor would mean the presence of nitrogen, such as humidity or acidity, is actually responsible for the obser-vada ratio. To demonstrate the hypothesis in the second way, the scientist can decide to conduct an experiment. In the development of the experiment, the scientist will try to isolate the supposedly causal agen-te: accessibility of denitrogen. Figure 1.3 Field Experiment at Cedar Creek, Long-Term Environmental Research Station (IELP), a center-based scientist, may decide on a Minnesota experiment conducted by the University of Minnesota. Experimental sites such as areas seen in photo fields, adding nitrogen to some natural areas and not used to study the effects of high nitrogen deposition, increase concentrations of other dioxide (Figure 1.3). The researcher monitors variable atmospheric carbon and biodiversity loss in the functioning of ecosystem.independent (nitrogen levels) in a pre-finished pathway and monitors the reaction of the dependent variable (plant growth). Observing the differences in production between meadows that were fertilized with nitrogen and those that were not, the scientist tra-800 ta proves whether nitrogen is a causal agent. NoProduction (g/m2/year) 700 however, when selecting locations for the experiment, the scientist should try to find an area where 600 other agents that can affect production, 500, such as humidity and acidity, are similar. Otherwise, the scientist would not be able to provide what factor is allocated from the differences observed in the production of 300 different locations. Finally, the scientist can try the third 200 approach: a series of laboratory experiments. The Ven-100 slice of laboratory experiments is that the scientist has much more control over the environment conditions- 0 2 4 6 8 10 les. For example, a scientist can grow local N herbs (g/m2/year) in a greenhouse under controlled tempera-drawing conditions 1.2 Prairie production reaction to the tour, soil acidity and water availability (figure 1.4). Nitrogen, variable If plants have an increase in conincreary growth, goes on the x-axis, the production of prairie, greater nitrogen fertilization, the scientist has a dependent variable, goes on the axis. However, scientistwww.FreeLibros.org-12 The first part of IntroductionytecedentesProduction (g/m2/year)800 y s (x 75.2) - 88.1Figur 1.4 These eucalyptus seedlings are grown in winter as part of an experiment that explores the 700-response of plant growth to different levels of nutrient availability. The researcher who sees 600 in the image uses a portable tool to measure photosynthesis pitases plants that received a different 500nives of nitrogen during their period 400 faces a general limitation for all laboratory experiments: the results do not apply directly to the field. The reaction of herbaceous plants in laboratory control may not correspond to 200 with their reaction in natural conditions in the field. In the field, plants are part of the ecosystem and 100intert with other plants and animals and with a physical environment. Despite this limitation, the scientist now 0 2 4 6 8 10co knows the basic N-plant growth response (g/m2/year) for nitrogen availability and continues to develop laboratory and field experiments to study the new figure 1.5 Simple linear regression model to predict lava questions about cause-and-effect relationships. production of the plant (on the axis) by nitrogen (x-axis). The overall form of the y s equation (x × b), a, where B is a line tilt (75.2) and a y crossing (-88.1), or a y value where the line intercepts the y-axis cryptic, as Darwin development theory is natu-ral by choice. Hypotheses are models. Our hypothetical-sis about the availability of nitrogen is a model. He predicts that plant production will increase with increasing availability of nitrogen. However, this forecast is qualitative, it does not predict how much. On the other hand, mathematical models offer quantitative forecasts. For example, based on data from figure 1.2, we can develop regression equations, a form of statistical model that predicts the development of a plan-t per nitrogen unit (Figure 1.5). (See www.ecologyplace.com to consider the regression of the analysis). All approaches mentioned above (observation, experimentation, hypothesis testing and models) appear in the following chapters to illustrate basic concepts and differences. They are the main tools of science.1.6 Experiments can lead to 1.7 Uncertainty is a characteristic prediction inherent in science Scientists use the interpretation of their observations and experiments to develop models. The data will collect observations, develop and demonstrate hypotheses, and limit the special case of what happened when predictive models were made, is the basis of methodized measures. Like photographs, scientific evidence (Figure 1.6). It is an ongoing process, they lie a certain place and time. Models testing and correcting concepts to explain variations use the interpretation of the data to predict what we are seeing in the world around us, thus achieving this to happen elsewhere and at a certain time. unit between observations at first glance, the models are abstract ideas and will be connected. The difference between science and artekadas of real systems. They allow us to predict that some of them, although both involve creating concepts, behaviors or responses through a set of assumptions in science their study is limited by the facts, explicit. Models can be mathematical, for example, in science the only proof of concepts is their true computer dissulation, or they can be orally empirical.www.FreeLibros.org-Chapter1 Naturedelaecology 13Observations the only possible explanation for observation. As a result, there may be countless hypotheses thatHiposis if the results are incompatible can be compatible with observation, so de-s projections, you should finish the observations that are compatible with the new hypothesis formulated. hypothesis is not enough to show that this hypothesis is correct. The real purpose of testing the Prediction hypothesis is to eliminate the wrong ideas. So we have to follow the reset process, looking for experiments If the results are compatible evidence that the hypothesis is wrong. Lay/or compile with predictions, science is essentially self-recreation activity, this will develop new hypotheses dependent on the process of continuous discussion. Data and forecasts for the expansion of the form are the activity of science, driven by a set of observations. free research and the independence of thought. For an external observer, this important discussion process can 1.6 A simple representation of the scientific method. This seems like a disadvantage to you. After all, we depend on the fact that there will be seniority of specialists leading to the development of a conceptual scientific model of technology development and the ability to function the system studied. From problem solving. In the case of problems with the ambient-conceptual model, a hypothesis will be made from which such current solutions are based, and solutions may make it difficult to de-produce certain forecasts. This is evidenced by ethical, social and economic differences. For this reason, experiments and/or other observations. If the results of uncertainty inherent in science are inconvenient. The synecudis are incompatible with predictions (as a result we should not confuse uncertainty with con-negative), the original conceptual model and hypothesis should bring back the merger, and we must not allow the differences between the horses to be evaluated and the new hypothesis to be formulated. If scientists are an excuse for no action. The results are compatible with the forecast positively), on the contrary, we need to understand the uncertainty for the conceptual model can be changed, making it more flexible to be able to balance it with the costs of no action, previous assumptions. The hypothesis is then changed to include other predictions and the testing process is repeated. However, there is no permanence for concepts 1.8 The individual is the primary scientific unit because they are our interpretations of those of natural ecologyphenomenos. We are limited to validate only a part of nature, because we need, as we observed at the previous exhibition, ecology to cover-simplify to understand. As we have expressed in Aparta-ca a very broad field of research, from individualsdo 1.5, when we design experiments we control their ecosystems. There are many points from what are the relevant factors and we try to eliminate others that we can- we can start our study. We decided to confuse the results. Our intention is to focus with the individual organism to study the processes of us in the subset of nature from which it follows, and the limitations it faces so that con-we can establish cause and effect. The trade-off is that Serbian life in different environmental conditions, regardless of the cause and effect we achieve identi-individual organism forms the main unit in ecolo-Mar, it will represent only a partial connection with nature. This is a person who discovers and reacts to a natural environment that we hope to understand. For this reason, the prevailing physique. These are collective properties where experiments and observations support our birth and death of the people who control our hypotheses, and when model projections of population dynamics and individuals of different backgrounds are not yet complete. Works species that interact with each other in the context we use to loosen the restrictions imposed on the need for communities. However, perhaps the most important thing is to simplify to understand. We expand our fear that a person, through the process of reproducing hypotheses, to cover a wider range of conditions, transmits genetic information to successive individuals, and, once again, we begin by testing their ability to determine the nature of future people that shape explain our new observations. part of tomorrow's population, communities and ecosystems. With the individual we can start com-It may seem strange at first, but the truth is to ignite the mechanisms that produce the diversity which science is the search for evidence that demonstrates the life and ecosystems of the Earth, the mechanisms that cur-that our they're wrong. There is rarely any gene for the natural selection of process.www.FreeLibros.org-14 FirstpartlantecedentsResumenEcosistemas (1.1) Scientific methods (1.5)Organisms interact with their environment in con- Study of models and processes in the ecosystem text. Generally speaking, an ecosystem is necessary for research or field experiments and a workforce formed by two main components, living (biotic) and river. The experiment begins with the development of non-physical (abiotic), which interact as a system. Hypothesis. The hypothesis is a statement about the cause of the Hierarchical structure (1.2) and the effect that can be demonstrated experimentally. The components of the ecosystem form a hierarchy. Models and projections (1,6)organisms of the same type, inhabiting a particular physical environment, make up the population. Population- Based on research data, de-nes ecologists from different types of organisms interact with the ecosystem. Models are abstractions and simplifications of their own species, as well as with individuals of other natural phenomena. Such simplification is necessary. These interactions range from competition to those who understand natural processes, common resources to predators, to benefi- Uncertainty in Science (1,7) mutual cio. Interacting populations are the uncertainties inherent in the study of the bibiotic community. Community plus physical and scientific environment; arises as a result of the limitation that we can only cen-co form an ecosystem. bring us into a small subset of nature, which the history of ecology (1,3) leads to an incomplete run. Since many observational hypotheses can be developed, the origins of ecology are varied, but its main root, which determines which observations are compatible with hypo-dates, goes back to the origins of natural history, and geothesis is not enough to demonstrate that such a hypothesis is a plant-based verco. They turned into a study of the dadera commune. The real purpose of demonstrating the hypothesis of plants esdads. Animal ecology was later designed to dismiss wrong ideas than plant ecology, ultimately laying the groundwork for population ecology, evolutionary ecology and ecolo-individuals (1,8) behavior. Individual organisms make up the main unit of eco-research of plant physiological response and anima-logic. The individual reacts to the environment. The birth and death of individuals collectively define the dina-forest to the characteristics of the environment the physique gave rise to mica and interspecific and intra-specific interactions with physiological ecology. psychics define communities. The individual is one transmis genes to successive generations. The study of species interactions was developed in the field of community ecology, and attempts to expand the perspective of nature by including the physical environment and the biotic community, gave rise to ecology eco-issues from the research. The development of modern technology and the growth of the 1. What is the difference between ecology and ecology? How does the influx of the human race to our planet depend on the ecology of ecology? The ecology of the landscape consists in the study of the spatial connection between the two. Define the terms of population, community and ecosystem, communities, and ecosystems in the landscape. Conservation ecology and ecology recovery focus on 3. How incorporating the environment and restoring species diversity and physique into the ecosystem can help ecologists explore natural ecosystems, while global ecology achieves the basic goal of understanding interactions that allow us to understand land as a system. organisms with the environment? 4. What is a hypothesis? What role do hypotheses play in science? Interdisciplinary Science (1.4) 5. The ecologist noted that the diet of the bird species consisted mainly of large grass seeds Ecology is an interdisciplinary science because of interdisciplinary sizes (unlike grass seed organisms with the environment and among the species smaller sizes or seeds of other herbaceous plants that are imposed by physiological, behavioral and physical reactions. because they have nymphosology, biochemistry, genetics, geology, hydrology with higher nitrogen concentrations than other species and meteorology. seeds present on the site. To demonstrate the hypothetical www.FreeLibros.org-Chapter1 Naturedelaecology 15Isis, the ecologist compared the grass seeds of the large Bronovski, J. 1956. Science and human values. New York: Size with other seed types and moss results - Harper and string. clearly brought that the large grass seeds actually had a higher concentration written by a physicist and poet, this short book is her-nitrogen. Did the ecologist show that the hypothesis was a verda-mosa impact scientific process, how to com-do? Can an ecologist conclude that's the reason why man promises them. Very recommended. nitrogen concentrations? Why or why not? Kronon, W. 1996. The problem with the desert; or, returning to the wrong nature. In unusual soil: reinvention6. What is a model? What is the relationship between the hypothesis and the human place in nature (Cronon, V.), 69-90. New York: Models? W. W. Norton. This article is perfect for students to read, ya7. Given the importance of environmental research, this has caused an incredible amount of controversy between political and economic decisions concerning pro-environmentalists, environmentalists and conservationists. Cronon's current environmental problems, such as global warming, describes that the idea of untouched nature is invin-how do you think scientists should report human uncertainty and that, as a result, ecology does not dumbres in its results of politicians and the public? without considering human beings to in-ingest it. Additional bibliography by Mackintosh, R. 1985. Ecology background: Concept and theory. Cambridge: Cambridge Uni. Bates Press, M. 1956. The nature of natural history. New York: Ran- Provides excellent science history at home eco-dom. scientifically. Weser, D. 1994. The economy of nature. Cambridge: Cambridge's Lonely Voice in 1956, Bates shows us that he is bothering them-Univ. Click. Environmental activities have a long history of ecology, written from the point of view before the emergence of the environmental movement of the leading figure in this area. Modern. A classic that all those should read who is interested in the current environmental problems.www.FreeLibros.org-16 The first part of IntroductionytecedentesCap'tulo 2 Adaptation and Evolution2.1 Natural selection requires two conditions2.2 Gerebelness is an important feature of natural selection2.3 Genes are units of inheritance2.4 Genetic variation is an important ingredient for natural selection2.5 evolution of the change in the frequency of genes2.6 The concept of the species is based on genetic isolation2.7 The process of species formation involves the development of reproductive isolation2.8 Geographical differences in the form provide information about the process of species formation2.9 The placement reflects the obligations and constrictions you remember the first visit of the zoo in Childhood? I'm sure he was struck by the pleasure of a rare and amazing animal: a long neck giraffe, white fur polar bear and the extremely long arms of an orangutan. These animals seemed to come from another world, very different from those that inhabit the environment we know. In the scattered umbrella-shaped trees of the African savannah, the icy arctic currents and the rainforests of Borneo, however, these animals look just as natural as birds feeding in our backyards or deer that appear on the edge of the forest at sunset. What appears to be rarities in the context of the environment are advantages or characteristics that allow organisms to develop in a different environment. The giraffe's long neck allows it to feed on parts of the tree that are beyond the reach of other animals that ramon in the savannah. Polar bear fur makes it virtually invisible to a potential do-sas in the Arctic landscape. The long arms of an orangutan are fundamental to living in the heights of the jungle, where balance depends not only on solid steps. These characteristics, which allow the body to develop in a certain environment, are called adaptation. Until the mid-19th century, these examples served as a revolutionary idea that would forever change our illustration of wise laws that allowed us to perfectly adapt the viewpoints of nature, all organisms to each other and to the environment. Adaptation, after all, involves- When analyzing the origin of the species, it is possible that the design should be, and the design, designer. Naturalistic history (...) concludes that Espe made up of the task of cataloguing the creations of architecture were not created independently, but divinely. By the middle of the century, however, it appeared to have descended as a variation of other species. Sinwww.FreeLibros.org-Chapter2 Adaptation of the 17th Population Divide, derived from its interaction with the environment. As Darwin described, natural selection is the product of two conditions: (1) the differences between humans in the population of some hereditary characteristics and (2) that this difference differs between humans in terms of survival and reproduction. Natural selection is a question of numbers. Darwin said: Among people who manage to reproduce, some will have more offspring than others. Pri-just considered more efficient than seconds because they contribute more to the next generation. Organisms that leave little descen-decency or have no offspring contribute little or nothing to subsequent generations and therefore become less effective. Human efficiency is measured proportional contribution it makes to future generations. Given certain environmental conditions, those with the characteristics necessary for survival and reproduction, and finally transmit these characteristics to the next generation, are tested positive, while those who do not have them pass the selection-figure 2.1 Charles Darwin (1809-1882). Negative. The works of Peter and Rosemary Grant are a perfect documentary example of natural selection. Theembargo, this finding, although it has a solid Grant dedicated more than two decades to the study of the bird foundation, it will not be satisfactory until it was demo with the Galapagos Islands, the same islands, the diversity of which as countless species that the animal influenced so many young Charles Darwin when they were in this world were changed to have a naturalist on board the expedition ship HMS Bea-take-the-world , with gle. Among other things, the investigation of these docu-reasons is a source of admiration for us. mentioned notable changes in the physical trait of the finches that inhabited some of the islands during the following pages of the Origin of Char species-period of extreme climate change (see. Darwin's quantitative assessment, first published on November 24: Ecology 2.1: Descriptive Statistics)1859, changed the history of science and questioned the figure 2.2 showing differences in the size of the world perspective that remained the peak of Darwin's Soil (Geospizant millennials (Figure 2.1). that inhabits 40 hectares of daphnetradikale island about the origin of the diversity of life in Major, one of the Galapagos Islands located on the coast of Tierra, but also in terms of the origin of Ecuador. The size of the beak is a burning characteristic of the human species. The fact that Charles Darwin pre-influenced the eating behavior of these birds, which he enters these pages, was the theory of natural selection, Ren Seeds. Specimens with large beaks can feed on the beauty of which lay precisely in their simplicity: I-I---mentams of a wide range of seeds, from Tuscanism to natural selection is a simple elimination of large to small, while those who are the current faces are lower. therefore, small peaks should be limited to the a leak of smaller seeds. In the early 1970s, the island had up to 2.1 natural selection required regular cypitations (127 to 137 mm per year), which pro-two conditions rationed abundant seed diversity and a large population of finches (1500 birds). however, to define it more accurately, the natural selection in 1977, periodic climate change of the Pacific Ocean - differential success (survival and reproduction) jointly named La Nina (see. Chapter 3, paragraph 3.9)www.FreeLibros.org-18 First Part (e) Introduction of IndividualsNumered Individuals Population 32 12 140 0 10 1.0SYSee abundance (g/m2) Population Size 16 8 .08 1000 0 9 6.06 Size 4.04 Body 2 .02 10 11 12 12 13 14 15 600 Depth Peak (mm) 1975 (a)Figure 2.2 Peak Size Change (measured in 60fundity) in the Nagalagos soil finch population The histogram represents the number of individuals who have taken 200as of the sample (off the axis) in each category (0.5 mm) of peak depth (x-axis). The depth of the beak directly affects the 1976 1977 1978ma'o seeds, which can be swallowed by each of the birds. The Year (Adapted from Grant, 1999) Go to enwww.ecologyplace.com work with histograms and scattering sites. 50 changed the weather conditions of the Galapagos Islands, resulting in survival (%) 40a severe drought. Only 24 mm of rain fell at this station. During the drought, production of semi-30llas plummeted. Small seeds dismi-nuyed faster than larger seeds, which led to 20increased average size and hardness of dis- 10ponable seeds (see quantitative ecology 2.2: Confidence intervals). The finches, which were usually fed 0 small seeds, were forced to sift the seeds of 6 7 8 8 9 10 11 12 increases. Small birds encountered difficulty peak depth (mm) to find food, while large birds (b) size, especially males with large beaks, above figure 2.3 Proof of natural selection in finches survived easier, as they could break the soil, Geospiza fortis. (a) The yellow line is a larger and more complex match. It is estimated that women suffered from high mortality on Daphne Mayor Island. Overall, the population has shrunk by 85 censuses of marked populations, while percentages due to mortality and possibly the age-like green line shows an abundance of seed, gration (Figure 2.3a). not including two types of seeds that Galapagos finches are not ingest. Populations' higher survival rate, represented by indie declines in the face of a shortage of larger long-term seeds, has led to a dramatic change in the prolonged drought. The Brown Line is a distribution of the size of the peak in the population (Figu- Body size. It should be noted an increase of 2.3b). This type of natural selection, in which the value of the body size of the surviving birds apromedio trait varies in favor of one end and in drought, which will mean that small birds against others (Figure 2.4a) have been named direct selection, have been eliminated by choice while the large ones have been favored. Choice. In other cases, natural selection may contribute to a wider body size, also reflecting the closest to the population average in relation to between peak size and survivaldetriment of the two extremes, in which case it is called in the same period. (b) Results indicate a stabilisation of selection (Figure 2.4b). When selecting what is most intense selection in the species occurs the giver contributes to both ends simultaneously, adverse environmental conditions. (Adapted from Boag and Grant, 1981.) www.FreeLibros.org-Chapter2 Adaptation19 Quantitative Ecology 2.1 Descriptive StatisticsWhat is characteristic, the same number of numbers over both the population is usually present and below the degree of variation. The quantitative analysis. Any environmental study is necessary to calculate the average length. By the peak mentioned above, first, how is the population characterized? What measures should be ordered from the lowest to the highest: das can be used to describe differences in population or set of observations? Added - 7.9; 8,7; 8,9; 9,2; 9,3; 9,5; 9,7; 10,2; 10.3len use two aggregate statistics to characterize a set of observations made on the population- The value of the median (average distribution point)tion: (1) the central trend score and (2) the estimate - is 9.3. In this example, the median has the same variation value. The actual statistics that are used without this means. If the number of observations is not immoderate, it will depend on the type of data presented in an even quantity, it will not be possible to select the average set of observations (see the quantitative estimate of ecolo- so that the average value of the two main values is calculated 1.1: Classification of environmental data). represent the median. The measures of the central trend describe the kill-third indicator of the central trend, fashion, drying of the environment or the center of the range of values. It is commonly used to synthesize discrete data. The arithmetic average (m), commonly referred to as simple fashion, is the most commonly used value. On average, this is a measure of central trend plus example, consider the following data collected from which for numerical data. This is simply the number of puppies produced by each pair of progeni-sum numbers (observation values) separating the (nest) of Canary jilgueros at the site of the study: Dida by the number of observations. For example, the next set of numbers represents 3, 2, 4, 2, 1, 3, 3, 4, 3, 5longness of the beak (mm) of nine Canary jilgueros (Car-duelis tristis) taken as a sample in the fashion study is 3, because the greater number of pairs of models changing the size of the beak of the parents (4) was 3 offspring. Fashion is easier than local depopulation: visualize when the data is represented by a histogram, as in Figure 1. 9,2; 8,7; 10,3; 9,3; 8,9; 10,2; 7,9; 9,7; 9.5 The fashion of continuous data usually calculated in the arithmetic average will be the sum of the dividing lengths from the group frequency distribution (see 9 (total observations added): quantitative ecology 1.2: Visualization of economic data: Histograms and scatter charts) and fashion (9. 2 - 8.7 - 10.3 - 9.3 - 8.9 , 10.2 - 7.9, 9.7 - 9.5) - this is the average interval point with the highest frequency (9.5 for interval). 9.0 to 9.99 in 9 Quantitative Ecology 1.2: Figure 1a). 83.7 After calculating the estimates of the central trend 9.3, the next step is to characterize variation of 9 of them. The simplest indicator of variation in a set of observations is range. The sim-average length of population jilgueros peaks- plemente the highest value minus the lowest value. In the study, eltion is 9.3 mm. range is the difference between the highest value (maximum: 10.3 mm) Another indicator of the central trend used with fre- and lowest value (minimum: 7.9 mm), i.e. 2.4 mm. Medium is the average distribution point: there is, although not necessarily to the same extent, it may cause the population to undergo a biomodal distribution of symbols of different selective pressures. One of the few examples of ristic (s) in the population (figure 2.4c). This selection, documented from destructive selection in populations known as destructive selection, occurs when the natural comes from the work of evolutionary ecologist Tho-www.FreeLibros.org-20 FirstPart Introduction andtecedentes6 Drado and will be called deviation in a square high average. Thus, a deviation of 0.4, whether positi- 5 vo or negative number, will have the same value (0.16). Frequency If we now square the deviation of the global average, the amount of deviations will be: 3 2 (-0.1)2 (-0.6)2 (1.0)2 (0.0)2 (0.4)2 (0.4)2 (0)0 4) 0.9)2 (-1.4)2 (0.4)2 (0.2)2 x 4.5 1 01 234 5 and an average deviation of 4.5/9 x 0.5. This deviation of puppies produced by the nest of the middle raised square is called varian-za (s2). Figure 1 Histogram showing the number of offspring produced by each parent couple (nest) jilgueros However, there is a problem with variance: dadocanarios. The X-axis represents the number of hatched cubs that, when calculating the deviation in the square, just as the axis shows the number of nests (frequency). units to do, too. To return units to the original values, you need to apply the root because the range only takes into account square variance values. This value (s) is called a minimum and maximum deviation, it is strongly influenced by the standard output. To deviate from extreme lengths that may not be representative of the peak, the standard deviation is ℮0℮ 5℮, i.e. 0.71.sample (or population) as a whole. For this reason, it is generally recommended to use stats that includes everything throughout this and other chapters, theobservations will be presented. The first attempt would be to calculate the deviation-results of the studies synthetically. With the fre-tion (difference) of each observation from the measurement as far as this will include means calculations and change-central trends as average. You can calculate zas (or standard deviations) from the samples studied. the average deviation from the arithmetic average (m x 9.3 mm) in the case of categorical data, however, this is not the case. Recommends using medium and variance, since the values represent only categories and statistical- First, the descriptive average ca should be deducted from each value will include fashion and deathethmic distribution: frequency. (9.2 x 9.3) (8.7 x 9.3) In the histogram of peak pin-I lengths (7.9 x 9.3) (9.7 x 9.3) - (9.5 x 9.3) mid-Darwinian zones, Shown in Figo-ra 2.2, What is the fashion (if depth intervals --0.1) (-0.6) (1.0) - (0.0) (0.4) peak 0.5 mm)? (0,9) - (-1,4) - (0,4) - 0,0 2. It would be useful to generalize the distribution of sizes Problem with this approach is that the amount of deviations - the peak for the sample of the Pyrenees Ventroeste average is zero and therefore the average deviation presented in figure 2.5 using the average ariste, will also be zero. The result will always be the same as a measure of the central trend? (Can the causes, causes of this phenomenon be explained?) Thus, to prevent this from happening, each deviation from the average will be increased to www.ecologyplace.com for the practice of these quantitative instruments with consolidated statistics and standard deviations. plus B. Smith of San Francisco State University. Smith Run, West Africa. There is a clear distribution of registered signs of non-biomodal polymorphism in peak sizes in birds (differentiated morphological types) in pyrenees of both sexes (Figure 2.5, p. 23), which is produced as a vendrinegro (Pyrenestes ostrinus) found in came-to-the-selection.www.FreeLibros.org-Chapter2yev Adaptationolution 21 (a) Direction Figure 2.4 Three Types of Choice: Curves (b) Stabilization of Choice represent the distribution of characteristics in the population. (a) Directed selection shifts the average population one way. (b) Stabilization of selection favours organisms with values close to the population average. (c) Destructive selection increases the frequency of both ends. Vertical arrows represent selective pressure, while horizontal arrows represent the direction of change. (c) Destructive selectionIn the case of the Ventro Pyrenees, the most popular choice at the time: inheritance by the mixture. The gap was thought to be related to the quality of seeds. The birds were the characteristics of the parents were mixed in the food of the main seeds of the two kinds of offspring, which produced intermediate injury characteristics, which are similar in size but differ form from those of the parents, largely in terms of their hardness. Samples with controversy arise in relation to the second largest su-peaks feed more successfully from the sample: that species characteristics could modify the more difficult sedge, while that of the beak more carse over time. The predominantly small point of view of the ingest seed species more effectively was that the species were created independently rather than softer. Varied. Thus, the nature of the species not only did not change from generation to generation, but also never changed. When Charles Darwin proposed the theory of selection-2.2 Heredability is a natural tion, the concept that species can mutarcaracteristically important for selection and be modified was an idea that, although not widely accepted, had already existed for some time. Teh Charles Darwin himself, ErasmusExisty are two fundamental assumptions for the theory that Darwin (1731-1802) published the Laws of Life Choice brings regarding the conversion of an organic specimen (zoomia) in 1794. Like his predecessor, he's different. First, the characteristics of the indie-French philosopher Diderot, Darwin's grandfather, believed that they were passed down from generation to generation, is whether the animal feels a certain need, it will give ori-say, from parent to offspring. This concept is not the gene to form the body that satisfied the nece-was discussed. For millennia it has been stated that de-sity . He believed that the modification of the kind of pedigree resembles parents. However, this was the case with the satisfaction of desires stemming from the way in which this inheritance occurred was a mystery. Without lust, hunger and danger and that many of them, Developing the theory of acquiring forms or trends that were passed on to the natural after selection, Darwin adopted the terite inheritance hypothesis (offspring).www.FreeLibros.org-22 First part of IntroyantecedentesFigura 2.5 Bimode distribution of the size of the beak (measured by the width of the lower part of the beak, i.e. jaws: x-axis) in the pyrenest ventreams ventrine). (a) Bimode distribution of beak size is observed in both men and women and occurs as a result of destructive selection related to seed quality. Individuals with smaller beaks feed on conifer seeds, while individuals with larger beaks are more effective at titled solid peeled seeds, as indicated in b). Both types of seeds are the main source of food for the species. (Adapted from Smith, 1993) (Nature Publishing Group). 200 Number of persons 150 100 50 0 10 12.8 15.7 18.5 Lower jaw width (mm) (b) French soldier and nature historian Ian-Batiste naturally limited variation contained in the population-Lamarck (1744-1829) came to the hypothesis of its own, but si-tion. On the example of natural selection in finches, as Erasmus Darwin. Lamarque argued that, by debais of Darwin's medium-sized soil, presented in section 2.1, to make that the environment introduce new needs to change the distribution of peak sizes during laanimal, its internal sensation of put in place by drought processes is still limited to the range of presen-(unknown) peak sizes that produce new bodies to meet the population. How can these needs be extended; in other words, have they adapted to anni characteristics? new features arise?bad for your environment. These organs were then transferred According to Darwin, the mutation was the main mechanism for the geneticity to the offspring of the animal. Maintaining variation in the population: Repentance- This deviation was the current of thought when Charles did not and remarkable structures are sometimes observed in Darwin wrote the Origin of species. The theory of offspring. Darwin also stated that, with the domes of natural selection he formulated, it was a prime example of ticking, sometimes extreme mutations (deductive monster-reasoning emerge. Taking a generation to the generation through reproduction and inheritance through the mixture requires Darwin to resort to the differential life of some people with excessively high mutation rates in order to make the person-population. There is no need to resort to dense, model variations that he has indicated in the internal populations or the vitality of his predecessors. When applying natural nes. Darwin was absolutely aware of this mechanism of origin of the species, however, still a limitation in his theory. What she overlooked was the need to have a huge leap of faith. Selection is put to these questions about variations, as well as loswww.FreeLibros.org-Chapter2 Adaptation 23 When Ecology 2.2 Confidence IntervalsIn quantitative Ecology 2.1: Descriptive Statistics, exa-Ecology 1.1: Environmental Data Classification): we undermine the use of medium and standard deviation In the example presented to describe a set of observations. Deviation in quantitative ecology 2.1: Descriptive statistics, Lastandar is a calculation especially infor-average change of peak lengths of nine jilgue-mativo, when the data have a normal distribution. The studied Canary Islands were 9.3 mm. If you take another normal distribution are a family distribution sample of nine Canary jilgueros of the same population, nes, which have an identical overall form. They sime-however, it is unlikely that the calculation of mediatrics, with a large number of values concentrated in gives the same result, average, rather than at the ends, as shown in Figure 1. This is common to describe normal distributions since the sound of bells is reliable. Can any normal distribution be average for the population? To what extent sees - the indication is mathematically in terms of two parame-dadera half of the population? If the population is long: average (A) and standard deviation (A). The average defi-peak is usually distributed (the central distribution point is close and although there are several normal deposits), the calculations of the normal population mean that everyone shares important property - (m values) will also be distributed as normal.dad, allowing us to treat them evenly. That is, if 100 different samples of nine tons were taken, the normal density curves corresponded to the following Canary jilgeroam populations, and properties often called an empirical rule were calculated. the average values of these samples, the values of m form a normal distribution, and the average average distribution will be 68 percent of observations occur by the average population. The standard distribution deviation is within 1 standard middle deviation. The average sample count will be □, known as 95 percent of observations occur Standard deviation (s) within 2 standard deviations from the average. An average of 99.7 per cent of observations occur within 3 standard deviations from the average. ±1 c (68%) ±2 with (95%) Thus, for normal distribution almost all values ±3 with (99.7%) are presented within 3 standard average deviations, as shown in Figure 1. Distribution- Figure 1 Normal distribution, which shows a normal diet, is a key concept in statistics, since the population within 1, 2 and 3 standard deviations from the latodes of the statistical class (known as mean.parametric statistics) is based on the assumption that the analyzed data correspond to normal distribution. It should be noted that in the previous description of normal disatribution symbols are used for both lamedia and standard deviation (respectively), in which then in the quantitative ecology 2.1: De-mysterious statistics were used symbols m and c. The reason for this difference is that the □ and average represent the average and standard deviation of the entire population, while the values m and with are calculations of the □ the population studied , i.e. subgroups of the population actually observed (see methods of quantification, by which the characteristics of the Unknown Darwin were transmitted , the Austrian monk, Gregorgeneration in the generation, began to develop-Mendel (1822-1884), studied in his garden the transmission of deldar aw.FreeLibros.org in the works of a contemporary. It will be calculated using za 68 percent (± 1 standard error) or 99.7 percent (± 3 standard errors) using the rule of difference between average sampling and empirical being exposed above. With it should be noted from the equation to calculate the error normal distribution, the estimated value of the ෆn, the standard (s/ෆn) that the standard error decreases to n is the sample size (the number obser-increase in sample size (n), so that you can improve the calculation of the sampling error and reduce the range of deviations used in calculating the average). Due to the interval of confidence by increasing the number of observations (samples) taken in the calculation of the average and which is unknown the standard deviation of the population standard under study.real (A), the most appropriate calculation of the s, departure- In reality, the above empirical sampling norm. The most appropriate 'm calculation, the above error applies only to the true standard deviation, then sm s/sෆn. demographic standard (A) and standard error (M). When calculating these sampling values, the distribution can now use a standard error to receive may be slightly deviated from the standard normal distribution. Calculated distribution based on the calculation of the reliability of the average sample (m). This sample of standard error (sm) is called distribution t. Like a normal distribution, the distribution average sample follows a normal distribution, and t is symmetrical around the average, although it differs in that it takes different forms depending on the quantity, considering the empirical rule mentioned with degrees of freedom. Degrees of freedom (opening which, for example, for example) means the number n x 1 in which it was born, the area 2.0 s/ෆn below and 2.0 s/ෆn by sample size, on which the calculation of the standard deviation is based. The t value for sample size n. Another way to express this afir-tral 9 (e.g. x 8) and a confidence interval of 95 percent is actually 2.31, instead of 2.0 is used symbolically: riormente. T values for different degrees of freedom (sample sizes) can be found in P s s (2.0 s/ෆn) ≤ s ≤ m (2.0 s/ෆn) s 0.95 any introductory or online statistical guide where p probability, m is the average sample, s/ෆn (search: t-distribution). Calculating the standard error and the average population. For example of peak lengths in the sample Canary jilgueros, presented in quantitative laecology 2.1: Descriptive statistics, calculation is as follows: m x 9.3; s x 0.71; n 9sm s 0.71 y 0.237 1. The standard deviation of a sample of 20 lunar fish ෆn 3, whose body length was presented in quantum-fifa ecology 1.2: Visualization of eco-log-P data No9.3 (2.0 × 0.237) ≤ ≤ 9.3 cos is 4.11. What is the standard margin of error for this sample (2.0 × 0.237) P 8,826 ≤' ≤ 9774 x 0.95 2. At t x 2.09, calculate the con-fianza interval 95 percent for the average population, of which there is a 95 percent probability that the peak length of Canary jilgueros.dadera the average population (A) will be between va-lores 8.826 and 9.977 mm. This range of values will be www.ecologyplace.com to check the confidence interval. In this example, it's a 95 percent trusted environment. There may be confidence intervals and compare samples using lacalculation with the same ease of trust intervals so else. Mendel lived and worked in Brunn Abbey, Austria with two characteristics that made them ideal for his stu- (now the city of Brno in the Czech Republic). Plants dio. First, they formed different varieties that Mendel chose for experiments that they could easily distinguish thanks to the featureswww.FreeLibros.org-Chapter2 Adaptationyevolution 25 Parental Floor Figure 2.6 Mendel studied the hereditary nature of the color colors of the three generations. Purple and white parent plants, which were thoroughbreds, crossed to give rise to Generation F, which was one all purple flower. When the faces of Generation F were crossed, the result of the F-generation 12 offspring was a 3:1 ratio of purple to white faces. F1 F2as flower color, seed size and shape and modes feature white colors to generationalines, and stem length. Second, Mendel is next. From the experimental results Mendel took out the forces to maintain strict control over the reproduction of the following findings: plants. I could let the self-fer plant. There are alternative form units that con-zara (pollen fertilizes an egg of the same flower) or can fer-troll hereditary characteristics (such as coloring it cross with another specimen of your choice. Mendel studied the plants until he was sure he had received the varieties for which self-fertilization is 2. For each inherited agency characteristics produced offspring with characteristics identical to the characteristics of the agency with two units, one from each parent of the progenitors. For example, he identified different (one of the eggs and one of the sperm). These purpleflores that when self-fertilized, produced units can be equal (purple and purple, oplants with purple flowers only. depending on the term white and white) or different (purple and white). When the two units are different, the net line is the headquarters. Thus, Mendel was willing to analyze clearly completely, while the other would not advance what would happen if he crossed the varieties with different features- he felt the observed effect on appearance. For example, what would happen if I crossed a plant with an organism. The unit is expressed by denome-purple flowers with one of the white colors (Figure 2.6)? Male-on dominant (purple) and another known as thedel found that plants produced at this recessive (white) intersection. (reproduction), called Generation F1 (letter F you may have noticed that until now it refers to the filial word of the child in Latin), were all the flowers we avoided using the term gene (or allele) using instead the word unity. It became intentionally purple. Mendel's question was: what happened along the way. While Mendel's work established a set of rules regarding the inheritance of white characteristics? the nature of these transmissions remains uncertain. However, as is often the case in science, when Mendel then crossed the face of the gene, although the horizon was unknown, the course was determined to continue thanks to the results obtained by F1 loss, he found the answer. Of the 929 Mendel plants produced by these crosses (the so-called F2 generation), 705 (approximately 75 percent) were purple flowers, while 224 (approximately 25 percent) were white. From these experiments Mendel came to the conclusion that the hereditary factor of whitish flowers was not lost in the F1 generation, but that fac- 2.3 Genes are inherited units of purple flowers was the flower color inherited by man. He also concluded that plants should have two factors for characterizing the color of the flower, bearing in mind that although all of Mendel's experiments have provided F1, no plants are purple flowers, they can transmit from all but what unit transfer? In searchwww.FreeLibros.org-26 The first part of the Introduction of The Human-EnergyStructures structures of organisms. The structure of DNA consists of a double of propeller DNA (Figure 2.7), consisting of four chemical cough is called nucleotides. All DNA consists of these four nucleotides, and the characteristic b) Gen 1 Gen 2 Gen 3 Gen 4 of each species varies only in the sequence of such nucleotides. DNA is found in fusiform alar-gadas structures called chromosomes. Chromosomes are found in pairs called analogue chromium. Each chromosome carries DNA that is organized into discrete units, or genes that contain information units of a DNA molecule (see Figure 2.7). Alternative forms of the gene are called alleles (originally called allele-c) chromosomes indicating the location of morphing genes; from Greek, of a different form). For example, the inheritance unit that controlled the expression of flower color in Mendel's experiments was an allele. Because chromosomes form pairs in cells, alleles are also found in pairs. The position they occupy on the chromosome is called a locus. Members of allele pairs occupy the same loci on the chromosomes of homolo-gou. If the alleles occupying the same locus in the homocyg are identical, the individuals possessing them are called homogeneous. If alleles are different, the person is called heterozygote. In this case, if one allele is fully expressed and the other has no observed effects, the first is called a domi-nante allele, such as the purple flowers of the Mendel experiment, while the untold hidden is called a recessive allele (which is of white flowers). If the physical expression of Aa BB cc individual heterozygous is intermediate, that of ho-heterozygous homozygous mozygous, locus is said to be full in dominant dominance. (d) The recessive homo vapor can now resume the results of Mendel 'alleles' experiments described in Figure 2.6, and use TheFigure 2.7 (a) The double helix structure of DNA. (b) The terminology of modern genetics (Figure 2.8). Dadogenes specifically sections of the DNA molecule that primary parent plants produce reduced-program production and function of proteins. c) The genes of Purebred cia, we both know that we are homozigotes. If found in elongated structures and fusiforms called we define the dominant allele, the gene of purple colors, chromosomes. (d) Chromosomes are found in pairs such as P, and recessive allele of white flowers such as w, called analog chromosomes. Because it happens in white flowering plants they will ww, while those alleles also form pairs. Members of a pair of purple flowers will PP. This situation allows the guarantee of alleles occupying the same locus on chromosomes because the offspring that receives an allele from each proge-nitor is heterozygote, that is Pw. Because the gene of the answer to this question has left a way of cognition - the purple flower dominates, all the plants of the accumulated gene, which then form the basis of the F1 diet, will present the physical expression of flowers violetas.la modern genetics. This path finally came to an end when the faces of the F1 generation intersected, in April 1953, when James Watson and Francis Crick led to differences. Since both parents published a two-page manuscript in the journal heterozygous (Pw), each of them has the same probabi-Nature who summarized its model of DNA structure theity of providing a gene for purple (P) or white (deoxyribonucleic acid). (w). The result of this crossover (generation F2), expressed at the root of all similarities and differences between those in terms of the share of total offspring, will be 0.5organisms is the information contained in heterozygote Pw, 0.25 dominant homozygote PP and 0.25ecmolulas DNA. All cells have DNA and a homozigotic form of ww. Эн-Терминос-де-экспресин фесика, esto видел que se codifica la informacion es la misma para todos los trasladar'a a las proporciones de 0,75 de individuos con flo-www.FreeLibros.org Капитуло2 Адаптасьонеvулучион 27PP ww Planta родительский PPPw Pw Pw Pw Pw w Pw Pw F1PP Pw Pw Pw Pw P Pw Pw F2 w Pw wwFigura 2.8 Более подробная иллюстрация эксперимента Менделя, описанная на рисунке 2.6. The genotype of each plant is shown in three generations (parent plant, F and F). Alleles of purple flower 12y white are dominant and recessive, respectively. Each plant has two alleles that control the color of the flower. When both plants intersect, each parent brings an allele to the offspring. Thus, the parent of the homozygota can provide a single form of allele (P or w), while heterozygota has the same probability of providing a dominant allele as a recessive allele. It should be noted that while the proportion of different genotypes varies from generation to generation in this experiment, the frequency of genes of each generation (the proportion of P and W alleles) is the same. Darwin's contemporaries considered Mendel observable (see section 2.2, figure 2.6). the difference between people, rather than the amount of hereditary information (genes) that carries the rule, was rather the exception. Although uti-consigo breeders a man is called a genotype. A common set of edested variations between individuals to create gene differences of all humans in the population in tee varieties of plants and This data semoment is known as the genetic pool. The genotype considered it relatively unstable: production determines the development and produces a morphological structure, careful selection and interbreeding of individuals. If physiological and behavioral personalities. External expression and left at random, these varieties would return to the original insum form of the genotype of the phenotype, as a flower flower of the parent species. In fact, the unstable nature of Mendel's pea plants. The ability of domestic varieties was used as an argumentagetype of the production of a certain set of expressions to protect the original and constant differentiation of lazphenotipics in different environmental conditions of annot-species. Darwin had a different view of variation-phenotypic plasticity. Some genotypes have one among individuals: this was not an exception, but a rule; it had a limited range of reactions to the basic conditions of the ingredient's natural, environmental selection and, as a result, produce highly stabilized phenotype expressions. Some of the best sources of genetic variation in phenotypic plasticity are examples seen in plants. mutation and genetic recombination in reproduction the size of the plant, the ratio between the repro-sexual tissue. Mutations are hereditary changes in the gene-inductive and vegetative and even leaf shape can or chromosomes. The term mutation largely refers to different levels as the process of gene or chromosome change, luminosity and humidity (Figure 2.9). product, i.e. the altered state of this gene or chromosome. Most changes in phenotypic symbols can be attributed to changes in enzi-2.4 More genetic variations and proteins and therefore changes in sequencing- is an important ingredient of DNA that encode them, for the natural selection of the point of mutation of chemical changes that occur in one nucleotide of a single gene (see one of the many brilliant ideas that Charles Darwin had drawing 2.7). If a one-time mutation occurs in an unfired emphasis on variations between individuals gamete (egg or sperm), it can transmitsewww.FreeLibros.org-28 The first part of IntroyantecedentsManving files possible genetic biring is huge, recombination is one of the first and major sourcesFigure 2.9 Plasticity in leaf form in response to genetic changes in offspring. In the case of environmental conditions. Human splash of water (Potamogeton), the number of combinations spear-shaped leaves underwater, in possible unique reactions that can occur from egg or sperm to underwater movements, and wide tosoid leaves of approximately 8 million. However, there is no heart floating on the surface. all organisms reproduce sexually. Asexual reproduction is the production of de de-dencia from one parent, without the involvement of an egg or sperm. Although this can be done in a variety of ways, in all cases it creates a decen-decen-dencia that is genetically identical to the parent (see Chapter 8 for detailed analysis and other examples). Without a mutation, I don't care. While Darwin understood that it was here that the dable variation that allowed natural selection allowed, he could not find an exact explanation for the mechanism that led to the observed variations in individuals of the same species. Although Gregor Mendel's work was published only six years after the publication of The Origin of Species, his discoveries were virtually unknown until 1900, about 18 years after Darwin's death, for the offspring and the succession of future generations. 2.5 Evolution is a modification Of most single gene mutations have an effect on the frequency of lowered or improved genetic genesis in the phenotype. Mutacio-nes are of this type, which cause significant effects of Darwin not to use the term evolution in the first edi-usually harmful. Gene mutations of the origin of species. Instead, he said decas are fundamental because they bring variability to modified offspring. The word genetic evolution. An example of one gene mutation is that (from Latin, South-East) has become whole-ln in mice. It's a complete absence of a pig - a common term in Darwin's time that involved crying in fur and iris, which produces an appearance of a number of events. It has to do with white hair and pink eyes. This gene is recessive and produces with the concept of progress, that is, direccio-descendencia change pure race when mating between albino. but it was the development of something simple to something chromosomal mutations can arise from the complex. It meant the same concept of structural or numerical prog-change chromosomes. Directed that Darwin's ancestors used first include duplication, transposition (change C and which Darwin wanted to dispel with the theory of laorder or position) or the removal of part of the chromosome. natural selection (see section 2.2). These changes produce phenotypic conditions Although the term evolu-les is commonly used. Numerical changes in chromosomes can still include directed change, the definition of bio-lyr in two ways: (1) partial or complete duplication of logic is applied specifically to genetic modification of the chromosome or (2) suppression of one or more chromosomes. And does not imply direction or purpose. In the most polypoliploid sense, i.e. duplication of whole groups in width, evolution is a change in the frequencies discussed in section 2.7. populations (or species) over time. There is no doubt that in most cases changes are passed from one person to another, the genetic denation between humans in the population occurs primarily offspring, the individuals people are not evolu-in species that reproduce sexually. In the sion, but the population is developing. Approaching sexual reproduction, two human produce evolution gametes is located in the genetic pool, a common set. Haploid (egg and sperm) haploids (half coquette- To illustrate this point, we will resume normal debd chromosomes of Mendel in figure 2.8.a diploid cell, or zigota, which has a set of facial lobes in each of the three complete chromosomes. Since the number of possible recom- genotypes (represented by character-www.FreeLibros.org-Chapter2 Adaptation of 29theristics of flower color) varies from generation to generation represents the physical traits that distinguish them. Each of them is unaotra (parent factory, F1, F2). The frequency of genes (essence, a separate unit, which was assigned a disproportionate gene P and w in the population), but is not named. So Carl von Linne (Linnaeus; they changed. Both P and W have the same ratio of 1707-1778) that created our generation-to-generation classification system: 0.5 P and 0.5 W. No matter the binomial, I considered plants and animals. When future generations are calculated frequency, just like his other contemporaries, believes that the distin-each gene (P and W) would remain stable if it did not see the affected organisms were fixed and immutable units, those called other agents. This rule is known as the staple products of special creation. They differed from the hardy-Weinberg enpio, in honor of two scientists who had color, pattern, structure, proportions and other characteristics established in 1908. Specifically, the principle in accordance with these criteria, naturalists such as Charles Darwinafirma, that the frequency of genes will not be changed in the described, separated and organized species in The population that reproduces each species was different. A certain degree was permitted desexually if the following conditions persisted: variations, although variants were considered random. (1) Mating is done randomly, (2) no mu-This classic concept of morphological species continues to be in effect, (3) populations are numerous, so that those are useful and necessary to classify a huge number of random changes in the frequencies of genes not plants and animals. It forms the basis of the description-significant, (4) there is no natural selection and (5) no organisms included in the identification manuals occur migration (ins and outs of individuals (Figure 2.10). However, if differences were observed eny, hence genes in the population. In a population of physical traits that are used to distinguish specific plants presented in Mendel's experiments, cies are the result of genetic differences between the population frequencies of different genotypes changed to lar-tions, the definition of species must determine the engo way of time (generation), and phenotypes that are supported by the genetic differences that led to the separation of the species. , purple and white evolutionary biologist Ernst Mair proposed the concept of purple only and again purple and white. However, the species, a group of populations whose humans like Mendel infer, change the color of their garden have the potential to cross and produce offspringno involved changes in the frequency of genes (or related fertile. This definition of the species implies repro-de isolation of inheritance according to the terminology used by Men-ductivo and since reproduction is a trans-del method). In natural populations, however, the genetic information (DNA) mission also includes the conditions required by the Hardy-Weinberg principle of genetic isolation, never fully implemented. There are situations in which it is impossible to distinguish natural mating in forests and fields. Fish-wise populations and natural selection occur. Swim in de-ove areas, amphibians migrate to breeding sitesTodas these circumstances change the frequency of genes and birdsong. In the midst of this madness of activity, from one generation to the next, bringing evolution- each species remains separate from the rest. Sparrows. Natural selection, in fact, is a choice (super-singers mate with the song sparrows, differential salvelinosvivence and reproduction) in favor of salvelinos, wooden frogs with frogs instead, that leads to a change- multiple errors occur, even between species at gene frequencies. The beauty of the concept of such appearance. However, what maintainsciselution by natural selection is that it does not require reproductive isolation of populations, resulting in direction or final cause, but guided by modification- for different species?randomizations in a sequence of four nucleotide methods by which different species of deferred-DNA that make up the characteristics of each organism, in particular , is limited only by the need for rencian caused by the mechanisms of isolation (or barrion) : the transmission of that DNA at the reproductive level): mechanisms that limit the exchangethe following generations. genetics among populations. These include morphological traits, behavioral characteristics, environmental conditions and genetic incompatibility. Isolation mechanisms can be precoulator or post-copyator. Mecca-2.6 The concept of the species is based on precopulatory nysos that prevent mating between the genetic isolation of individuals of different species, including habitat selection, temporary isolation, behavior and understanding of the genetic underpinnings of germ mechanical or structural incompatibility. Mechanisms have changed the concept of the species. With a postcopulatory guide to identifying declining survival success or hand disapproval, you can differentiate the thrush from the thrush deduction from the offspring that may arise from a mat or white oak from An American oak. Each organism of individuals of two different specieswww.FreeLibros.org-30 First part of the Introduction of the 2.10 Illustration of Roger Tori Peterson's field guide by birds, which identifies the physical traits of TANGARA, used to distinguish different species of VERANERA from Tangara (Thraupidae). At any time ammadodoming TGARA ESCARLATA Reproductive If two potential satellites in conditions of apa-visual, auditory and chemical stimuli. Some insects, mammals do not have the opportunity to meet, it is a little like certain species of butterflies and lapnobable flies that intersect. This is the case when two species of fruit and some mammals have their own raw aromas that coexist in the same geo-form. Birds, frogs and toads, some fish and insects, but use different habitats (local habitat). Singers such as crickets, grasshoppers and cicadas, produce reproductive isolation because of differences in habitat is common in a species group of sounds that attract species correctly. Theranas and toads. Different sites call and pair The visual effects are highly developed in birds and frogs and toads, which mate in the form of some fish. In the case of insects, desimultant models help keep the species separate. If I fly and flash fireflies on the summer nightwellth American Frog Mountain Chor (Pseudoacris ravine visual stimuli. Signs of luztriseriata feriarum) and its close relative, the choir of frogs emitted by different species vary in terms of rhythm, southern (Pseudoacris nigrata), bred in the same pond, brightness and color, which can be white, blue, green, yellow, males, which they call, usually scattered in various orange or red places of the pond (figure 2.11). Chorus frog Mechanical insulation mechanisms prevent the lasurean flame from a hidden location at the base of arrays of copulation or pollination between species of closely grass or plant waste, while the frog is bound. While mechanical isolation rarely means an American mountain from another location, it is a barrier to ajar genetic exchange. Animals, differences in floral structure and temporary isolation (differences in the season of complex mechanisms of cross-pollination of mill-breeding and flowering) works to isolate species that bloom or are sexually active at different times of the year. Animals can isolate plants with the same flowering season or conflict in plants.roll in the same geographic area of a habitat. Toad Even when two individuals of different American species (Bufo americanus) mate at the beginning of ii manages to mate, the whole toprinavera genetic differences which otherwise the same geographic area, while fowler toad (Bufo woodhouu-allow fertilization occur. Place, however, there are other genetic barriers that work-behavioral barriers (differences in behavior) like post-copyer mechanisms and maintaining courtship and mating) are important isolation mechanisms in many species of ponds. These are downward insulation mechanisms. Males of many sia that arise as a result of mating between dosanimales have specific courtship displays, for a different species called hybrid. In most cases, only cases to react, hybrids are not viable and die. In other chembrass of the same species. These exhibits include cases that survive but are sterile, unable to producewww.FreeLibros.org-Chapter2 Adaptation 31 Page 2 Figure 2.11 (a) The American Mountain Chior Frog (Pseudoacris triseriata feriarum) and its close relative, b) the southern choral frog (Pseudoacris nigrata), which live in the same ponds, although the males they call, as the rule, are scattered in different ponds. in the pond, of his own origin. This is how it lives with a mule, which is two). As a result, today they are classified as a cross between a mare and a donkey. Because the mule is not one species. In addition to being a mechanism capable of proliferating by man, it cannot transmit reproductive isolation between narrow genetic species to future generations. related mind, geographical isolation is also an important factor in the process by which another additional factor arises is a key element of the isolation of new species. Species can be eesympathic or allopathic. The simpatrick species occupy the same area at the same time, so they have a 2.7-year process of species that involves the portability for crossing. Allopathic species occupy the development of reproductive isolation of separated areas in time or space. Since allopathic species have no account- Lee Darwin's hypothesis in the Origin of Physical Lasto with each other, there are no signs that they can cross-species, a species implying a divergence of species. Thus, only existing insulation can be verified by natural selection. A key step in the product if the barriers were broken and allowed to come from the species is the point at which the genetic pool meets. Geographical isolation often consists of isolating one population isolated from other populations of the reproductive isolation mechanism of species, in two features, and genetic exchange disappears. Once similar but allopathic elcies, and without this barrier as the genetic subpopulation pool manages to isolate itself, the species will continue to function as one. So commit, for example, self-development as the modifications of the gene-flat, from the American red-haired picadatero (Cafe Colaptes) and flickas by natural selection and mutation. American allymarillo (Colaptes auratus) process (Fi-speciation can be classified into two models according to 2.12). If you take an ancient bird guide, for example, the geographical relationship subpopulation in relation to the Audubon or Peterson series (approximately since 1940 for the parent population. However, if you look at external physical editions such as topography, water (or soil) or current habi-tok, you can see that both have been combined into adverse tat, this is called allopathic imaging. If one species is known as a carpenter (Colaptes aura- reproductively urged in presenciatus). Historically, two species inhabited differs from the parent population, this is called simp'tric speciation.tes geographical areas: the American red picamedero The first step in all-patriotic species, or speciation lived west of the American allymarillo picamadero. Since the geographical, as it is sometimes called, is the division of time, the distribution of both species is the same population intersect in two spa-extended populations and coincided (became simp'tric), and jointly called isolated, Each of which takes its own evolutionary path to cross and produce viable offspring (hybrid-lutive (Figure 2.13a). Imagine a warm, dry terrain, www.FreeLibros.org-32 First Part Introduction and Parental-Populations Divided and Geographical Barriers develop mechanisms of reproductive isolation. a) If barrier A' breaks and reproductive isolation is not completed, they find that they come together to form a gene-forming pool 2.12 Carpenters: The eastern shape of American mince (b)allymarillo has a wing lining and a surface under the tail is yellowish, as well as a gray face with a black mustache. Complete reproductive isolation A B, scattered by different species. Somewhere in the 1980s mountains rise, the earth sinks and runs off the river. This action separates the terrain and physically separates the A-view segment from the rest of the break. The new isolated population will become a sub-friendly A' and now inhabits a cool and (c) humid climate. Since it is only one subgroup of the genetic pool of Species A, Population A' will have small differences Figure 2.13 Species Species: a) ogenetic allopatic species formation. Climatic conditions and selective geographical forces arise when two populations isolate one of the populations in which the two populations now lives are different. Another for a long period of time. The first step in natural selection will help people better adapt-species occurs when Species A is divided into a cool and humid climate. A similar selection for two populations due to the geographical barrier: A and A'..warm and dry climate will remain in the population A terre b) At this time, if sufficient differences are not developed. With different selection forces operating before the barrier breaks, but the two populations will be different from them, both populations will be different. In addition to insulation are incomplete, hybrids are formed. (c) In the event of a genetic divergence, it is possible that insulation mechanisms may Completed, lations in physiology, morphology, color and 'population has evolved from the same species and evolve in external differences. Type B. If the barrier was to break, species A and B could exist asymptotic. If the geological barrier is broken down and the two populations are reunited before natural selection is pro-it is possible for the two to mix and re-introduce the differences that cause reproductive isolation, one genetic pool (Figure 2.13b). However, if sur-www.FreeLibros.org-Chapter2 Adaptationyevolution 33gen is sufficiently different to inhibit interbreeding, it goes into a large number of species, including examplesony populations will function as different species presented as peak-sized Darwin (psychiatric) finches, even if they ever find again (see Figure 2.3) and the development of resistance to them (figure 2.13c). antibiotics in bacterial populations (see Cuesio-Simpatical Species occurs without insulating the environment: The ecology of antibiotic resistance is geographical. The second process, speciation, is more difficult to form a simp'tric speciation in which to observe directly because an important species occurs spontaneously in per'o-rece. The double method is much longer. As a result, the most common sudden prey is the type of mutation, most of the knowledge about the spectra-chromosomal process called polyploidy, i.e. duplication was developed by analyzing patterns of changes in the number of chromosomes. An organism that pre-tions geographically in some species, puts a double number of chromosomes in gametes (egg or sperm) unable to produce descen-species that have a fertile geographical distribution with a member of the parent population, although with the extensive often encounter a wide range that it can do so when paired with another polyploid. Thus, environmental conditions compared to polyploid species have already reached reproductive isolation. distribution is more limited. Changing environmental conditions usually results in corresponding many plants that are usually grown, variations in morphological, physiological and driving traits like potatoes, wheat, alfalfa, coffee and herbs, tuna. In populations of one species that lives between others, they are polyploids. Polyploidy appears with different regions (often signifi-cuenca differences in native plants in which it produces Con-Con-cativas. The greater the distance that divides them, along with species such as the Blackberry (Rubus), the more pronounced the differences are usually lassaces (Salix) and birch (Betula). Blue lily (Iris sees- which each population fits to the place where it lives. Lasicolor) north of North America is a polyploid that geographical differences in species can produce clinas, probably originated from two other species, I. vir-ecotypes and geographic races.ginica and I. setosa, when both, in the past widely separated, were found during the rollback of the cap-Clina is a measurable and gradual polar modification of Wisconsin (see chapter 18). Sequoia, which occurs in the geographical region above the angigan (Sequoiadendron giganteum) (see figure 5.1) of some phenotypic symbols, such as size and color, is a polyploid remnant, since its parental appearance was given, or gradient of phenotypic frequency. Klina sextinguido. often associated with an environmental gradient such as temperature, humidity, luminosity or altitude. Simpatrick pherical formation can also occur - continuous changes occur as a result of destructive selection, which favors from one population to another gradient. Because the cons are different phenotypes of the population. When there are environmental trictions that affect natural selection on the characteristics required to look for varying degrees, any population gradientequally different food sources or occupy will have certain genetic differences from other microhabitats. natural selection can favo- and differences will increase as it increases to different population phenotypes (see Fi-distance between populations.) Climatic differences occur in the size, proportions of the body, coloring and physiological adaptation of animals. For example, the North American virgi-nia deer has a climatic change of 2.8 geographical changes in body weight. Deer from Virginia from Canada and the northern United States are the largest, given the queen species provides information exceeding an average of 136 kg. Faces thisobre the species process weighs an average of 93 kg in Kansas, 60 kg in Louisiana and 46 kg in Panama. The smallest individuals thisAs we observed analysis performed before the species, the Florida Keys deer, weigh less demoment, two fundamental processes required for 23 how evolution by natural selection leads to species: (1) how the clial oscillations can represent cases of sea cessation. These sudden changes, or types of wedges, change over time and (2) the step mode tends to reflect drastic changes in which one species becomes two (or more) specifications of local environments. These variants are called eco-cies. The first process, evolution by choosing types. The ecotype consists of a population adapted to the natural, it has been documented and studied exhaustively local environmental conditions of its own. For example, eswww.FreeLibros.org-34 Firstpart Introductiontecedentesposable than a population that inhabits the top of the inexhaustible habitat mon- (e.g., a mountain range or a large Britain represents differences from another population of reservoirs). As a result, the species rounded out the same species that lives in the valley. Often, buy them geographically in a circular pattern, or shapedecotypes will be scattered like mosaics in a landscape. ring, in a large geographical area. Populations, usually, when several habitats to which they immediately abut (neighbors) represent only the lige adaptation of species repeated throughout the range of differences in distribution and intersect. At opposite ends of the species. Distribution, which came together to form a circle, however-millennial, Achillea millefolium, is a vege-te species, the different between populations is so great that it develops in temperate and sub-circular regions function as two species that do not intersect. In the Northern Hemisphere and represents an extraordinary number of examples documented in detail ann onto ecotypes. It has significant differences such as pres- llo is Salamander Ensatina eschoLtzii overlapping coast adaptation against the various climatic conditions of the Pacific Ocean in the United States (Figure 2.15, p. 40). The heights of Ensas. Lower elevation populations are high, and southern California can find two different forms - have large seed production, while tees of species that represent remarkable differences in mountain populations (high altitude) have character-in-color and do not intersect. However, the chain be smaller and produce smaller seeds. Northern populations surrounding the central valleyIn the classic study, plant ecologists J. Clausen, California connects these two forms. In this D-population ring. D. Keck and W. M. Hisi of Stanford University, the color scheme of salamanders were altered by the seeds of millennials, which they gradually collected. Ecologist Robert which first described the different heights of the transect in the Sierra Nevada in the bank - for the first time this model of geographical variations of transplant endins located at different altitudes, since 1949, suggested that it evolved at low altitudes to the mountain. Millennials from the ancestral population of Northern California expanded large heights, maintaining low altitudes in all southern areas, one part heading west through the Sierraluguar, where they were planted, while the other eco-Nevada and the other to the east coastal range. Bothtypes had some phenotype plasticity in the growth of populations then gradually differentiated but became smaller in more places as they expanded south. adapting to suselevados. appropriate local environments. When they returned to southern Appalachia, they constantly found them in southern California, they developed Sufi-variety salamanders, inspired in part by earthy differences, so as not to cross. Some stu-unscathed, a set of environmental conditions and the recent genetic god of these populations confirm the limitedcapity of salamanders to disperse the Stebbins hypothesis, giving us an overview (Figure 2.14). Populations have been isolated from each other, the reverse process continues, including the free exchange of genes. One type of desalination, Plethodon jordaniai, is divided into a series of semi-isolation populations, each of which is a character - 2.9 reflecting the adaptation of a particular mountain region. Groups of obligations and narrowings of populations form geographical races separated by some external barrier (in the case of salamanders, rivers and hereditary characteristics possessed by the body of mountain peaks), thus avoiding the free flow of the genus due to past generations. The ancestors, in fact, are associated with other subpopulations. The degree of isolation suffered from the natural selection process, which led to depension from the effectiveness of the external barrier, although rarely hereditary characteristics are present in absolute individuals. These geographic races are usually classified as current. Possession of these characteristics allows an organized subspecies, a taxonomic term for the population, to adapt to the environment. As long as the conditions of the species are differentiated by one or more environmental features in which people live from generations. Subspecies with a small genetic exchange between current diets resemble those encountered in the early stages of species formation. From generation to generation, the body adapts to you can draw a geographical line to the environment. On the contrary, if the conditions of ambien-ca divide subpopulation into subspecies. such species are significantly altered, the effectiveness of eThe pattern of geographical change of species that even human survival will be in the sam species that some evolutionary ecologists of some of the gro (see figure 2.3, section 2.1). Adapting, the best examples of how the process can develop then, covers all behavioral characteristics, species formation is a strange phenomenon known as morphological or physiological hereditary they support or ring species. In the ring species of the population, the body's efficiency is increased, compared to containment - one species form a circle around the area mined by the environment conditions.www.FreeLibros.org-Chapter2 Adaptation 35Perphile researchers Beren W. RobinsonEVersions zoologyPartia Gwelph, Guelph, Ontario, Canada Most lakes that are distributed throughout the region that morphological differences between North America formed after two vast forms of ice covering the region retreated were inherited, about 15,000 years ago. The group of fish that inhabited rather than belonging to this new environment, prickly (Gasterosteus spp.), went from expressions to a rapid period of species formation, in which the species of plasticity that inhabited the lakes of the coastal area of the British phenotypic in Plumbia was one of the youngest species on earth. Answer to twoNo more than two species appear on the lake. In addition, habitats or species habits in each lake seem to have evolved food completely independently of other couples. Different. Secondly, that differences of morpho-gika observed in both forms influence eficien-In all lakes where several sources of the area are located, that is, that they factonoses, both species have different models of compromise, the use of habitat and food. One species feeds on all mint plankton in the open water area (lim-shape To test the first state, Robinson is bred de-noti), while the other species captures the condence of the extraction of two forms under the same conditions of most sediment size and laboratory underwater plants (environmental and fodder conditions), although there was some degree). Morphological differences between the phenotypic plasticity of the overy, the differences between most of them are related to these differences in use and characteristics were retained in both forms when feeding food (Figure 1). If the superimposed constrictions are withdrawn under equal conditions. On average, the benthic form of these different environments are or are not responsible in representations (1) the smaller overall body length, (2) besides the evolution of both species is a deeper matter of the body, (3) the wider mouth, (4) non-neuve in the study of Beren Robinson Department more dorsal spikes and (5) less zoology of the University of Guelph. gills in relation to the lymnetic form. Thus, the phenotypic differences in morphology of both in lakes where only one sample is found are certainly inherited. To test the second state, Robinson conducted a sample of the species's population, Gasterosteus conducted a series of feeding tests on laborato-aculeatus, which inhabits Cranby Lake in the coastal region of Rio, in order to assess the commitment in the effectiveness of British Columbia, Robinson found that humans supply two forms. Efi, taken as a preliminary habitat for the open waters of individual fish, was assessed in two morphological differences from shallow waters near the coast. Similarly, these (a) differences in morphology were parallel to the differences between species inhabiting both habitats (b) in lakes inhabited by pairs of species (Fi-fura 1). Robinson hypothesized that these individuals Figure 1 morphological differences in gills represented different phenotypes that originated from the prickly species according to habits as a result of natural selection, which promotes food divergence (a) of the limnet form and b) form of the population. You can use divergent (or destructive) choices. Illustration by Laura Nagel, King's University (Fromde occurs when people in the population are faced with obligations related to the implementation of de Schulter, 1993.) accomplished the task. Commitments arise when a task (e.g., eating plankton open skirts) is a cost to implement and any-science of the second task (feeding sediments from shallow water of the coast). Commitments can lead to different choices that fa-vorzcas specialize in resources. To demonstrate his hypothesis, Robinson had to demonstrate two conditions. First of all, www.FreeLibros.org-36 First part of Introduction simulating current conditions - the rate of eating 1.0das of lyminetic and benthic environments. in a benutical form Shallow water (amphipod/min) two types of food were used in tests. 0.9 larvae were placed Artemia (Artemia), prey often in open water, in artificial limnetic habitats, 0.8while more amphipods, fast-moving arthropods with rigid aguasque exoskeletons were introduced, fed by dead organic matter on the surface of 0.7 discovered sediments, in artificial vanilla habitats. 0.6 One of the experimental tests was to release the fish into the test aquarium and observe it for a long 0.51.5 2.0 2.5 3.0 3.5 4.0time. At the end of the observation period, the total number of ingested victims was calculated, and the obtained data were converted into two indicators of procurement efficiency: the rate of ingestion (the amount of mined prey per minute) and the figure 2 Average ingestion rate (and standard errors) capture the blur (average number of bites per prey). lymphetic (open) and benthic (small) forms in open water feeding tests (source of food test results: Artemia larvae) and shallow water are clear differences in search effectiveness (food source: amphipods). (Adapted from Robinson 2000.) two morphological forms (phenotypes) (Figure 2). Individuals of limnetic form showed a large study that actually quantifies the nature of descience in the supply of Artemia larvae, pre-commitments that confront individuals with higher levels of reception and only half of the population in relation to exploitation are different re-bites to ingest prey, compared to in-courses. Robinson's work sheds a lot of light on the kind of military uniform. On the contrary, the individual mechanisms that affect the evolution of diversity in this form represent a higher rate for the intake of amphipods and, on average, they are the ingested amphipods of this group of closely related fish. more than individuals in a lymnetic form. Robinson's bibliography was able to determine that Robinson had the highest speed, the B. W. 2000. Trading offs in the habitat of specific feeding larvae Artemia shown a lymph-nontic form has been associated with a large amount of bran efficiency and the nascent adaptive divergence stickle-quispinas with which this form has, while the backs in the lakes. Behavior 137:865-88.The large width of the mouth was associated with the largest veil - Robinson, B.V. and S. Wardrop. 2002. Experimental Taking amphipods at an inquisitive rate of growth in three-beam sticklebacks: an assessment of the shape of war. Thus, it was discovered that efi-trade with the development of stabilization. Environmental sources have been linked to various- Fish Biology 63:67-78.cias morphological between the two forms that will indicate the characteristics associated with operation- 1. Do you think the differences in morphology, the effective tion of these two different habitats and their recurs-food and habitat are two phenotypic forms of the respective food lassos. can the fish population lead to re-productive isolation and, finally, to species? These and other Robinson experiments would confirm that these two have a multi-directional natural selection. If there is an intermediate phenotype (intermediate in characteristics and which may constitute early stages of theristics) in the population and the population lead-species. Previous studies of thorny species in both open and endivergetent environments (pairs of species) inhabiting lakes near the coast (and with the same effectiveness were British Columbia have indicated that selective pressure as other phenotypes), as if it atteproceeds is present in open water environments and interpretation of the results?near coast (shallow water) were a major factor in the evolution of these species. However, go to www.ecologyplace.com for the text of Kolka-Beren Robinson is unique in illustrating that natural selection works in one population, which lar aggregate statistics with thorny data, leads to different morphological phenotypes that inhabit two different environments. This is one of the most fewwww.FreeLibros.org-Chapter2 Adaptation 37 Ecology Issues Ecology of Antibiotic Resistance, when it comes to adaptation and evolution, a person is often able to develop some in periods of millions of years. However, as resistant infection is observed in some examples, such as modifying antibiotics when they increase the peak size of Darwin's average finches initially infected (see Figure 2.3), evolution by natural selection of a strain of resistant bacteria can occur at relatively times when a strain of resistant bacteria occurs in the body when populations are exposed to changes after the start of antibiotic treatment. Sudden environmental desa-environmental. In a group of organisms, the roll of antibiotic resistance in the naturally selected bacteria seevolution accelerated due to produces by acquiring genes that hinder attempts to eradicate, possibly with serious resistance to the compound (i.e. exposure to our own species. actual cough of the drug). Bacteria acquire these types of genes in three ways. It is possible that a bacterial antibiotic, genes for antibiotic resistance. Antibiotics are a class of natural compounds spontaneously mute, which appears to be synthetic deo causes that destroy or inhibit the development of more frequent micro-resistance. In a process called trans organisms. Discovering and successfully using formations, one bacterium can take the DNA of another. Ter same anti-disease bacteria constipation-cera way acquired the resistance of smalltuyen one of the success stories of modern DNA medicine circle called plasmid, which can be transmitted by other compounds (drugs) are one type of bacteria to another. One plasmid gives rise to widespread use by the middle of a set of different resistors. In 1968, more than 12,000 sajlo XX, saved countless lives of potential people in Guatemala died in an epidemic of diarrheal infections and bacteria causing diseases of bacterial origin. The bacterial strain was housed plas-des. But just four years after pharmaceutical companies carrying resistance to four different antibiotics, c'uticas began mass production of penicillin, the first of these compounds, micro-although resistant bacteria to antibiotics that could resist them began to emerge. this natural phenomenon, a group of social factors also exacerbates the problem: the misuse of antibiotic resistance is rapidly expanding. Antibiotics. For example, doctors sometimes re-entered 1979 and 1987, for example, a survey of the Centers for The Reuse of Antibiotics for colds, coughs or flu, all for disease control and prevention (CDC) viral diseases that do not respond to antibiotics. The United States found that only 0.02 percent of patients prescribed antibiotics for bacterial pe-strains that caused pneumonia were ro-resistant not to complete treatment (they did not take the correct dose of penicillin. today 6.6 percent of strains of ta throughout the treatment period) can contribute. In addition, according to the CDC, in 1992 more than 13,000 to resistance, hospital patients died from bacterial infections resistant to antibiotic treatment. Another common problem is the widespread use of antibiotics in livestock, where drugs are used in for healthy antibiotic-animals for disease prevention, or introduced is the result of evolution, in particular, a reduction in the dose in food during a long period of accelerated natural selection of populations make time to increase the rate of weight gain, bacterial that arose as a result of the widespread use of antibioti-Although the Center for Veterinary Medicine Agency. All populations of organisms, including the Food and Drug Administration (FDA), from the United States, have genetic variations that affect the United States limiting the number of permian-antibiotic residues in human characteristics; In this case, tidos in poultry and other meat products, these drugs the ability of bacteria to resist the effects of antibiotics- can make bacteria more resistant. Every time antibiotics are used, there is one of the drugs used to treat people who have selective fi-pressure for resistance going on. It still causes some human disease to be when a person takes an antibiotic, the drug de-trusses the most defenseless bacteria. Without starting- make them harder to deal with. Go, if he was resilient, I'd survive. Resistant tobaccoria then multiply, increase - 1. When treating potential doses of bacterial infections in quantities up to a million times a day. This deadly mind is often prescribed by different types of process accumulating, with more and more antibiotic bacteria for patients. Explain why they develop resistance to the more antibioti compounds that is used for this treatment.cos. Natural selection favors population (bacte-rias) who are resistant to antibiotics. Major 2. Why is the development of loss-making populations of antibiotic-resistant individuals an example of evolution that leads to a higher proportion of the population of natural selection?resistance in successive generations.www.FreeLibros.org-38 First batch Introduction andtecedentesFigure 2.14 Geographic races in the Jordanian Pletodonic of the Appalachian Highlands. These salamanders originated when the population of the salamander P. yonahlossee separated through the Valley of the French Broad River. The population of the east evolved to the salamander metcalf, which expanded to the north, the only direction in which members of the lras group could find adequate temperature and humidity conditions. In the south, southwest and northwest, the mountains suddenly disappear, restricting the rest of the Jordanians. Salamandra Metcalfa is the most specialized and environmentally divergent, and the least competitive. Then the salamander The 18-1990s and the rest of the group were ingilised by the flooding of the Little Tennessee River. Other members are still connected in some way. If the Earth were a vast homogeneous environment, such a narrowing tax that, ultimately, one phenotype, a single set of characteristics, could be traced back to the laws of physics and chemistry. The can give all living organisms a few words, characteristics that allow the ability to survive, develop and multiply. Without individual success under certain conditions the limit, however, is not: the environmental conditions of their work in another set of conditions. It is a con- that directly affects life varies overall, but the fundamental treatment is clear for fans and space, so natural selection will promote the sport. Let's take a look at the case of two important figures coming out of different characteristics as you sport. Wilt Chamberlain was arguably the best changing environment as spatial basketball and Willie Shoemaker was perhaps the most temporary. The body's reaction to an outstanding racer. With the ambient growth he has no endless repertoire of possibili- 1.49 m, Willie Shoemaker would never have played dads, but is limited and limited to a number like a pavo in the Los Angeles Lakers, while, with environmental tolerance, that is, a limit of 2.15m, Wilt Chamberlain can not have environmental tions in which he can survive, slip-never won the race in Kentucky. The assembly is filled and reproduced by the body (Figure 2.16). These physical characteristics that allow human dis-tolerances are a function of obligation in sports prevents the same person from the so-www.FreeLibros.org-Chapter2 Adaptation 39Figure 2.15 All species subspecies ensatina escholtzii salamanders of the Pacific coast area descended from one previous population. As the species expanded to the south, subpopulations adapted to the local environment on both sides of the San Joaquin Valley. Throughout the distribution of the population cross successfully. However, in a region where the circle is closed (areas are painted black), salamanders no longer intersect and populations function as two different species. S - Bresalga survival in another. Thus, the G-Development characteristics they possess are also limited to organisms (see figure 7.1, chapter 7). A - Play O - Optimal For the following chapters, In Part 3 (chapters 6 to 8) this principle of Basic indicators of fulfillment of obligations in their application to adaptation of species will be analyzed and how the S G R O R G S nature of adaptation varies from changing environmental conditions, both physical and biotic. Chapters related to the post-annual (temperature) nature of the environment will highlight the effects of such adaptations, as environmental conditions change over time and space, leading to patterns and processes observed in communities and ecosystems. However, models of changes in the physical environment of the Earth's surface, variations that determine the scenario in which natural selection and evolution processes are developed, will be studied. Figure 2.16 The body's response to an environmental gradient such as temperature. The ends of the curve are the maximum and minimum survival limits (S). This gradient shows more limited ranges, in which the organism can develop (G) and multiply (R.www.FreeLibros.org-40 Firstpart IntroductionyantecedentesResumenNatural Choice (2.1) Concept Species (2.6) Natural selection of differential success (survival and species of a group of individuals who mateproduction) achieved by individuals in each other's population and live together in a similar environment of a particular environment. Species can be psychiatric or allopathic. that (2) produces differences between humans in terms of survival and/or reproduction. : the direction between populations. The widest, most stabilizing and destructive mechanism of species formation. To provide protection. The accepted mind is an allopatric or geographical characteristic. The inheritance (2,2) is the only species that intersect is divided into isolated spatial-minded populations that develop into different species. Natural selection requires that the characteristic be inherited or where reproductive isolation is anticipating a difference that can be passed from parent to offspring. and the process happens in the population, you get TheGenes (2.3) psychiatric speciation. The most common type of simpatrick speciation is plant polyploidy. Units genes contained in chromosomes. Alternative forms of the gene are called geographical variations (2,8)los. Individuals with equal pairs of alleles are species that have an exten-homozygous geographical distribution, while those with different alleles tend to face a range of surrounding conditions called heterozygous. In the case of heterozygous, wider ale than those that are distributed more limited, what is expressed is dominant, while the one that is not a change in environmental conditions tends to lead to an expression called recessive. The amount of information corresponding to variations in certain characteristics that each person carries is a genotype. Its morphological, physiological and behavioral, physical expression of the case on which natural selection operates is a phenotype. The range of phenotypic expressions under different conditions am- Commitments and constrictions (2.9)biental is called phenotypic plasticity. Environmental conditions that directly affect genetics (2,4) of life vary in time and space. Similarly, the purpose of selection varies with environmental circumstances, most hereditary variations arise as a result of spatial and temporal variations. Characteristics that allow genetic recombination in sexual reproduction. Some of which species survives, develops and reproduces the genetic material is altered by mutation. Many conditions limit the latter's ability to have genetic characteristics can alter nucleotide sequences - the same efficiency under different environmental conditions. Chromosomal mutations change the structure or number of chromosomes. The duplication of whole sets of chromosome research questions is called polyploidy, which occurs when the frequency of ma-yor in plants. Unique genetic mutations 11. What is natural selection? Which conditions are rarely seen. Most genetic ren mutations for natural selection occurTare neutral and support genetic variability in po-bo-lation. 12. David Reznick, an ecologist at the University of California, Riverside, studied the natural selection process in evolution (2,5) guppy (small freshwater fish) on the island of Trinidad. Resnick found that the population resulting from natural selection is an evolution that inhabited at lower altitudes facing attackmodification in gene frequencies during predatory fish, while those that were there at the time. Natural selection speciation is a taban type at high altitudes enjoy peaceful life The species formation process requires changes because few predators are able to swim gene frequencies of the population that lead against the current and pass waterfalls. The average size of the deal is reproductive isolation: the development of characteristics of individuals who inhabit high altitudes is that they interrupt the genetic exchange with a population larger than that of guppys the population is smaller than the al-parents. Turas. Resnick suggested that the smallest number of people in populations minorswww.FreeLibros.org-Chapter2 AdaptationYevolution 41altures was the result of older people ca, whether this new result changes the answer as to whether both are more likely to be attacked by forerunners - populations should be classified as separate species?dors. Indeed, this pressure made a choice of 16. Point out the differences between genotype and phenotype that favored the smallest people in the population-What is phenotype plasticity? In order to demonstrate this hypothesis, Resnick 17. What is a genetic pool? What is the difference between the concepts of higher (unemployed) species, where the fact is morphological and biological? Pointing to a set of predator attack conditions is not a factor. After applying the definition, but not years of exposure to these conditions, indivi-other, duets of this population were more than 19. What is vision formation? What are the differences between the loss of lower populations. Is the study of models of simpatrick and all-patriotic species. Resnick is an example of natural selection? (i.e. 10. What is the difference between the evolution of natural selection? If so, what type of choice does it represent (directed, additional stabilizing or destructive bibliography)? Make some alternative hypotheses to explain why the average size of individuals was changed during Desmond, A. and J. Moore. 1991. Darwin: the life of tormen- time as a result of the transition of the population to the ted evolutionist. New York: W. W. Norton. high-altitude conditions. The work of two historians, this book resembles one13. If the following assumptions have been accepted: (1) the gene of the anthology, since it provides an introduction to blue eyes is recessive and (2) brown eyes gene domi-man and his work. what conclusion can be drawn against Gould, SJ 1992. Since then Darwin: Reflections in the natural color of the eyes of father and mother, if the girl was born with a story. New York: W. W. Norton. Eyes What can be said about the genotypes of the collection of essays Gould, written for magazines (eye color) of parents and girls, respectively - scientific. The first in a series of entertaining works of the mind? in a humorous way. Vid. other collections, including the panda thumb, the smile of a flamingo and a dinosaur in a14. What are the two main sources of variation in hay gene-stack. in the sex breeding population? Gould, SJ 2002. The structure of evolutionary theory. Cambridge, Massachusetts: Belknap Press Harvard University Press.15. An ecologist who studies the diversity of species from Gould's latest book, the best and most respected lizards on a small island west of the African coast, is aware of evolution. Although he identified a kind of lizard that resembled one job is more technical than the other, Chapter 1 provides a gift on the African continent. An excellent summary of the current theo-go thinking can only point to the difference between the evolutionary populations of ria. islands and the mainland. The men of Grant's population.. R., and B.R. Grant. 2000. The non-venish fitness-varia-continental is a red head and body tion in two populations of Darwin's finches. Proceedings are bright green, while the men of the Royal Society of London series B 267:131-8. The island's population has the same bright green body, an excellent source of additional information for, but with a dark green head. Females who want to know more about the sample selection of both populations seem identical because they are natural in the Darwinian finch environment of section 2.1. bright green in all its fullness. In the Mayr series, E. 2001. What is evolution. New York: Major Books. Experiments, the ecologist found that the females excellent guide to the themes of the national selection of the continental population do not recognize the male ral and evolution, developed by a prominent figure in the island population as potential companions (not re-enacted. , D. N., F. H. Shaw, F. H. Rodd and R.G. Shaw 1997. Team. Given this information, is this possible with - Assessing the rate of evolution in natural cluir populations that the populations of the island and the continent are different species? The ecologist then proceeded with the study by changing the guppies (Poecilia reticulata). Science men's physics. The head was painted in red Color Experiment superbly designed to assess male island populations and the dark green role of natural selection in the evolution of male characters of the continental population. When they were theristic about life cycles, they repeated experiments, the women of the island population learned continental men and weiner, J. 1994. The beak of the finch: The history of evolution paired with them, and vice versa. Assuming you're de-our time. New York: Alfred A. Knopf. Pulitzer Prize winner. Gives the reader the decendence of this mating survivors and playing first hand on research on action.www.FreeLibros.org-42 The first part of IntroductionyantecedenteswwwFreeLibros.orgSegunda part of Physical Environment Chapter 3 Climate P. 46 Chapter 4 Water Environment P. 68 Chapter 5 Ground Environment P. 87In January 2004, two small robotic vehicles When we think of penguins, comes to us called Marine Exploration R'veres Mars (MERs , the sea is a sight of the icy landscape of Antarctica. But the Islands of Uncharted Rovers) descended on Mars. Its Galapagos mission, which extends over Ecuador, is Elera to explore the surface in search of evidence that the confirmation habitat is the smallest species of penguin: the maran that was once life. Vehicles not Spheniscus mendiculus, or Galapagos penguin, were looking for living organisms or fossils on scattered rocks- They are only 40 to 45 centimeters tall and weigh between 2 on the surface. His task was to determine the history and 2.5 kilograms. They are only on the Water Islands on this planet. Although there are currently no Galapagos Islands, and they are those who live in the north of all the water in a liquid state on the surface of Mars, there may be species of penguins, footprints that have been some active-Penguins Galapagos forage major aquatic in the past in rocks, minerals and palment small fish such as salmonella and geological-shaped planet, especially sardines, and dependent on ocean currents that are the ones that can only form in the presence of water. of the coldest waters in the south that these people carry, why look for water as proof of life? Because the fish is on your land. Darwin himself has warned of the importation of life, as we understand it is impossible without con-cia currents heading north of the Eldes, which allow the existence of water in the South Pacific state into the environment of the Galapagos Islands: liquid. So the history of water on Mars is, given that these islands are located jus-fundamental value in determining whether in Ecuador, we will note that the Disamart climate was once conducive to life. Mission much to be warm in extremes; The main reason for the IER was not to seek direct proof of life, but to be exceptionally low temperatures that would provide us with information about habitability-around and that reach there because of the greatness of the environment. polar currents of the south. (Beagle's Journey). However, the study of the physical environment is the main goal, the prevailing winds that carry free-pal water disciplines such as geology, meteorology and ace on these tropical islands are not always foreseeable.hydrology, it is this concept of habitability, the quality of discipline of ecology. For the Galapagos Islands tempered. Warm aquatic water is linked to ecology and the study of the result in a dramatic decline in the physical population-environment, we will move away from the surface of Mars and the fish cats on which penguins depend. Estenos we enter a small chain of islands cos-event caused about 20 years ago by the western grant of South America that so affected the feather-lack of food. At that time, more refrain from the young Charles Darwin: the Galapagos Islands. 70 percent of Galapagos penguins. Sinceww44 w.FreeLibros.orgentonces its number is growing, and the current-air surrounding them: an important feature in this regard is the estimated population of 800 tropical surrounding pairs (see chapter 7). Secondly, for the dif-selectors. Fishermen in the region have recorded most of the other penguins, their fingers dating back to the 16th century, periods of warm waters such as the Galapagos Islands do not have a mating period that occurred 20 years ago, and those times of heavy esque determined and can have up to three nidadassity of food undoubtedly affected the population per year. It is an adaptation that allows them to confront penguins, since their ancestors first reached this variable and unstable food source, leaving the island. changes in wind and ocean current structures. Understanding even for this small description, it becomes obvious these characteristics require an understanding of me-te that understanding the ecology of penguins physical dio, which influenced these species during the Galapagos Islands largely depends on evolutionary understanding, through the process the natural, prepension of the physical environment of these islands, specific habitat characteristics, which affect short-term habitability, changes from one year to the next in the fears of the penguin population. The water ecologists and currents surrounding the islands are crucial to understanding the population dynamics that surround them on two very different time scales. It's a species. Newspapers have been increasing and decreasing over several generations, the physical environment suppresses-in the population of Galapagos penguins is a force that directs the process of natural selection and direct response to the availability of resources, which favors some individuals with certain food-characters.ticas over others (see chapter 2). Over a shorter period, the physical environment affects both the performance in the chapters that make up the second part, the physiological individuals and the presence we will observe these characteristics of the physical environment of the main resources, and both factors have direct terrestrial effects that directly affect their habitability. An example of Nantes penguins that characterize our planet: The Earth and the Galapagos Islands mentioned above can be used for water. Let's start with the study of the Earth's climate (Ca-illustrate both time scales. 3); a wide range of temperate models, winds, precipitation, seasonality and currents At the evolutionary stage, the physical environment of the Ocean Islands. We will focus our attention on the characteristics of the Galapagos influenced by the characteristics and dominant physical methods of the aquatic environment (Capita-porting penguin locations through pro-lo 4) and terrestrial (Chapter 5). These chapters will lay the groundwork for natural selection. First, the small baseline size of our study in the third part of the body adapah (this is the smallest of all types of tations of plants and animals in these environments) allows them to more easily dissipate the heat of physics.www.FreeLibros.or45 gCap'tlo 1 Earth intercepts solar radiation3.2 Intercepted solar radiation varies depending on station3.3 Air temperature decreases with altitude3.4 Air masses circulating globally3.5 Solar energy, Wind and rotation of the Earth create ocean currents3.6 Temperature affects the humidity content of air3.7 Precipitation has a characteristic global picture3.8 Topography affects local models and rainfall3.9 Irregular climate change occur at the regional level3.10 Most organisms inhabit microclimatesHn it determines that a specific geographic region is a tropical forest, grassy lla-noura or arid landscape of sand dunes? The aspect of the physical environment that has the greatest impact on a particular ecosystem, as it imposes most of the restrictions on elorganism, is climate. Weather is one of those terms that we usually use without much precision. In fact, many times people confuse climate with atmospheric weather. Atmospheric weather is a com-beatation of temperature, humidity, precipitation, wind, cloud cover and other atmospheric conditions that occur at certain times and places. Climate is an average model of long-term atmospheric time and can be local, regional or global. The structure of terrestrial ecosystems is in high heat and generates thermal models, which, together with the rotational part, determined by the prevailing plants, plants and the movement of the Earth, produce domi-which winds, in turn, are a reflection of the physical conditions of the Nantes and ocean currents. These dominant deambient movements, particularly climate (see air and water, in turn, affect Chapter 23 time models). Geographical variations in climate, mainly atmospheric land, including temperature and precipitation distribution, containment of civilization, undermine the large-scale distribution of vegetation and, by and large, the nature of terrestrial ecosystems solar radiation, electromagnetic energy, which (Figure 3.1). In this chapter, we learn how the Sun radiates, travels almost unhindered through the climate, determine the presence of heat and water in the cosmic vacuum until it reaches the Earth's atmosphere. The Earth's surface and influence the amount of energy scientists have conceptualized solar radiation as co-solar that plants can use. photons, or energy packets, which, according to one of the great paradoxes of science, behave interchangeably like waves or as particles, depending on how they are observed. Scientists describe this energy at 3.1 The Earth intercepts solar radiation in terms of its wavelength, or physical distance between successive ridges, and the frequency (□) or the number the Earth's atmosphere intercepts solar radiation at its peaks passing per second through the dot-defined-outer part. The resulting molecular interaction creates c. All objects emit radiant energy (see Cuan-ww46 w.FreeLibros.orgBosque Forest Ra Lastizales Figure 3.1 Gradients of Dry Vegetation American oaks from east to west and from south to northern oak. (a) The gradient from the eastern to the western forest Mixed forest tundra forest reflects a decrease in tropical deciduous subtropical climatic conditions of annual precipitation (non-temperate climate extends beyond the Rocky Temperate Mountains (b). Note that both the decrease in temperature and the amount of precipitation reduces the size of the vegetation. Cm. Chapter 23 for a more detailed discussion of the characteristics and distribution of terrestrial ecosystems that purify ecology 3.1: Transmission of energy through solar radiation (short wave) only during the day, buttva radiation), which usually crosses wide constantly emits longwave radiation, like the wavelength of the du-spectrum. The exact nature of frog day is like at night. In addition, the atmosphere emitted, however, depends on the temperature that covers it allows only a small part of the object (Figure 3.2). The hotter the object, the more energy (6 units) it is transferred to space. The energy may-more has the photon that it emits, and the shorter the estuation (111 units) is absorbed by water vapor and wavelength CO2. Very hot surface, like the atmosphere and clouds. Most of this energy (96Sol,5,800 oC), mainly emits units of wave radiation) emits back to Earth and produces short-wheeled cream. On the contrary, colder objects such as the super-greenhouse effect (see chapter 29), the fundamental earth (with an average temperature of 15 oC) to maintain the heat of the Earth's surface. As they fear longer wavelengths of radiation, or as a result, the Earth's surface gets almost double the long wave of deradia. long-wave radiation from the atmosphere that radiation from solar radiation reaches the top of the sun's short wave. In all these exchanges, the Earth's energy atmosphere, only 51 percent goes as far as the loss on the Earth's surface (30 units and 117 combined Earth's surface. Taking the amount of solar radiation received (51 units and 96 units x 147 units) reaches the atmosphere in an average of 100 units, clouds and (see figure 3.3). Tie's radiation economy reflects and dissipates 26 units, and the surface is in balance. Earth's Cie reflects another 4 units, giving a total of electromagnetic radiation emitted by units of the Sun recu-30 back into space (Figu-bre a wide range of wavelengths. Total range 3.3). The atmosphere and clouds, together, are absorbed from solar radiation reaching the Earth's atmosphere, lon-yet 19 units (giving a total of 49 units), and wave glida of about 400 to 700 nm (one on-left 51 units of direct and indirect-no-meter solar radiation is one millionth of a meter) is a ket that will be absorbed by the Earth's surface. visible light (Figure 3.4). Taken together, these are of 51 units that reach the surface, 23 used wavelengths known as photointti-lysan radiation in evaporation water and another 7 heat hot air (PAR) because they include deadyacent lengths to the surface, bringing 21 units to the wave that plants use as an energy source in the form of continental masses and oceans. Masses with the process of photosynthesis (see chapter 6). Lon-tinentals and oceans, in turn, emit radiation wavelengths shorter than the range of visible light on the atmosphere in the form of longwave radiation (termi-have ultraviolet (UV) light. The amount of long-wave radiation emitted by purple: UV-A, with wavelengths from 315 nm to 380o of the Earth's surface exceeds 21 units of nm radiation and UV-B, with wavelengths from 280 to 315 nm. Absorbed azure. radiation with wavelengths longer than the range of lightIn reality, in total, about 117 units are emitted. visible infrared. Nearby infrared includes longitu-How is this possible? This is because the surface receives a wave des about 740 to 4000 nm, And Infra-www.FreeLibros.org-Chapter3 Climate 47Landra (15oC) 110 30 90 20 50 30 10 0.1 0.5 1.1 0 1.1 0 5 2.0 00 10 30 50 or mm) Intensity of radiation wavelength (mm) Length (millions Joules m2/s) Wavelength intensity (millions Joules m2/s) Figure 3.2 wavelength, the object emitted is a function of its temperature. The sun, with an average temperature of 5800oC on its surface, emits relatively short wave radiation compared to the ground, which has an average temperature of 15oC on its surface, and emits relatively long wave radiation. When comparing these two graphs, pay attention to the difference in scale (1 J/s x 1 W). Radiation figure 3.3 Distribution of solar energy reaching the Earth's atmosphere. Solar inputs entering space include solar radiation (wave 100 returns to short space) and long-wave radiation emitted 30 6 to Earth as an effect function (reflected and scattered greenhouse. Teh include thermal clouds, the atmosphere 117 Effect1i1n1 landfill from the evaporation of the surface and the Earth's surface) emitted and longwave thermal and energy that the Earth's surface emits from the Earth's surface. 30Absorbed evaporation Tea and atmosphere 23 51 96 Emitted back to the Surface of the Earth Exits - 30 units and 117 units - 147 unitswww.FreeLibros.org-48 Secondpart Physical Environment Thermal Radiation Figure 3.4 A piece of infrared remote electromagnetic spectrum, divided into thermal and solar radiation. Ultraviolet, visible and infrared light waves represent only a small part of the spectrum. To the left of ultraviolet radiation are X-rays and gamma rays (not shown). (Hulverson and Smith's 1979 adaptation.) nfrarroja close100 280 00 5,000 10,000 100,000 wavelength (nm) far red or thermal radiation includes wavelengths, pendicular to the ecliptic, but is prone to about 4000 to 100,000 nm. Corner 23.5o (Figure 3.6). This slope is responsible for seasonal temperature fluctuations and the length of the day. In Ecuador alone, there are exactly 123.2 intercepted solar radiation changing the clocks of light and darkness every day of the year. According to the stations of the vernal equinox (approximately March 21) and the autumn equinox (approximately 22 septiem-Number of solar energy intercepted in any pun), solar radiation directly affects the Ecua-to the Earth's surface varies markedly depending on the dora (Figure 3.6b). At that time the equatorial region (Figure 3.5). There are two factors that affect this has stronger heat and at all points tie-variations. First, the higher the latitude, the emitter occurs the same 12 hours in the day and night, affects the surface at a more pronounced angle - in the summer solstice (June 22) in the hemisphere, and sunlight dissipates in a wider area. In the north, the sun's rays have a direct effect on the co-second, radiation entering the atmosphere with peak cancer (23.5o north latitude) (Figure 3.6a). This is the more sloping angle you have to travel through a layer of time in which the days are longer in the hemisphere thicker. In the process, it finds more par-North, and the sun heats the surface more intensely. Porticles are in the atmosphere that reflect it in a larger space. Although changes in solar radiation reaching the Earth's surface at different latitudes may reduce the temperature gradient from the ecuador to the poles, it does not explain the systematic change in the tropics, one year. What makes Mance change seasons on Earth? Why do warm 23.5-year-old latitude days give way to changing autumn colors, icy waves and the snowy landscape of Winter Norte becoming a green mantle with the arrival of spring? The explanation is quite simple. That's because EcuadorTierra is wrong, and prone to repeal. Earth, like all planets, is subject to two different Advents of Capricorn Polo. Describing its orbit around 23.5o the latitude of the Sun, it rotates on an axis that crosses the Nor-Te and the South Poles, and leads to the luminosity of the day followed by the Suroscurity of the Night (day cycle). The Earth revolves around Figure 3.5 solar radiation emitted by the Earth in the Solar in the so-called ecliptic plane (high latitude reaches at a sloping angle and dissipates over a flat area through which all planets pass except the broad one. Coincidentally, the Earth's axis of rotation is not vertically within Ecuador.www.FreeLibros.org-Chapter3 Climate 49Th elevation of 3.1 Transmission of energy through radiation There are three mechanisms from which energy is calculated higher, for the maximum amount of radiation that any super-transmission between objects. Driving is transfe- ficie can radiate for a certain temperature. Energy (heat) through the movements of the surface emits this maximum amount of radiation, the selecular. For this form of transmission to occur, it is known as the black body. Most superfi-two objects must be in direct physical contact. Con-cies are not black bodies and emit only part of the laduction explains the transmission of energy through the amount of thermal radiation that the black body emits solid. Transferring energy through movement. This faction is known as emission (e). Mass loss of fluid, whether gas or liquid, is called convek- emission values vary from 0 to 10. If super-tion. The third form of ficie energy transmission emits only half of the body's radiation of non-radiation, or the transmission of energy through gro rays is said to have a 0.5 emission. If it emits 1/10 of the electromagnety. The most reflective objects have cer- Transfer of energy through elec-gray radiation to zero, opaque or black objects have the value of the magnetic Sun (solar radiation) is the one that provides close to one. The behavior of the Sun and the Earth that controls the Earth's climate system. Not close to black bodies. If we take in the conside-embargo, all objects that have a temperature ration of the concept of emission, we can apply the equation more to absolute zero (0 K) emit the previous electromagnetic radiation to apply it to all objects: notics, where the energy is carried by light photon in the infrared and visible parts of the electromagnetic spectrum -e-T4tico (see Figure 3.3). The transmission of radiant heat from the conductive and convection is that no objects usually emit radiation in several medium-sized areas, with energy emitted in the form of photon wavelengths (see figure 3.2); however, they will have to travel at the speed of light. It is the radiant wavelength energy in which the object emits the majority that heats our faces to the Sun, and it is the apparent heat that begins. The dominant wavelength, indicated by the tr-feeling when approaching the fire. Mino 'mex, is a function of temperature in which the wavelength increases when the temperature reduces the amount of radiant energy emitted from which- (see Figure 3.2). The dominant wavelength of any object around it is a function of its tempera object can be determined by the Law of Wein:tura and is described by the following equation: 'Max' 2,897 Heat emitted in units of temperature of the Watt object (W) at m2 in high degrees Kelvin T, is the temperature of the object in degrees Kelvin (K x C 273.15). This formula can be used to calculate the power difference in second to fourth in the dominant wavelengths emitted by the Sun and Earth in figure 3.2. • – 1. The emission value for the human body is e x 0.7. Calculate the transmission of radiant energy (5.67 × 10-8 22) into the air around you (per square meter of surface area) and suppose that temperature, for example, we can use this formula for a 98.6 F calcing-body, or 310 K.lar radiant energy per square meter emitted by elSol (average temperature of 6000 K): 2. What is the dominant wavelength of electromagnetic radiation emitted by the human body? Use 5.67 × 10-8 (W/m2 and K4) × 60004 (K) Figure 3.4, identify the type of radiation (infrared - s 7.3 × 107 (W/m2) ha far, near infrared, visible, etc.). Note that the scale in figure 3.4 is in nanometers (nm), not least after the units for the previous calculation are in micrometers. To make these units comparable, you must first perform the conversion (nm'm × 1000).www.FreeLibros.org-50 SecondPart Physical EnvironmentSamy radiation drops solar radiation daily, latitude and seasonal temperatures do not explain why the air cools with an increase in altitude. The tropic of cancer, the entrance and duration of Mount Kilimanjaro, for example, stands on the warm plain of the southern hemisphere of tropical East Africa, but its summiting duration of day is covered with ice and snow. The explanation of this installation in the Northern Hemisphere Solar radiation falls you the rarity of snow in the tropics lies in the physical properties of the air. The weight of all the air molecules surrounding the Earth reaches an amazing figure of 5.6 billion tons. The weight of the air acts as a force on the Earth's surface, and the amount of force exerted on a given area of the surface is indicated by atmospheric pressure or air pressure. Imagine the Lightning vertical column of air. Pressure at any point in the column can be measured in terms of the total mass (a) b) of the Sun (c) air above this point. As the rise and fall, the air mass decreases, and so the pressure from the summer solstice to the Winter Solstice on June 22, December 22Figures 3.6 The corner of the sun and the light circle in the descents. Although atmospheric pressure decreases deequinoccios and in the winter and summer solstice. the rate of decline slows with an increase in height (Figure 3.9). Since the air pressure on the Earth's surface is higher, on the contrary, the southern hemisphere at this time passes through the density of air (the number of molecules per unit of life. As for the Tropic of Capricorn (23.5o south latitude) (Figo-that altitude increases as much as 3.6c). During this summer period in the southern hemisphere, air injuries as density decreases. Despite the fact that in the Northern Hemisphere days are more than 50 km high, the air pressure is only 0.1 porto and the coldest temperatures. Thus, the solstice of a hundred registered at sea level, the atmosphere continues in summer in the Northern Hemisphere corresponds to the solstice extending upwards by many hundreds of kilo-winters in the southern hemisphere. and gradually becomes thinner until the seasonality of solar radiation, temperature and fusion with exterior.la during the day increases with latitude. In Although the air pressure and density dis-circle of the Arctic and Antarctic (66.5o latitude of the North and Minuyen With altitude above the level, respectively), the length of day varies between 0 sea, the air temperature has a little more profile and 24 hours throughout the year. Days are complicated. The air temperature is usually dismi-tan until the winter solstice, a day of continuous clouds from the Earth's surface to the height of darkness. Days lengthen in spring, and in the sun - about 11 km. The speed at which summer latition decreases, the sun never sets. The altitude temperature, called the adiab-figure 3.7 gradient, shows how annual, seasonal and daily solar radiation varies across the Earth. Although, in theory, every drop in air temperature as it rises from Earth receives the same amount of daylight that we we burn from the Earth's surface, caused throughout the year, at high latitudes, where there are two factors. Given the high density of air on the surface, the sun never gives a complete, solar radiation input is its molecules collide, which generates heat. The smallest decline. This model of the variant of radiation exposure in air density at the longest distance from Earth controls the average annual temperature of the balloon (Figo- produces fewer collisions, and thus, 3.8 will be generated). Like annual solar radiation, the temperature is less than the heat. However, the main reason why the annual average is higher in tropical regions and the air temperature drops as the altitude rises as we head towards the poles. correspondingly reducing the heat effect of the Earth's surface. The absorption of solar radiation brings heat to the Earth's surface. Energy3.3 Air temperature is reduced (longwave radiation) emitted upwards from the surface height, which heats the air found by Enzi-ma. This transmission process continues upwards aOn so much that the degree and duration of exposure as heat flows spontaneously from solar radiation can explain many changes in the hottest areas to the coldest, but at a rate of thatwww.FreeLibros.org-Chapter3 Climate 51Regional moderate high latitude on June 22. June 22, December 22. June 22, December 22. 22Радиаксьон Радиасьон Радиасьон Радиасьон Хора Радиасьон Хора Радиасьон Гора Радиасьон Гора солнечная солнечная солнечная солнечная солнечная солнечная солнечная батарея (c) Хора Хора Радиасьон солнечная W/m2 Радиасьон солнечная W/m2 Радиасьон солнечный W/m2 ED ED Mes Mes Mes (b) 80 100 80 80 120 120 140 100 140 200 160 160 240 260 200 180 240 220 240 280 240 180 200 220220 220 220 180 200 240 240 x200 220 240 180 180 200 160 200 140 180 140 120 120 120 100 (a)Figura 3.7 Вариации solar radiation on Earth. Global solar radiation. (b) Solar radiation fluctuations during the year at three points: temperate region, tropical region and high latitude region. (c) Daily fluctuations of solar radiation for two days a year: summer solstice and winter solstice. (Adapted from Barry Chorley, 1992.) decreases constantly, as the energy emitted by these four areas of the atmosphere is called a trail-from the surface dissipates. pause, stratopause and mesopause, respectively. The difference in pressure and air density is the most important topics-regions in terms of climate, and therefore the air temperature does not decrease continuously both for life on Earth troposphere and how altitude increases from the Earth's surface. From the stratosphere made in some parts of the atmosphere, there is a change from so far, it is assumed that the change in the temperature of the theme can lead to a sharp change in air temperature depending on the increase in the height of the burrow. Scientists studying the atmosphere are used to imply vertical movement of air from the surface at these altitudes, in which the temperature changes to the upper limit of the atmosphere. However, the atmosphere is sharply different from when the volume of air on the surface is heated (Figure 3.10). Starting with the surface begins to float and rise (just as the Earth remains, regions are called tropospheres, but the balloon does). While the volume of the ertosphere, mesosphere and thermosphere. Restrictive zones (called an air bag) are being lifted, decrease in lawww.FreeLibros.org-52 Second instalment of physical environment-29-34th -29th -23rd -29th -34th -34th -12th --12-12-12--12-12-29-23rd -40-18th -7 -51 -23-12th -1st - 4th -12th -10th -7th 4th 16th 4th 10th 21st 16th 16th 27th 21st 21st 27th 27th 27th 32nd 21st 21st 21st 10th 16th 16th 10th 10th Izotherms (equal temperature lines) January Around the Earth 4th 4-4 -10-10-21-16-10-32-21-16-16-21-21-21-27-27-27-21-21-21- 16-16-10-16-10-4-10-4o (b) Isotherms (equal temperature lines) around EarthFigures 3.8 Average change in global annual temperatures depending on latitude and season. (a) Average sea temperature (C) in January. (b) Average sea level temperature (C) in July. Notice the lowest winter temperatures in the Northern Hemisphere (January), the highest temperatures during summer in the southern hemisphere, and the change in temperature patterns with the transition to summer in the Northern Hemisphere and winter in the southern hemisphere (July). Pressure expand and cool down. Dante reduction is called adiabatic cooling. The air temperature by expansion occurs, in contrast in the air conditioning apparatus, where the liquid caused by the loss of heat in the atmosphere of the heat cool compresses. As elwww.FreeLibros.org-Chapter3 Climate 53500 Adiabamatic cooling rate depends on humidity. The Adia-height (km) 400 batico cooling dry air is about 10 oC at 300 1000 m height. Wet air cools more slowly (6 oC every 1000 m). The rate of change is tempera- The density of air tours with height is called an adiabatic gradient. 200 3.4 Air masses circulating 100 High global air pressure Air mantle, the surround planet (atmosphere) is not static. It is in a state of constant motion, which occurs in the masses of air that rise and descend low and in the rotational motion of the Earth on its axis. The Equatorial Region receives the highest intakeFigur 3.9 Both air pressure and annual air density of solar radiation. Hot air rises because they are aligned as the altitude increases above less dense than the cold air above it. Heated air in the equatorial region rises to sea level. the atmosphere limit, which establishes a low pressure zone on the surface (Figure 3.11). Because the air height of TERMOSFERA is 1000 longer, the air mass is forced to extend by 500 towards the North Pole and the South Pole. As these air masses move towards the poles, they cool, become heavier and descend. When this happens, the air pressure increases on the surface (mesopause area 100 high pressure). This cold, heavy air then moves MESOSFERA 50 towards Ecuador, replacing the hot air that rises in the tropics. Stratopause If the Earth were also not had irregular continental masses, the atmosphere would circulate as the stratosphere 20 Height (km) Tropopausa 10 Air cools and descends to the surface, where it moves to Ecuador TROPOSFERA 5 2 60o 30o 1 '100'50 0 50 100 0' Ecuador Temperature (C) 30o Hot Air in TheFigure 3.10 Atmospheric temperature changes (average 60o surface Ecuadorglobal) with altitude. Regions of ascents and movements towards the Northatmosphere are marked, and Mount Everest (summit and high Earth Surma) is attracted to facilitate the prospect. (Adapted from Graedel and Crutzen, 1995.) Figure 3.11 Air Cell Circulation and prevailing winds in imaginary and fixed planet Earth. The heated liquid air runs from compressor to coils, and in Ecuador it rises and moves north and south. Half-empty pressure causes it to expand and cool. cools down at the poles, descends and returns to Ecuador.www.FreeLibros.org-54 SecondsignOphysical Environmentobserva in figure 3.11. The earth, however, includes a rotation in favor of the Fuertz needle axis ori isu from west to east. Although each jet point in the Northern Hemisphere is 100% and or desecrates the Earth performs a full turn every 24 hours, the speed of rotation varies depending on the latitude (and with a circumference- N 86.7%rencia). At one point in Ecuador (circumference plus 60o Ngrande, 40.176 km), the speed of rotation is 1674 50%km/h. By contrast, at 60o north or south, the circumference of 30o Nrencia Earth is about half the airport (20,130 km) and the rotation speed is 839 0 with 0%km/h. According to the law of angular motion, the pulse of an object moving from a larger circumference of 30o S 50% to a smaller circle will deviate in the direction of rotation, and an object moving from the circumference of 60o S 86.7% less than the larger one will deviate in the opposite direction from rotation. As a result, the air masses and all Sen objects moving in the Northern Hemisphere are deflected 100% to the right (in favor of clockwise), while in the southern hemisphere the counterclockwise rotation will deviate to the left (counterclockwise). This deviation in the structure of airflow is located in the hemisphere Surdenomine effect of Coriolis, whose name is associated with the French mathematica, which lived in the nineteenth century, G.K. Coriolis, who drawing 3.12 result of the Coriolis effect in his direction became the first to analyze this phenomenon. (Figure

3.12). Wind. There is no such effect in Ecuador, where the linear speed is the highest, 465 m/s (1040 mph). Any object as a result of the deviation of air masses, Ecuador moves at the same speed. The increased Coriolis Coriolis effect prevents direct and simple flow from the perpetual poles. If the object, including massEqueador to the poles. Instead, it creates a series of air brakes, moving north from Ecuador at the rate of dominant winds, which are named after the direction from which they come. These fronts slowly break down (403 m/s at a latitude of 30o, 233 m/s with a simple latitude of surface are 60o, and 0 m/s on the poles. and creates a series of six cells, an object that is dehydrating right or east in the Northern Hemisphere, harder and lower are carbonated and downward masses and the spaces to the poles. If the air heats up the equatorial region of the Earth, which receives the largest annual ranti-cion of solar radiation. Polar Cell Figure 3.13 Circulation of fronts and aerial elements around the Earth Winds p to Ferrell in rotation. This circulation produces trade winds, western and eastern. The westerly winds of Hadley Cell Equatorial Depression Northeast trade winds rent suptropical and high pressure south-windsWww.FreeLibros.org polar winds3 Climate 55 equatorial injury. This airflow with a significant lift of the flow of water over the surface in the oka-dent is balanced by air flow from the north and de-nose from the ground. These are systematic patterns of movement from the south to the equator. Because the water mass is called currents. In fact, the heat rises, begins to spread, separates into two most important currents of the oceans generallyNorte and south, to the poles, and reduces its tempe-mimics the movement of wind currents that seratura. In the Northern Hemisphere, under the influence of Coriolis, he finds on them until they intersect with some con-air pushed east, which reduces the speed of their advance north. In about 30 years north, The air, which is now cold, descends, and closes each ocean dominated by two important movements-the first of three cells, Hadley cells, which are circular water cops, called ocean chains, named after the Englishman George Hadley, who was in every chain, the ocean current moves in favor of the depressing that made the description of this pattern of surface winds in the sense of 1745. The air descending forms the first clockwise in the southern hemisphere (Figo high pressure semi-permanent on the surface and circles ra 3.14). Earth: High-pressure subtropical belt. After de-kender, the cold air is heated and divided into two currents along the equator, with trade winds pushing the flowing air above the surface. One moves to the pole of warm surface waters to the west. When you're on the side and it's distracted to the left Corio reservoirs meet the eastern suburbs, and it becomes the dominant winds of the West continents are divided into streams that go north and south across the ocean, forming a circus-mean meanwhile, another current is moving towards the ocean outlets of north and south. As in the south, to the equator, and veers to the right. They con-currents depart from the equator, they cool. Finally, it becomes a strong and reliable trade winds, called to collide with the winds of the West at higher latitudes thus trading sailors of the seventeenth century (30-60o N and 30-60o S), which produces currents that dry them to reach the American continent to move east. When these currents meet with Europe. In the Northern Hemisphere, these winds are known on the western edge of the continents, for-cen as the northern trades. In the southern hemisphere, in the cold currents that flow along the coast, where such currents exist, these winds are known to Ecuador. Passing the Antarctic continent to the north, dine like a southern trades. ocean currents are circulating, free of obstacles, all over the world. As moderate air from the westerly winds move to the pole, it meets the cold air moving down from the pole (approximately 3.6 Temperature affects 60o N). These two air masses of different temperatures con- in moisture content in the airante do not mix easily. They are known by the boundary, called the Polar Front, an area of air temperature, playing a crucial role in interpolar pressure (subpolar depression), where the superfi-change of water between the atmosphere and the Earth's surface. Part of this air is thus directed to the north and the other is a south-to-the-ground of poor time, the air cools from the surface to the north. This is water matter, including water, changes from one thing it moves southwards toward an area of calm state to another, absorbs or releases energy. The amount of ener-subtropical, where it descends to the surface and closes the gia released or absorbed (by gram) during the change of the second of three cells, the Ferrel cell, whose name is the latent heat or what is known as hidden heat (from Latin Latens, comes from the American meteorologist William Ferrell. On the way from a more orderly (liquid) state to a less orderly (gas) state, it is absorbed as the air moving up from the surface and closes the energy. While the transition from sub-zero to the surface slowly descends and flows re-ordered to a more orderly one, the energy is released. Lamented south, to the pole, sub-polar front, and completed the last transformation of water from liquid state to all three cells: the polar cell. This gas-heavy air is called evaporation, and requires 2260 jou-south diverted to the right by the coriolis effect, les (J) energy per gram of liquid water, generating the polar winds of the East. There is a sy-stream converted into water vapor (1 J/s x 1 W). Conversion-lahr in the southern hemisphere (see figure 3.13). Water vapor in a liquid state is called con-3.5 solar energy, the sensation of wind, and releases an equivalent amount of energy, and the rotation of the Earth creates When the air comes into contact with water in a lye-oceanic state, the free exchange of water molecules occurs between the air and the surface of the water. When the rate of evaporation - The overall picture of the prevailing winds plays a role equal to the rate of condensation, he said that sefundmental air in identifying the most saturated patterns.www.FreeLibros.org.56 Secondpart Physical Environment75 75 60Laistia 60 4 5 45 30 30 30 15 Ecuador 0 15 15 30 30 45 45 60 60Figure 3.14 Ocean Currents of the World. Notice how circulation depends on the strength of the Coriolis effect (clockwise movement in the Northern Hemisphere and counterclockwise movement in the southern hemisphere) and continental masses and how the oceans are bound by currents. Dotted arrows represent cold water, and continuous arrows represent moderate water. In the air, water vapor acts as an inde-ice gas in the air becoming too heavy for weighing and pressure. The amount of the suspension will be precipitation. For conteni-pressure, which exerts water vapor regardless of given water pressure in the part of air (steam pressure), dry air pressure is called vapor pressure. The temperature pressure at which steam pressure is produced is usually determined in mega-pastoral units (MPa). The content of water vapor in the air in Humidity - the current PV × the 100th saturation point called steam pressure to the relative saturation of PV Pressure to saturation, also co-nocida as the capacity of water vapor air, can not- Pressure vapor H2O (MPa) to be exceeded. If the vapor pressure exceeds capacity, saturation occurs, in order to reduce the pressure of steam to steam pressure. Steam pressure before saturation varies from saturation to saturation, increasing as normal air temperature increases (Figure 3.15). Hot air has a higher water vapor ca-pacity than cold air. Normal Pressure Couple La water in a certain amount of absolute humidity. The most fami- Temperature Deliar temperature measuring the shape of relative humidity, or the amount of water vapor in normal air is expressed as a percentage of the saturation of the dew pressure of steam. At the vapor pressure point before saturation, the temperature (C) relative humidity is 100 percent. If the air cools figure 3.15 Steam pressure to saturation as functionwhile the amount of moisture it contains (air temperature pressure (steam pressure to saturationwater vapors) remains constant, then humidity increases with air temperature). For temperature increase arelative as the value of pre-given decreases, relative humidity is the reason between steam evaporation pressure to saturation. If the air is cooled to a normal point, the pressure is before saturation (current PV/PVel, that actual vapor pressure exceeds steam pressure unit saturation x 100). At this pressure of steam, azure, humidity of air will condense and form, at which the pressure of steam is obtained before saturation of clouds. At a time when water particles are called dew point temperature. (See www.ecology.place.com to review functions.) www.FreeLibros.org-Chapter3 Climate 57Saturation is called dew point temperature. A simpler profile changes the average precipitation according to The Pienso in a layer of dew or frost in a cool landed (Figure 3.17), we will be able to observe the pattern of the gene of the morning autumn. After dark, rai. Precipitation is the most abundant in the region of lower temperatures and relative humidity increases. Ecuador and reduce as we move towards theSi cold overnight temperatures reach the tempira-north or south. This decrease, however, is not a dew point, the water condenses and is formed continuous. There are two maximum points at latitudes, which reduces the amount of water in the air. When the averages, followed by the continuation of the descent to the Indo, the Sun rises, the temperature of the air and the tank poles rise. The sequence of maximum points and intermediate areas of water vapor (steam pressure to saturation) increases. Among the maximum points seen in figure 3.17Cacho result, the dew evaporates, increasing the pre-match pattern of increase and decrease in the mass of the day of steam in the air. powered by the dominant wind fronts shown in Figure 3.13. As the winds trade3.7 precipitation have a warm picture of moving over tropical oceans, acquiring characteristic moisture. Not far from Ecuador, Northeast trades meet with the trading winds of the southeast, that is lag from the concepts of temperature patterns, narrow winds of the region, where trade winds are located, ocean currents are laid, we are ready to understand the area of intertropical convergence (ICIT), characterized by a global picture of precipitation. They are not found by high precipitation levels (Figure 3.18). At a point spread evenly across the Earth (Figure 3.16). In which there are two air masses, the air cradle at first sight, it may seem that the global map of the precipita-mule, and the wet air rises and cools. How many annual ratings presented in figure 3.16 do not have C, you reach the dew point temperature, they form a tangible or regular pattern. However, if we look at the clouds and the precipitation falls in the form of rain. This picture explains the high rainfall in the Ecuadorian region Less than 25 centimeters 25 to 50 centimeters from 100 to 200 centimeters More than 200 centimeters Figure 3.16 annual rainfall worldwide. Correlate wet and dry areas with mountainous areas, ocean currents and winds.www.FreeLibros.org-58 Secondpart Physical EnvironmentCells from the ascending air mass cools the air downstream heats up. Because n pressure and causes para-to-saturation precipitation increases, it draws water from the surface, causing arid,atmospheric conditions on these fronts where the world's largest deserts have formed (see Chapter 23).80 20070 qCIT Air mass as air masses continue to move north and south, once again they remove the downward dry moisture of the surface with less, but in a lesser degree 60,150 cold surface conditions. As they move to the poles, they find masses of cold air that pray there -50 ginan (approximately 60o north and south latitude). Air surface masses converge and rise, and ma-40 100 sa ascending cools and precipitation occurs (can be seen as two maximum precipitation points-30 tions between 50o and 60o north and south at a figure 3.17). , the temperature of 20 50 cold, associated with the low saturation point of the steam function, limiting rainfall.10Precipitations per year (inches) Another picture to be corrected is the one that obser- Annual rainfall (see) shown in the figure of 3.17 of 30. Overall, rainfall is higher in the southern hemisphere, compared to the Northern Hemisphere90 60 30 0 30 60 90 (in the coverage of the maximum rainfall value associated with ICIT). That's because (south) Latitude (north) is a higher proportion of the southern hemisphere, and water more easily evades the surface of the water than from TheFigure 3.17 Change in the average annual precipitation of soil surface and vegetation. It's also mo-according to latitude. The maximum point corresponds to the masses of liv air, which receive less precipitation on the rise, for example, in the zone of internal convergence of continents, than in intertropical coastal areas, while the minimum points are associated Under precipitation gradients from the coast mass of downward dry air. to the interior of North America and Europe/Asia in Fi-gura 3.16), precipitation on Earth. Temporary changes are directly related to changes, losing most of its moisture, seasonal air masses in Earth's warming and its luminous effect continues to cool as it divides, and the movement of global pressure and mass systems heads north and south. In the areas of cal-mas subtropical (approximately 30o latitudenor and south), where cold air descends, there are two dry climatic fronts that surround the Earth (two depressions in mid-latitudes seen in figure 3.17). Northern Hemisphere Autumn and Spring Northern Hemisphere Winter Tropics Cancer Figure 3.18 Changes in the intertropical convergence zone that cause rainy and dry seasons. Note that as the distance from Ecuador increases, the dry season is longer and less precipitation. These oscillations are the result of differences in the height of the Sun between the equinoxes and solstices, as shown in Figure 3.6. Air circulation models are shown in the 3.13.www.FreeLibros.org-Chapter3 Climate 59A25 centimeters (mm) 800 Doala, 700 Cameroon 600 500 400 300 Less than 25 centimeters Niamey, 25 to 50 centimeters from 50 to 100 centimeters 200 Niger Maun, 100 Botswana 0 100 to 200 centimeters E FMAM J J A SOND More than 200 centimeters MesFigure 3.19 Seasonal precipitation fluctuations in three places in the zone of intertropical convergence. Although the site (a) shows seasonal changes, rainfall exceeds 50 mm each month. Sites (b) and (c) are located within the CMIT regions, where the season is wet (summer) and dry (winter) is well differentiated. Note that the rainy season is 6 months out of the phase of these two sites, and difference in the pace of the summer months in two hemisferios.de air. This is illustrated by the seasonal movement to part of its humidity at high altitudes on the bar-north side and south of the ICA, which follows the obvious loventto. This phenomenon is called a drop of sunlight (Figure 3.18). (Figure 3.20). As the air is now cool and dry de-hundred on the lee side warms again and La qCIT does not depend on the seasons but tends to get wet. As a result, on the windward side of the demigrat in regions of the globe that have tempera-mountain can be observed the development of a warmer surface vegetate tour. Although denser, stronger, and different species near Ecuador are always exposed to plants and animals than those that are on the warmer side of detemperature, the sun is directly leeward, where you can see some dry areas con-over geographical Ecuador only twice a year, in addition to deserts. Therefore, in The North of the Equinox of Spring and Autumn. In the solstice serum, the easterly winds blowing over the Sierra Leonean of the Northern Hemisphere, the Sun straight-Nevada and the Rocky Mountains leave moisture in the lasament above the tropics of cancer; on the winding slopes of the west side, and boasting the development of forests (which summer in the southern hemisphere), it is directly more energetic. On the contrary, the slopes of the Eastern Musa-over tropic of Capricorn. As a result, the ICIT transcribed semi-desert or desert conditions. Some efec-moves to the poles and invades the most pronounced subtropical cough heights of the same phenomenon occur by the northern enveran; in winter it moves south, Hawaii. There vegetables range from care to dry and clear time. As you migrate the leeward zone of the island to the boss-southern slopes, it brings rains in the summer. So, to measure things and humidity on the windward side (Figure 3.21).da, that CIT changes its direction from north to south, produces wet and dry seasons in the tropics (Figure 3.19).3.8 Topography affects the patterns of 3.19 Irregular and regional variations in precipitation in the climate occur at the regional level of the Model of Temporary Climate Change, which already Mountain topography affects the models of precipitous - we analyzed widely occur at regional and local intervals. Mountains intercept regular and predictable: seasonal changes in pace-air. When the mass of air reaches the temperature with the rotation of the Earth and lanja, rises, cools and is saturated with water vapor (debi-migration zone of intertropical convergence, remains at the lowest pressure of vapor saturation) and releases a large seasonality of precipitation in tropicswww.FreeLibros.org-60 SecondsignOphysicalAltitude (m) 3000 Figure 3.20 Formation of 2250 shades of rain. The air must reach the mountain by force. As the lift, the mass of 750 air cools and loses moisture 0 in the form of windward side precipitation. The air that descends, already dry, takes moisture from the leeward side, and monsoon winds in southeast Asia. Unraged - the image of white Christmas evoked by Charles Dickens, not all features of the climate system pro- and New England poets of the eighteenth and nineteenth centuries smile with such regularity. The Earth's climate system is largely a product of cold and snowy winter climbs characterized by variability of both scales of time - The Small Ice Age. But since then, the climate has been global. heated and white Christmas in these regions is anus-malia. The small ice age, a cooling-off period that lasted from about the mid-14th century to the Central region of North America, which for the mid-19th century, brought extreme winters to the Great Plains, experienced cold temperature periods in many parts of the Northern Hemisphere, and affected one, starting with the mid-Holocene period, agriculture, health, politics, economics, migracio- about 5,000 to 8,000 years ago but the settlers of dens and even art and literature. In the mid-17th century, early 20th century, best selected in the Great Glaciers of the Swiss Alps, advanced and buried the Nurs at a time when summer was a relative household and crushed entire populations. In 1780, pig-minded people wet, They assumed that the conditions in new York were frozen, allowing people to be normal, so they used to route from Manhattan to Staten Island. In fact, the agricultural techniques they used in the drawing area 3.21 rainy shade in the mountains of Maui, Hawaii. (a) The windward, eastern slopes that intercept trade winds are covered with moist forests. (b) Vegetation consisting of low shrubs on dry side.www.FreeLibros.org-Chapter3 Climate 61These and began to cultivate, but the cycle of drought has returned to the tropical Pacific Ocean (see Figure 3.13). As they reached, and the meadow became a dusty hollow. surface currents in the trail- These examples reflect variability Limes flow west (see Figure 3.14) and bring the acclimatics of the Earth, which run on cold, deep water-time scales to the surface on the coast, from which they range from a few decades to tens of thousands of Peru, a process known as nurility (see years occurring from various changes in the records in section 4.8). This pattern of exposure together with the energy on the Earth's surface. Outside the current orbit of the Earth cold water flowing from south to north along the fixed. In the tilt of the axis and in the form of its journey - the west coast of South America leads to the annual status around the Sun are changing. These ocean regions tend to be cooler than what onevariations of climate impact by changing inputs one would expect at their equatorial location (Figure 3.22a). These variations, which as surface currents move on tens of thousands of time to time, the water heats up and gives its place for years, are associated with the achievements and failures of the destination, the eastern Pacific, ocean surfaces plus glaciers throughout the history of the Earth. heat that exists on Earth. Warm waters of fluctuations in the level of solar radiation over the eastern Pacific make the wet sea air of the East also refer to activi-asce-asceenda and cool, causing heavy rains in the era of sunspots, huge storms of the magne region (Figure 3.22a; see also figure 3.16). Entica, which are found in the Sun. These storms contrast, the coldest waters of the western Pacific are harmful with intense solar radiation and occur as a result of relatively dry conditions throughout the cycles, the number and size of which reach their maximum each Peruvian coast.11 years approximately). Among other facts, studies conducted during the El Nino phenomenon show that trade winds link the weakening of sunspot activity, reducing the flow of surface currents with periods of drought and warming winters in which they head east (Figure 3.22b). The result is the Northern Hemisphere. reduction of exposure (surge) and heating interactions between the two components of the surface water system of the eastern Pacific. The climate, oceans and atmosphere are associated with rain, which follows the warm waters in the east and gives a host of important climatic changes that lead to floods in Peru and droughts in Indonesia and seduce regionally. If we go back to 1525, Australia. This is East of the source dealgunos historical documents confirm that the atmospheric heat of the fish (hidden heat associated with the evapo-res coast of Peru made annotations on water rations, see section 4.2), which covers those that describe periods when the warm waters surface leads in an unusual way. Peruvians have referred to this peri-change in global atmospheric circulation, which is in suodo warm waters such as El Nino, because it usually affects the climate in regions far from the Pac'fi-mind occurred at Christmas, a tropical co-period associated with the baby Jesus. El Nino is a phenomenon that in other cases cold water injections are becoming more inten-happening in the waters of the Galapagos Islands, which has been de-sa than usual and makes the surface of The Pacificrcito in the introduction of the second part. The east is currently cooling. This change is known as La Nina, called el Nino-southern climate (ENOS), this phenomenon causes droughts in Sudameri- (ENOS), this phenomenon is an event that occurs in Sudameric about and abundant rainfall, and around flooding, around the world and that arise as a result of great changes in temperature, including droughts in eastern Australia. The recent discovery of southern oscillation verifies fluctuations in surface pressure (mass 3.10 Most organisms of thesatmosphere) between tropical areas of the southeast Pacific inhabit microclimate and regions of Australia and Indonesia. When the surface waters in the eastern Pacific are warmer than usual (due to the fact that most organisms live in local El Nino conditions), sea level pressures decrease in the Pacific Ocean, which does not correspond to the overall climate profile of the eastern lafico and increases in the west. The decline is in the largest region around them. For example, a pressure rating report accompanied by a weakening of today's meteorological may establish that the temperaturethe exchange of low latitudes of easterly winds. It's 28 oC and the sky is clear. However, this pro-although scientists have not yet figured out the meteorological com-notic is only part of the panoramaplety cause of the Phenomenon of Southern Oscillation, common. The real conditions of the specific atmospheremecanism are well documented. Let's remember that they will be very different depending on whether it is a sub-paragraph-section 3.4 place, winds blowing to the east crossing of the neo or surface, under vegetation or on the groundwww.FreeLibros.org-62 Secondpart Physical Environment Figure 3.22 El Nino-South Oscillation Scheme, which occurs on the west coast (a) Under normal conditions, intense trade winds move surface waters in a western direction. As surface currents move westward, the water heats up. Warm water in the western Pacific causes moist sea air to rise and cool, causing heavy rainfall in the region. (b) Under ENOS, trade winds are reduced and reduce the flow of currents heading west. Precipitation follows warm waters in the east, followed by floods in Peru and droughts in Indonesia and Australia. (a) Normal conditions (b) of El Nino conditions, on mountain slopes or by the sea, spaces from the maple stump. Flies can display light, heat, humidity and air movement varying their activity there, even though the temperature is largely different from one place in the landscape to another, and affects the air almost frosty because, during the day, the surface in the transmission of thermal energy and create a wide stump absorbs solar radiation and heats a small variety of localized climatic conditions. These microclimates determine the layer of air on their surface. On a quiet day, they are the conditions in which organisms live (see Cues-air heated tree stump remains close to ecology detions: urban microclimates). Surface, and the temperature drops sharplyin a sunny but cold day at the beginning of the prima way, above and below this layer. A similar phenomenon, flies can be attracted to the juice that occurs, When the icy surface of the soil absorbs lawww.FreeLibros.org-Chapter3 Climate 63'3 El Nino La Nina No 2 Warm Attack No. 1 Index OCoontens -1 cold 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 YearFigur 3.23 Record el Nino-La Nina events in the second half of the twentieth century. The numbers on the left deldiagram are the ENOS index, which includes a combination of six factors related to environmental conditions over the tropical Pacific Ocean: air temperature, water surface temperature, sea level pressure, cloudiness, speed and wind direction. Warm events are shown in red and events in blue. A value greater than No.1 is El Nino. Value 1 represents Girl, solar radiation and thaw. On a sunny day at the end of plants, the rate of evaporation on the slopes is oriented-winter, we can walk on the ground covered by days to the south, usually 50% higher, in the day and, even if the surrounding air is cold. Changing average pressure and moisture on soil moisture, humidity, lower movement. Conditions are more and straight up to the top of winds and evaporation, vegetation moderation of microclimate south-facing slopes south, where the air movement is greater, especially in areas adjacent to the ground. Today, and water at the foot of example oriented slopes, plant shaded areas have lower soil levels so-north, prorate than open places The same microclimate conditions occur on the Sun. On a clear summer day, 25 mm (1 flea-less scale on slopes facing north and south) above the ground, covering dense forests of large anthills, mounds, dunes and small can reduce daytime temperature ranges between 7 oC ridges of flat terrain, as well as sides of edi- and 12 oC below open soil temperatures. physiology, trees and logs. The sides of the buildings orien-Under shelter of dense grasses and roof factories tados to the south are always warmer and drier than the lower, the air at ground level is completely calm-faced to the north, something to consider. This serenity is an extraordinary feature of those landscapers, gardeners and gardeners. Half-bok-faced trunks, which are found in dense vegetation - northern trees are colder and wetter on the Earth's surface. It affects both the southern two and them, reflecting temperature and humidity, and creates the environment in the strongest growth of moss. In winter, unfavorable to insects and other animals living on the side of the northern tree can be hela-soil. while the southern face is one moderate. This survey, especially targeting (the direction of temperature can cause cracks in the lation of the slope), affects the bark of climatic conditions as the juice wears out during the day and conga-local. In the Northern Hemisphere, the slopes are facing the night. Bark beetles and other insects in the south get more solar energy, while those who live in the forest in search of cool, humid terrain in the north get less. In other orientations in which laying eggs prefer the location of the slopes, energy varies between these extremes, and de-oriented to the north. Flowers located in orientation are dependent on the direction of cardinal points. South of the treetops usually bloom morelnstuous exposure to solar radiation, rapid orientation than those located in the northern orientation to the south or north, has a noticeable effect Extremes They also occur on the amount of moisture and heat present. Soil troughs and concave surfaces of microclimate scorpions range from warm dry and variable valleys where air is protected from wind. When heated desire slopes facing south, even cold, humid and more with sunlight during the day and cool down during launiformes where they collide to the north. Because of the night terrestrial vegetation, the air usually dries up at high temperatures and high evaporation speeds. As a result, these protected search sites associated with them extract moisture from the soil and lower temperatures at night (especiallywww.FreeLibros.org-64 Secondpart Physical Environment Exams Urban Microclimates urban areas create their own microclimates with various toxic fogs, measured as ozone (PPMillardo)les surrounding them. At night these significant structures in terms of temperature, precipitation and ture release slow wind flow patterns from which the surrounding querval heat occurs. The result is an increase in day storage, energy consumption and reduced air quality, which has a negative impact on public health. On warm days-Effect of the island's hot summer canaries, with little or no wind, the air temperature rises between 6oC and 8oC above the queen's urban areas may be a few degrees higher than in nearby rural areas. Baltimore, a neighborhood of the countryside. As a result, scientists in Phoenix, Tucson and Washington, D.C., for example, consider these urban areas to be hot urban islands. Scientists show that the maximum temperatures in Elrason, in which urban areas have more in the July months of the last 30 to 80 years have gone incorrect the rural environment around them is the result of their regular eco-change at a rate of medium to certain degrees of energy, or the difference between the amount of Energy Fahrenheit has for a decade. The highest temperatures are pro-received and lost. In rural areas, solar energy is sweetened in areas with higher population density and population activity absorbed by vegetation and land is partially dissipated, while temperatures are known to reduce the evaporation of vegetation and soil. In areas to the periphery of the city. While differences in the themes-cities are less vegetation, and therefore buildings, peraturas can be detected throughout the year, the effect of lacalls and sidewalks absorb most of the solar energy. Hot island more during the summer and at the same time with narrow streets and tall buildings, the walls of buildings are winter zos, especially at night when they elirradian heat between them, not towards the sky. The accumulated heat on the pavement and in the buildings returns to Theazo, as the asphalt surfaces built hom-radiate in air.bre, cement and bricks are not porous, most of the rain is lost, as liquid residues in the pipes of the Hot Island effect in urban areas before evaporation can cool the air. It also affects air quality. Along the airport, flowing from cars, buses and buildings in addition to the year, urban areas are covered with matter in the form of nominal well-promoted energy input. While these wastes of mikula and pollutants that come from fuel and heat eventually target the atmosphere, it can contribute to both fossil fuels and industrial activities. I like a third of what's derived from solar power. This is created by the photochemical reaction of the agents, the problem is that building materials (asphalt-polluters of the atmosphere. , 1985 ozone, a pollutant that is harmful when there are elevated levels in the air that we breathe. In addition, ozone 250 has a negative impact on vegetation, both in urban environments and in surrounding areas 200. The impact of the hot island exacerbates these national standard effects on air quality as the highest ambient temperatures during the 150 summer months lie using air conditioning 100 of electricity. As power plants burn more than 120 fossil fuels, they increase both 100 levels of pollution and energy costs. 50 Matter in the form of particles has other microclimatic effects. Due to the lower evaporation rate of 0 in the city and the lack of vegetation, the relative humidity of 50 60 80 80 90 100F is lower in urban areas than in rural areas 10 15 20 20 25 30 35C. However matter in the form of particles act as condensate cores for water vapor Maximum daytime temperature causes fog and fog. The fog is much more fre- Urban areas than rural areas, especially the relationship between maximum daily temperature and concentration of toxic fog (measured as winter concentration. 2. How can the impact of the hot island affect the rural environment?www.FreeLibros.org-Chapter3 Climate 65in winter), higher temperatures during the day (specification- Although global and regional climate models vary and higher relative humidity. have already analyzed in this chapter to perform the function of limi-If the temperature decreases sufficiently, large-scale distribution of resin bags and an abundance of plants and frost are formed in these depressions. Microclimate animals are localized models of the microclimate, frost balls usually show the same pheno-determine actual environmental conditions that are detected, and contain different types of plant life than individual organisms. Thus, it is this mi-which can be found in small sites of localized chromium, which determines the distribution and acti-environment. organisms within a specific region. SummaryIndimentaries of solar radiation (3.1) circuits move clockwise in the Northern Hemisphere and counterclockwise in the hemisphere Sur.La Earth intercepts solar energy, which comes in the form of short-wave radiation, which easily passes through the atmosphere, and emits atmospheric moisture (3.6) again in the form of long-wave radiation. Without em-bargo, the energy of large long waves cannot be expressed in terms of light hydration of the atmosphere and, therefore, a return to the relative pope. The maximum amount of moisture that air can-Earth is by producing a greenhouse effect. containing at a certain temperature is called steam pressure before saturation, and increases with temperature. (Sequence 3.2) Relative humidity is the amount of water in the air, expressed as a percentage of the maximum amount that the amount of solar radiation intercepted by the Earth can be contained at a certain temperature, surprising with latitude. Tropical regions near Ecuador receive the highest amount of solar radiation, and precipitation (3.7) of high latitudes receives the least amount of precipitation. Because Tie-rra has its sloping axis, wind, temperature and ocean currents produce solar radiation with seasonal differences. These differences are in global precipitation patterns. They explain why they come from seasonal temperature fluctuations and there are regions with a lot of precipitation in three-pitaciones. There is a global gradient in temperature peaks and dry weather fronts in areas of average annual calm; in the tropics warmer and decreases to them (N and S). Topography (3.8)Height and temperature (3.3) Topography of the mountain affects the models of heating and cooling precipitation, influenced by local and regional energy. When the mass of air arrives, emitting the Earth's surface and atmospheric pressure, the mountain rises and rising and falling. This water, and releases most of its moisture at high altitudes, the movement of air masses involves adiabarty-to-barlovento (o) in which no heat is received or lost outside. Irregular oscillations (3.9)Atmospheric circulation (3.4) Not all weather fluctuations in the regional climate are vertical movements of air masses, which are produced at regular intervals. Irregular fluctuations in global atmospheric circulation. Land-like trade winds occur periods of unusually calm water on its axis, diverting air and water currents to Das on the west coast of South America. This phenomenon, right-deno in the Northern Hemisphere and left in the El Nino mine by scientists is an event globalhemisferio Sur. In each hemisphere there are three cells that come from large-scale interaction between air elcicularsis. ocean and atmosphere. Ocean Currents (3.5) Microclimate (3.10) Global wind systems and the impact of the Coriolis ocalia are the true climatic conditions under which nans live the most important models of ocean currents. organisms can vary greatly within each ocean dominated by large movements circulating in the same climate. These local variations, or microclimate, reflect water resources, also called oceanic circuits. These topography, vegetation cover, exhibition and otherwww.FreeLibros.org.66 are the second part of the environmental factors on all scales. Solar radiation angles 19. Which orientation, facing north or queocasioning noticeable differences between the southern slopes receives the greatest amount of radiation from the north and those oriented to the south, or in mono-solar in chains southern hemisphere, sand dunes or anthills. 10. Spruce Pen (latitude 38,625o N) east of West Virginia Research Matters is named after the spruce (spruce) that predominate in the forests of this place. Firs se11. Why does Ecuador receive more solar radiation than usual in colder forests in the polar regions? What is the effect of patro-latitudes further north (northeast latitude temperature nes? U.S. and Canadian). What about the presence of spruce pen in this area?12. What is the greenhouse effect and how does it affect the balance of energy (and temperature) of the Earth's Additional Bibliography? Arens, C.D. 2003. Meteorology Today: Introduction to13. The Earth's tilt of 23.5o on the North-South axis gives weather, climate and environment. 6th o.p. Belmont, California: Origin stations (see Figure 3.5 again). Brooks/Cole. How would these models differ if the Earth's tilt was 90 degrees? How would an excellent introductory text to the climate written in cla- (day-night) affect the daily cycle? well illustrated. Feigen, B. 2001. Little Ice Age: how the climate went down in history.14 Why the waters of the southeast coast of the states Uni- 1300-1850. New York: Major Books. two warmer than the southwest coast (knew-pleasant book that offers a wide view of niendo, that it's the same latitude)? the influence of the Ice Age on the history of mankind15. Temperatures on January 20 at noon were from Graedel, T. E. and P. J. Crutzen. 1997. Atmosphere, climate 45 F (7.2 oC) and air temperature on July 20 when changed. New York: American Science Library. noon at the same place was 85 F (29.4 oC). A brief introduction to the written climate for the population in relative humidity was 75% on both days. Which one is like a general. Does it provide excellent information for those who in these two days had more water vapor in the air? interested in air pollution and climate issues.16 How can you change the relative humidity of Philander, G. 1989. A boy and a girl. An American air mass scientist as it moves up to 77:451-9. the slope of the mountain? Why? Soupley, K. 1999. Boy, girl. National Geographic 195:73-95.17. What is the Intertropical Convergence Area (CIT) and these two articles give an idea of why it generates different patterns of seasonality of the El Nino-La Nina climate cycle. precipitation, in the tropical zone?18. What is the characteristic of global atmospheric circulation Desert from mid-latitudes?www.FreeLibros.org-Chapter3 Climate 67Capitorus 4 Water Life4.1 Water cycles between Earth and atmosphere4.2 Water has important physical properties4.3 In aquatic environment light varies depending on the depth of the 4.4 Temperature varies depending on the depth of water4.5 Water functions As solvent4.6 Oxygen dissipates from the atmosphere to surface waters4.7 Acidity has a big impact on aquatic environment4.8 Water movements form freshwater and marine environment4.9 Tides dominate the environment coastal marine 4.10 The transition zone between freshwater and salt environment has unique narrowing Water is an important substance life, the dominant component of all living organisms. Water is 75 to 95 percent of the weight of living cells, and there is almost no physiological process in which water is not vital. Covering about 75 percent of the surface of the components of the water cycle (also called cycloplanets, water is also the dominant medium of hydrological tie) (Figure 4.1), the process through which it elrra. One of the most important features affecting water travel in sequence from air to Earth and regre-adapting organisms living in the environment sa in atmosphere.aquatic is the salinity of water (see section 4.5). With solar radiation that heats the Earth's atmosphere, aquatic ecosystems are divided into two large categories (see chapter 3) and provide energy evaporation: salt (or marine) water and fresh water. These two waters ition is the driving force behind the water cycle. Pre-large categories, in turn, are divided into large va-cypitation begins the water cycle. Water vapor, the richness of aquatic ecosystems that are classified according to circulating in the atmosphere, finally gets into some depths and currents of water, substrate and type of precipitation ma. Part of the water falls directly to the dominant organisms (usually plants). Explore - on the ground and on the reservoirs. The other part is the diversity of the aquatic environment and the of brushed vegetation, the organic lethal substances that inhabit them later, in chapters of 24 land and urban structures and streets, and 25. In this chapter, we will observe the physical characteristics of interception, which can be significant, and unique water chemicals, how these characteristics interact-a certain amount of water never penetrates the ground, ristics determine the nature of different environments, but evaporates immediately, passing and how they function as constrictures in the atmosphere. Precipitation reaching the earth is due to the evolution of the organisms that inhabit them. Penetration. The rate of penetration depends on the type of soil (see section 5.8), inclination, vegetation and precipitation intensity. Rainy 4.1 Strong water cycles between the Earth, when the soil is saturated, excess water flows and the atmosphere flows on the surface in the form of runoff or super-social flow. In some places, it concentrates on depression and south-all water environments of seawater and cos water, and the current goes from laminar flow to channeled stream, sweets are connected, directly or indirectly, as a process that can be observed on the streets of cityww68 w.FreeLibros.orgTren the desire to infiltration of the Internal use of nfiltration deepens the Deep Naturee 4.1 Water Cycle on a local scale, with the most important ways of water movement when water passes through the sidewalks into the sewers. water from the inner surfaces of the leaves, the stems of the idebido to low infiltration, runoff other residential parts of the area (see chapter 6). The total amount of delurban can be up to 85 percent of the evaporating water from soil and vegetation surfaces. it's called evapotranspiration. Part of the water penetrating the soil is filtered in the direction of Figure 4.2 The glo-down cycle diagram is presented up to a waterproof layer of clay or rock, for water balm showing different reservoirs (cuer-accumulate as groundwater (see figure 4.1 and pos water) and streams (exchanges between reservoirs: groundwater resources). The total volume of water on Earth is approximate - from there the water finds its way to the spring mind of 150,000 cubic kilometers (km3), of which they and streams. Streams gather and produce rivers that are more than 97 percent in the oceans. Another 2ssy topography of the landscape. In basins and lands as a percentage of the total number of inhabits of polar ice lakes and wetlands are formed. Rivers end up and glaciers, while the third active reservoir flows to the coast and the transition from fresh water to groundwater size (0.3%). in the form of water vapor, don streams, lakes and oceans, returns to the atmosphere of eva de is deposited in the form of precipitation. Of the 111,000. The rate of evaporation will depend on the canti-km3 of water falling in the form of precipitation on the surface of the water vapor in the air as a result of the Earth, only about 71,000 km3 return to vapor pressure to saturation (see section 3.6). atmosphere of evapotranspiration. To the remaining 40,000 Plants cause additional water loss from sue-km3 carried out by the river as runoff and finally sonlo. Through their roots, they take water from the earth and lose it back into the oceans. This amount balances losses through leaves and other organs through the clean process of water from the oceans to the atmosphere, called sweating. Sweat evaporation evaporation (Figure 4.2).www.FreeLibros.org-Chapter4 Environmental 69 Ecology Issues Groundwater Resources On Agricultural Fields, a known process Although 95 percent of bom-like irrigation water is an ancient and important practice. In the dry sea aquifer beada, irrigation is essential. However, used for irrigation, moreaun in regions where the average rainfall is ade- 80 percent of the inhabitants for agricultural production, irrigation is used from the region depends on the aquifer as a whole to provide a constant supply of water for consumption. Water from some areas of water to fields and force plants to grow with aquifer does not meet agency standards for protection-less dependence on climate impacts. While only the U.S. Environment Tion (EPA), which regulates 15 percent of the world's cultivated land, irritates water for human consumption, and lowers degan levels, groundwater is responsible for 35 to one water reduces the quality of the remaining water to measure 40 percent of the total food crop. concentrations of salts and other solutions increase. In most cases, groundwater provides the water needed for irrigation. About 1. In many areas of the Altiplanos-Ogallala aquifer, 30 per cent of the groundwater used cannot develop more sources and materials for irrigation in the United States from the same water. What measures could be taken to assist with the source: the Aquifer Altiplanos-Ogallala (see Figo-Servar of existing water sources in these areas?ra 1). An aquifer is a water table made of stone, sand or gravel capable of supplying a significant amount of 2. Because the use of water in can affect water. Buried sand and gravel that support the long-term availability of water throughout the aquifer water comes from rivers that have flowed into the region (other states) as the east can be managed from the Rocky Mountains over the past these water resources? The thickness of the aquifer, 65 m on average, varies between more than 1000 m in Nebraska and less than 20 m South Dakota New Mexico. The water contained in it dates back to the last glacier, more than 10,000 years ago. Wyoming's High Permeability of the Altiplanos-Nebraska Aquifer allows a large amount of water to be pumped out of the ground, but also implies that because of the aku-Kansas-samulatory pumping effect anywhere, the water level drops over a large area of the aquifer. The rate at which water is pumped today from more than 200,000 wells in the region is 50 times greater than the New Oklahoma city's veil from which water is replenished from the aquifer. During Mexico, it was believed that the water supply of the aquifer would never run out. However, since the 1940s, Texas intensive pumping has consistently reduced water levels in many areas. In 1990, altiplan oil aquifer production alone exceeded almost 53 x3 per day. During the drought in the western states, the 1st Water Horizon of Altiplanos-Ogallala-Delineake passed from mid-1992 to the end of an area of approximately 451,000 km2, which extends into 1996, which is a decrease in the water level (deep) of aquifers over eight states. This aquifer is a source of an average of 40 cm per year. water in one of the largest agricultural regions in the United States. One consequence of the decline in aquifer water levels is that in some places pumping costs have increased significantly and have become prohibitively expensive. Pumping has also brought volume of water from aquifers that de-ambush into streams and springs. For example, the bom-beo of the Colorado Aquifer reduced the flow of the Arkansas River, which runs through Kansas. In addition to the impact on agriculture, the decline of the Altiplanos-Ogallala aquifer also harms the supply of water used for consumption in the region.www.FreeLibros.org-70 Secondpart Physical Steam Transport Figure 4.2 Global Water Cycle. Reservoir values (shown in blue 40,000) 108 km3. Thread values (shown in red) are measured in km3. polar ciares 000Fumber from a relatively small size of an atmospheric reservoir, so the two H atoms are -ferik (only 13 km3) does not reflect its value trans-cycle at one end of the molecule and O in the water globe. Notice the large threads between the others (Figure 4.3a). Bridges between the two atoms of the demosphere and the ocean and the Earth's surface relative to hydrogen and oxygen atom are formed by the amount of water found in the atmosphere in the joint of common electrons (the so-called covalent concrete bonds (reservoir size). Hydrogen atoms have given up time to update the tank. The common is closer to the time of the renewal of the oxygen atom is calculated by dividing the size of what is between them. As a result, the tank has an exit speed (the stream comes out). For example, the side of the water molecule in which the ato-ocean renewal time is found, the size of H-reser-mos has a positive charge, and the opposite side, where the atom is located (1.37 × 106 km3), separated by the rate of evaporation, has a negative charge; (425,000 km3 per year), or more than 3000 years. On the other hand, and therefore the water molecule is polarized (the so-called atmospheric time of tank renewal is a polar covalent bond) (Figure 4.3b).). That is, the content of its polarity, each water molecule is bound by weak common water in the atmosphere is replaced on average every 9 species with molecules around it (Figure 4.3c). You were Ali. The positive end (hydrogen) of one molecule attracts a negative ex-tremo (oxygen) of another. The angle between hydrogen atoms facilitates an open arrangement for-4.2 Water has physical ma tetraetary properties of water molecules. This position, in theimportants that hydrogen atoms act as a connection between water molecules, are represented by the bridges of the physical arrangement of the molecules that make up it, hydrogen. The simultaneous binding of a hydrogen atom is one substance. The water molecule to the oxygen atom of two different water molecules formed by two hydrogen atoms (H) attached to one results in the network arrangement of the mole-oxygen (O), represented by the chemical symbol H2O. Those (figure 4.3d). Эмбарго на грех, estos enlaces сын d'biles si'tomos де Хэтан enlazados лос Остомос де О асиметрика-лос comparamos con el enlace entre лос Остомос де hidr'genowww.FreeLibros.org Атуло4 Ambienteacu'tico 71Agregados аналоги H OH al hielo HHO H OH O O H H H HH O HH O O O H H HH HH HH HH H(a) OH H(b) H H H H Water Molecules (c) O H H separate H Hydrogen H O HO Oxygen O H H H (e) (e) HO HH HFigura 4.3 Water Structure. (a) An isolated water molecule showing the angular location of hydrogen atoms. (b) The polarity of the water. (c) Hydrogen bridges to the water molecule in the ice. (d) The structure of liquid water. (e) The structure of open network ice and the oxygen atom and, as a result, can be dulled - you need to subtract 80 times more caloric energy (80per and easily reformat. calories per gram) to convert the same amount of water, has many unique properties associated with water, in 1oC in ice (freezing point 0oC). So with their hydrogen bridges. One of the properties is the same, the 536 calories needed to reverse a particular heat binge-high; i.e., the number of calories needed between the molecules and convert 1 g of water to 100oC of ensaria to increase the vapor temperature by 1 degree Celsius, the same amount of heat that is needed for 1 gram of water. Specific heat of water has the value of increasing the temperature of 536 grams of water by 1 C.de 1, and the rest of the substances are assigned the value com- Nature of the network arrangement of molecules by separating them with water. Water can store great water provides water with a special link between density and calorie energycanting with a slight increase in temperature. Most liquids become more den-temperature. Thus, large dogs should be absorbed when cooled. If the heat density is cooled to a temperature so that the temperature of the natural water freezes, they become firmer, and the hard phase is denser, such as lagoons, lakes or seas, increase than liquid. This does not apply to water. Clean water is only 1oC. These heat slowly during the pri- becomes denser as it cools until it reaches the stomachs and cools just as slowly in the fall. It's 4oC. Lower cooling temperatures will cause den-behavior to prevent widespread seasonal fluctuations in severity. When the temperature of 0oC is reached, the temperature in aquatic habitats is so often in freezing reached and the network structure is complete: the air temperature, and the moderate temperature of each oxygen atom is associated with four other environmental atoms locally and globally (see chapter 3). Oxygen is a hydrogen atom. The result is also a specific water sector, which is important for a network with large open spaces and therefore for lower thermal regulation of organisms. Because of the density of 75 (see figure 4.3e). Conal water molecules 95 percent weight All living water cells, this structure takes up more space than they will take up in changing temperatures also moderate depending on their liquid state. Because of the lower density, ice changes the temperature of the environment. lighter than water and floats above it. This propertyFor the specific high heat of water, great- is very important for life in the aquatic environment. You guy the amount of caloric energy to change the presence of ice on the surface of Sir's body water between solid (ice), liquid, and gas phase (ve vapor to isolate the water below and to aid the water). Collectively, the energy released or absorbed by the gift to prevent the freezing of water by larger bodies of water from one state to another is called hidden heat in the winter months (see section 3.6). To reduce the pace-Thanks to hydrogen bridges, the deatura molecules of one gram of water from 2oC to 1oC, it is only necessary-water, usually tightly to hold between them and resist subtracting 1 calorie caloric energy (4184 jouls), but the external forces that would break these bridges. This property-www.FreeLibros.org-72 Secondpart Ambiophysicality is called cohesion. Within the mass of water that most aquatic organisms (plants and anni-these forces of attraction are equal at all points. Beneath the surface, structural molecules such as skeleton or cellulose to be able to maintain water are strongly attracted to each other. Above, the face of gravity is dented vertically. Thus, it gives much weakest attraction among molecules similar in terms of movement, animal water and air molecules. Thus, earthy molecules have to lift their body weight against the forcesurface attracted downwards and the surface becomes gravity at every step they take. These requi-tense movements are like a pout balloon. This condition, called significantly more energy than those who need surface stress, is essential in the life of aquatic organisms for water movements. Swim. For example, the surface of the water is able to withstand however, high water density can have small objects and animals such as cobblers (Gerri-significant effect on the metabolism of organismsdae) and aquatic spiders (Dolomedes spp.), which meet sailors who inhabit the deepest waters of the ocean.tran on the surface of the lagoons. For other institutions Its higher density, water also experiences may-small, surface tension is a barrier, as the pressure varies depending on the depth in comparison, because they want to enter the water that is below or with which the air represents. At sea level, the weight detacheds the surface. For some, the super-voltage vertical air column from the top has-ficial atmosphere just too big to be able to make the sea surface 1 kg/cm2, or 1 atmosphere (1 3).break it; For others, it is a trap that should be avoided while unlike, underwater pressure increases by 1 asm portras along the surface to feed or spawn. If every 10m deep, they get caught by surface tension, insects because the ocean floor has different sizes can have trouble staying in the range of 100 meters to 10,000 m in pits on the surface of the water. For underwater ephemeral non-ampers, the pressure range at the bottom of the ocean (Ephemeroptera) and tryoptera (Trichoptera) living at the level of 20 to more than 1000 atm. Recently researched and converted into alous adults, voltage shows that both proteins and membra surfaces are an obstacle to their efforts to create biological areas hard affected by water pressure. When slowing down on the surface, these insects also need to be modified to work on animals that vi-convert into easy prey for fish. see at the bottom of the ocean. Cohesion is also responsible for water viscosity. Viscosity is a property of a material that wiars the force needed to separate molecules and allow 4.3 in the aquatic environment light to change through the liquid. The viscosity depends on the depth of friction resistance for objects that are separated into water. This resistance to friction of water 100 when light reaches the surface of the water, the definition of times more than that of air. The hydrodynamic shape of the body-yes quantity is reflected back into the atmosphere. Cocty mica of many aquatic organisms, such as light reflecting from the surface, depends on the angle of fish and marine mammals, helping to reduce from which light reaches the surface. At a lower angle, it's friction resistance. Replace the water in the spa-more amount of light that will be reflected. Getting conse-cio behind animals when moving means how much light is reflected off the surface of the extra brake for the body. The water-like animal will be different every day and in all the inverted stability-hydrodynamics, with a short, rounded forehead according to moves one of Ecuador to the poles (see ely noticeably conical bodies, offers a minimum section 3.2 to read the full information about esterism in the water. The amount of light that passes through the surface of the water is the high viscosity of the water, compared to the decreases through the other two processes. First of all, air, it is largely due to its higher density. Particles, both living and dead, water is about 860 times larger than those intercepted by light and absorbed or scattered. Air supply (clean water has a density of 1000 kg/m3). When the light is damaged, his journey through water and lapel increases, which means that the viscosity of the water implies a narrowing fades even more. Secondly, water itself absorbs for the mobility of aquatic organisms, it is also light (Figure 4.4). Even in completely clean and shaky water. If the body dives into the water and its light weight, only about 40 percent of the radiation dees less than that of the water in which it moves, it will be attached to a depth of 1 meter. Also, I elto to an ascending force called buoyancy. Because of the water, it absorbs some wavelengths of more others.www.FreeLibros.org-Chapter4 of the 73adiation of the incoming or absorbed and outgoing or emitted. The exponential reduction of solar radiation in accordance with the pro-relative intensity of 3 Water melting surface (as shown by the vertical light profile in figure 4.4) also causes corresponding dismi- 5 degrees of water temperature. The depth area of the ver- 7 tical profile, where the 10 fastest temperatures are reduced, is called a thermocline. Pro- 15 20 UV V 30 O R melting thermoclinic will depend on solar radiation input and water surface temperature. 50 Under the thermocline the water temperature continues at 100 75 jando with depth, but at a much lower speed. The result is a marked model of the B GY300 390 510 620 720 800 with depth. The termoline demarcates the wavelength (nm) of the top layer of the warm, Light water (less den-c) is called epilimnion and the bottom layer of cold water plus 4.4 Spectral distribution of solar energy in a dense so-called hypolimnion (figure 4.5; see also the Surface of the Earth and after it has been changed by section 21.8 and figure 21.18). Notice how quickly the lengths are strated, as well as seasonal fluctuations in the arrival of red radiation. Approximately 10 m, the red light has dried up; But in to the earth's surface causes seasonal changes100 m, blue wavelengths still persist almost that in surface temperatures (see section 3.2), lasmitad intensity. (Clark Adaptation 1939.) Seasonal fluctuations in the arrival of solar radiation to the surface of the water cause seasonal changes in the profileFirst absorbed vertical visible radiation ambient temperature or aqua-media red and infrared light, wavelengths more cos. Relatively constant arrival of solar radiation at 750 nm. It's a absorption of half solar energy. Then, in clear water, the yellow light disappears, follows- Water Temperature (C)da green and purple, and only wavelengths 0 5 10 15 20azules penetrate into the deepest water. Part of the blue light is lost due to the increase in depth. Deep in the water of the Epilimnionmar cleaner, only about 10 percent of surface waterazul light reaches more than 100 m deep. Low Heat Density These changes in the quantity and quality of light are very important for life in the aquatic environment, so-Thermoclinate, because they directly affect the amount and distribution zone of performance changes (see section 20.4 and fast temperatureCapition 24) because they affect the vertical temperature profile of Hypolimnionla depending on the depth of the water. The lack of light in the deepest waters of the ocean caused several cold deep waters of high density. The organisms that inhabit the most profun-up ocean, between 200m and 1000m, are usually silver-grey or dark black and, often, orga-veranism, which live in deeper waters (more than 1000 m) have no pigmentation. Another adaptation is the Big Winter, which gives them a greater ability to capture light, and many organisms have adapted the bodies of Figure 4.5 Temperature Profile with the depth of water to produce light through chemical reactions, which is an open body of water such as a lake or lagoon. Bioluminal bioluminescence profile (see section 24.10). can be divided into three marked areas: epilimnion, thermal line and hypolimnion. When the temperature drops by 4.4, the temperature varies depending on the air in the autumn months, the surface water cools and the water depth sinks. At the moment, the temperature is constant with depth. With the onset of winter surface water, as noted in Chapter 3 (section 3.1), cools them further, and ice can form on the surface, the surface temperature reflects the balance between Spring comes, the process is reversed, and thermoclina.www.FreeLibros.org.74 Secondpart Water surface environment is re-formed throughout the year makes the thermal line perficien, which produces in the spring, water becomes a permanent feature of tropical waters. In the waters of tratificar.de temperate areas, there is a marked thermal line in the summer months. In the autumn, conditions begin Stratification changes occurred as con-varia, and changes occur. The temperature of the sequence of such seasonal changes does not occur in all the air and sunlight decreases, and the surface of the water of the reservoir and should not be considered as characteristic - begins to cool. As a result, the water becomes ca from all the deep reservoirs. In some lakes both denser and sinks, displacing the warmer water of shallow lagoons, the stratification can occur from the surface, where, in turn, it cools. This short-lived; in other countries, even if stratification exists, cooling continues until the temperature is deep, may not be enough to de-homogeneous throughout the pool (see figure 4.5). Then, arrolle marked the thermal line. Some lakes have very pro-water lagoons and lakes circulating throughout the basin. This and in the oceans, during renewal periods, the vertical circulation process called the thermal line update does not disappear completely, but simply an important component of the dynamics of nutrients descending. In such reservoirs, water from the open water ecosystems (see chapter 21). It never mixes with the highest layer. However, with the help of the wind, this vertical mixing process can exist some form of thermal bundle in alldurar up to the shape of the ice. open reservoirs. Then comes winter: the water temperature de-- On the other hand, the temperature of the water mass falls below 4oC, and the surface water current (flow or river) is variable (Figure 4.6). Streams come back slightly again and stay there. (Remember- small and small tend to follow, even if not so easy that the water becomes lighter above and up close, the air temperature. They are heated and cooled below 4oC; see paragraph 4 (2). If winter is with the seasons, but rarely their temperature reaches quite cold, surface waters freeze; if not, be below zero in winter. At that time, place cies are exposed to warmer sunlight than those warmer from the lagoon or lake in the background. With a dark shrubs or high-school shrubs. This ice integration and warming of the water is important from an environmental point of view, As the temperature affects the community water temperature flow at various points during the water 21.1 Air temperature 21oC 20.020.0 16.1 16.1 17,215.6 16.1 15.6 13.9 14.4 Forest Rock 1 km Rio Alt. 543 m) Figure 4.6 Profile of Bear Creek (Adirondack Mountains, New York) and the water temperature chart. Note that the water temperature rises when the stream moves through the meadow and descends again when it flows through the shaded part of the forest.www.FreeLibros.org-Chapter4 Environment 75e affects the presence or absence of additional matter organisms in the form of particles and cold or hot polvoagua. For example, predatory fish that are suspended in the atmosphere. The water that falls to the ground in each one is different: in colder waters, there are streams on the surface and filters into the ground, and thus get more oxygen, such as trout and solutions. Surface waters such as the creeks of the Icelandic American small mouth; and in warmer waters, rivers, collect more solutions of substances and above them are species that require less oxygen that flow. Water of most rivers and lakes with such folds and som (see figure 24.13). dissolved minerals. The relative concentrations of minerals in these waters reflect the substrates on which they flow. For example, water flowing over areas of 4.5 Water functions as a solvent, which largely underlies the basis of limestone (consisting mainly of calcium carbonate; $CaCO_3$) have a high con-if a tablespoon of sugar is removed in a glass with calcium (Ca2) and bicarbonate (HCO_3) water, sugar dissolves, and homome-nea mixture is formed. Compared to fresh water, a pre-substance of the oceans, a liquid that is a homogeneous mixture of two or more is called dissolution. The solvent agent sits much higher concentration soluble. Deve dissolution solvent or solvent, and substance made, oceans function as large yet. The one who dissolves is called soluble. Dissolution, the flow of fresh water into the oceans of which is constantly increasing - is water, called acquiescence. soluble water content, as clean water evaporates from the surface and passes into the atmosphere. Water is an extraordinary solvent that has a concentration of solvents, however, it cannot continue the ability to dissolve more substances than any other lipid growth indefinitely. When the concentration dequido. This is Extraordinary function as some elements reaches the limit set by ladisolvente makes the water biological substance the maximum solubility compounds they form (critical grams. This is a liquid in which molecules per liter), excesses are deposited and deposited as sedatives and waste can dissolve and cops. Calcium, for example, easily forms a carb transport, helps regulate temperature and stores Nato calcium ($CaCO_3$) in ocean waters. Chemical balance in living cells. The maximum solubility of calcium carbonate, however, is only 0.014 grams per liter of water, the concentrate-ability of water to function as a solvent due at the beginning of the history of the ocean, mainly to the link covered by section 4.2. As a result, calcium ions are deposited by the continuous result of the asymmetrical bond of atom H with O te atoms from the solution and deposited at the bottom of the ocean (see figure 4.3), one side of each water molecule has both limestone deposits, constant positive load, and the other side has a constant payload; This situation is called dipole In contrast, the solubility of sodium chloride is very (fields with opposite loads). Because the opposite loads are high (360 grams per liter). In fact, these two elements, in addition to attracting each other strongly, mole-sodium and chlorine, form approximately 86 percent of those from the water also attract other molecules with load. sea salt. They, along with other important elements such as sulfur, magnesium, potassium and lime- Compounds consisting of atoms of okrium groups, whose relative proportions differ little, are electrically charged atoms called ion. 99 per cent sea salt (table 4.1). Sodium chloride (table salt) definition, for example, is one of the most common elements, chlorine used as an index formed by positively charged sodium ions (NAH) salinity. Salinity is expressed in negatively charged carbonated blocks of chlorine (Cl-), located in for-functional (USF) (represented as a), measures such as the crystalline network. When salt is poured into the water, grams of chlorine per kilogram of water. The salinity of maratractions between negative (oxygen atom) and open loads is quite constant with 35o on average. Inposives (hydrogen atoms) in the water change molecule, freshwater salinity varies between 0.065 (see figure 4.3), as well as sodium and chlorine atoms and 0.30. However, over time more than the forces held together by chrysological salt shale (ion bonds). As a result, the ocean crystals have increased and haciéndolo.de easily dissolves in the ions that connect them to the water, i.e. dissolve. Water solvents are the cause of most minerals (elements and compounds inor- 4.6 Oxygen is dissipated from tannins) found in the aquatic environment. Atmosphere to surface waters When water condenses and forms clouds, it is almost pure, salty part of some dissolved atmospheric gases. When water is not limited to dissolving the surface in the form of precipitation, it acquires solids. The surface of the reservoir determines the temperature of unwww.FreeLibros.org-76 SecondPart Physical EnvironmentTable 4.1 Composition of sea salt 35 units the speed at which the gases are dissipated by water. Functional salt gas scattering (USF) occurs about 10,000 times more in water than in the air. In addition to the diffusion process, elements of g/kg Milli-Milli-Oxygen, absorbed by surface waters, mix moles/kg equivalents/kg with deeper water thanks to internal currents and aCationes 10,752 467.56 467.56 turbulence. In shallow water worksOdium 0.395 10.10 10.10 very quickly and in wind-induced deuces, oxygenPotasium can reach and maintain saturation levels and even oversaturation by increasing the absorption area in laMagnesium 2,295 53.25 106.50 contact between the surface air and water. Oxygen heated 0.416 10.38 20.76 loses in water when the temperature rises, decreases-strontium 0.008 0.09 0.18 th solubility and consumption of aquatic life. In summer, oxygen, as well as temperature (see - 605.10, section 4.4), can be stratified into lakes and lagoons. The largest amount of oxygen is usually given near the surface of the information, where there is an exchange between waterCloro 19,345 545.59 545.59 and the atmosphere, stimulated by the removal of the action TheBrome 0.066 0.83 0.83 wind (Figure 4.7). In addition to its entry into the water at 0.0013 0.07 0.07 average diffusion of the atmosphere, Oxygen is also a product of photosynthesis, severely limited in sodium 2701 28.12 56.23 surface water due to limitations in the availability of bicarbonate 0.145 2.38 - light (see Figure 4.5 and Chapter 6). The amount of oxy-boric acid 0.027 0.44 - geno decreases with depth due to the demand for oxygen decomposing organisms living on 602.72 bottom of sediments (chapter 21). During the prima faith and renewal of the odonya water, when water circulates across the lake, oxygen is replenished in the deep, bordering on the atmosphere. The gases are exchanged through winter, reducing oxygen in water that is not the master of this limit during the diffusion process. Diffusion is frozen mild, as the demand for oxygen for the total loss of molecules to move out of the body is reduced by cold, and the capacity of high concentrations of oxygen-region at low concentrations is not higher at lower temperatures. There is no ice (see quantitative ecology 4.1: Diffusia and Osmos). However, the decrease in oxygen can be serious due to the diffusion process produces global transmission, the lack of diffusion from the atmosphere to the superfi-two important gas from a metabolic point of view, ciales, oxygen and carbon dioxide, from the atmosphere (con- As in lagoons and lakes, oxygen does not emphasize above) to surface waters (concent-distributes evenly in the depths of the lower oceans) the environment. years (Figure 4.8). The typical oxygen profile of the Ocean Oxygen dissipated from the atmosphere into the water shows the maximum amount in the upper 10-20 m surface. The diffusion rate is controlled by where photosynthetic activity and diffusion from oxygen lasolyuati in water and the slope of the gra atmosphere usually lead to saturation. In diffusion eldient (difference in concentration of elevated depth, dismi-air oxygen content and surface water where diffusion occurs). He sniffs it. In open ocean waters, concentrations of waterproof gas are a function of temprat-reach a minimum value, somewhere between 500 yra, pressure and salinity. The value of oxygen saturation is 1000 m, an area called conteni-core area in cold water than in hot water, because minimal oxygen is solubili-do. Unlike lakes and laga-papa (the ability to remain as a solution) gas in us, where seasonal decomposition of thermoline and water decreases when the temperature rises. Without the mixture that leads to between the surface and deep water, solubility increases with increased lead to dynamic temperature gradient and atmospheric depression and decreases with increasing oxygen content, limited depth of super-nity, which has little value in fresh water. Mixing fiss in deep oceans supports gra-in surface waters, the diffusion process continues and the vertical availability of tooth oxygen all year round, oxygen dissipates from surface to water that the presence of oxygen in lower water (lowest concentration). The largest densi-moving water is quite different. Agitation and viscosity of water associated with air serve to limit and constantly swirl watercourses conwww.FreeLibros.org-Chapter4 Ambient 77When ecology is quantitatively 4.1 diffusion and osmos diffusion is a passive global movement of particles such as ha-ses such as oxygen (atoms, ions or molecules) from high con-area and carbon dioxide to lower concentrations. In others, they dissipate from the atmosphere into the surface layer of words, any substance dissipates, and therefore reduces water in aquatic ecosystems. Once they're in laye, their concentration gradient. One substance makes this surface layer, these gases continue to spread to a two-way that reaches balance (Figure 1). This one is reached downstream. We can use this equation when the concentration is equal at all points to calculate the diffusion rate of the carbon dioxide system. between the surface layer of water and the depth of 10 cm as follows: Fika's law describes the flow (sus-tance movement): Flow or movement of the diffusion factor. The diffusion rate of CO_2 CO_2 concentration at one point a (mol/cm2/s) (mol/cm3) (mol/cm3) describes how quickly it is transferred over time to another. They are distributed by substance J (1.6 × x 5 × × 10-5 x 2.9 × 10-5)/10 x 4.32 ×-11 units of mole per unit area and through Wednesday. Units on time. For example: unit time: cm2/s. mol/cm2/s. Distance diffusion ratio (see) for CO_2 (cm2/s) J x D Δ/Δz Concentration Ratio. The distance at which he was (z2 -- focused in addition to being An important process for mo- 1 vition substances in and between the atmosphere and morning- 3 water wells (such Δ as the movement of substances in C2). therefore, even at saturation levels, it is scarce and problematic. a slight decrease in the value of genoenoenza in water reaches a maximum of 0.01 liters per liter in deep wells or in contaminated water. (1%) fresh water at 0oC. As a result, the concentration of oxygen in the aquatic environment, however, even in ideal conditions, solubi- in general, limits the breathing and metabolic activity of gases in the water no more. For example, oxy-geno is almost never confined to the Earth's environment. The aquatic environment, however, provides oxygen, (see section 6.1).www.FreeLibros.org-78 Secondpart Physical Environment occurs in biological processes. Most of the transport pattern 2a through cell membranes is done by blurring (see chapters 6 and 7). When osmotic matter is involved in maintaining a balance concentrated more on one side of the membrane than on the other, there is water in all living beings, from the simplest to the tendency for the substance to spread through one cell of vertebrates. Osmosis occurs with onemembrane, reducing its role as a concentration gradient is especially important in organisms (provided that the membrane is permeable to this substance). Fresh water and marine, whose concentrations Of Caco, membranes permeable internally soluble differ from water to suselective, and therefore affect the dife-rental rate of dife-leased substances. water diffusion through the disatu shift membrane- 1. What is different about the influence of paravameable mosis, is a special case of transporting passi-fish, inhabited in freshwater and paravo environments called mosses. Suppose we lock salt water? Suppose a desert concentration, such as salt (sodium chloride) in the soluble concentration (salt) of fish tissues, is located between delilate (and low-concentration water) in freshwater duct and salt water, sealed with a semi-permeable membrane and immersed in a glass of sediment with distilled water (Figu- 2. The membrane is permeable for water, but not for salt. how would the rate of blur change the volume of liquid inside the vessel increases and increases the injury (in the waters at 10 cm deep) you duplicate it through the tube, while the water moves through the mem-tion concentration of carbon dioxide in the elbran to the dissolution process called surface water? The water continues to move through the membra-na until the osmotic pressure of the solution (which decreases-you while the clean water dilutes the solution more) equals the physical pressure down exerted by the water column in Glass. The tendency to dissolve to carry water molecules from areas with high concentrations in an area with low concentration is called osmothicular. The osmotic potential of the solution depends on its concentration. The higher the soluble conken tariff, the lower its osmotic potential and the greater its propensity to increase water. Moss is important for biological processes. Transporting water and other molecules through biological membranes is important for many pro-cesses in living organisms. Usmos and the potential4.7 Acidity has a large surface area, carbon dioxide reacts with water and influences the aquatic environment produces carbon acid (H_2CO_3). Carbon dioxide soot is slightly different from CO_2 and H2O;: H2CO3of oxygen, as it reacts chemically with water. Carbon acid, in turn, divides and forms ion water capable of absorbing hydrogen and bicarbonate ion, carbon dioxide and, therefore, the latter abounds in both fresh water and salt water. After spreading in H_2CO_3 ;: HCO_3 and H'www.FreeLibros.org-Chapter4 Environment 79Verenity (m) 0 Ice Summer surface ice reduces figure 4.7 Stratification 1 Winter oxygen diffusion from oxygen to Mirror Lake, N2 Atmospheric Renewal toward Hampshire Water, Winter, Summer and 3 Surface Autumn. late fall. Later call update 4 leads to 5 15 20 0 2 4 6 8 10 12 Oxygen Descent reflects the constant temperature and 6oC) Oxygen (PPM) demand and oxygen distribution consumption of 7 homogeneous decomposing organisms in Pool 8 that inhabit the lower region. Lake. In summer, there is a 9 pronounced bundle of 10 temperature and oxygen. 110 5 oxygen is drastically reduced in the thermocline and does not exist at the bottom, due to the consumption of decomposing organisms in sediments. In winter, oxygen also stratified, but in deep water it exists in low concentration. (Adapted from Likens 1985.) 0 Carbon acid zone and bicarbonate produce more CO_2, up to 1000 minimum new balance. Oxygen Chemical reactions are shown to result in inProfundity (m) production and absorption of free hydrogen ions (H). The abundance of hydrogen ions in dissolution 2000 way of measuring acidity The higher the amount of H ions, the more acidic dissolution. Alkaline- 3000 Nas solutions are those that have a large amount of OH (hydro-xylos) and several H ions. Measuring the acidity and alkalinity of 4000 pH, which is calculated as a negative logarite (in 10) concentrations of hydrogen ions in the dis- 5000 0 lute. In clean water, a small fraction of the molecules are 1234 5 6 breaks down into ions: H2O: H 'OH, and the ratio of CM3 O2 per liter of H ions in relation to OH ions is 1:1. From both Figures 4.8 vertical oxygen profile at depth appears at concentration of 10-7 molecules per liter in the tropical Atlantic Ocean. The oxygen content in the neutral solution has a pH 7 -journal (10-7) x 7.waters descends to a depth known as the area of dissolution is no longer neutral when the ion increases and contains minimal oxygen. Increased oxygen is thought to reduce others. Typically, logarithmodebajo of this area is the result of the arrival of cold, negative hydrogen water to classify lumpaic solutions into oxygen coming from the immersion of acidic or major polar waters. Thus, an increase in hydroion (see section 4.8). Geno 10-6 molecules per liter means a reduction of OH-ions to 10-8 molecules per liter, and the pH of the solution bicarbonate can, at the same time, disperse and form another 6. Negative logaritic scale ranges from 1 to 14. One is a hydrogen rhon and the other is carbonate ion. More than 7 denotes alkaline solution (more OH-concent), and pH less than 7, acidic dissolution. HCO_3 ;: HK CO32 - Although clean water is pH neutral because the decomposition of water molecules produces the same carbon dioxide-carbon acid-bicarbo-number-number of Ions H and OH-ions, the presence of CO_2 ennate is a complex chemical system that tends to permane-water alters this relationship.cer in balance. (Note that the arrows in the equations of the above reactions flow into production and are presented in both directions). As a result, the absorption of free hydrogen ions (ICD). Since the lasi is removed from the water, the balance is disturbed, and the equation-abundance of hydrogen ions in the solution is a measurement that has been presented to go left; The acidity yes, the dynamics of carbon dioxide-system-www.FreeLibros.org-80 SecondPart Physical Environment100 Figure 4.9 Theoretical CO percentages in each of the three co2 free 2A total CO_2 percentage 50 HCO_3 CO32 - water condition relative to pH. At low pH (acidic conditions) most of the CO is in 2 of its free form. In intermediate values (neutral conditions) bicarbonate prevails, while in alkaline conditions most CO is in the form of carbonate ions. 2 0 4 5 6 7 8 9 10 11 12 pH'cido carbonic has a direct impact on pH embargo, as pH goes down and becomes more acidic, they are aquatic ecosystems. Overall, the aluminum dioxide system begins to dissolve, which increases its con-carbon-carbon acid buffer dissolution.tion to keep the pH of water within the field. This is achieved by absorbing dehydrogen ions into the water when they are in excess (that 4.8 Water Movements produce carbon acid and bicarbonates) and through the environment of fresh water and marine production of them when they are scarce (which produces carbonate and bicarbonate ions). In neutral condition (pH-7) the movement of water, flow and most co2 currents is presented as HCO_3 (Figu - waves open or breaking water mass in 4.9). In a state of high pH, there is more CO32 than the coast, determines the nature of many environments in low pH, where more CO_2 is produced in free condition. Water. Current speed forms the shape and the addition or subtraction of CO_2 changes the pH as well as the flow structure. The shape and tilt of the exchanges in pH changes CO_2. Flow channels, width, depth and hardness of the bottom, the intensity of rains and the speed of thaws - the pH of natural waters varies from 2 to 12. Water, all of which affects speed. Fast streams emanating from geologically dominant limestone basins will have a higher pH and will easily be loving - those whose speed is 50 cm per second or more, compared to the water of domi basins (see quantitative ecology 24.1: River discharge). A nest of sandstone and granite. Having ions of this velocity, the current will remove all highly alkaline particles, potassium and calcium from the ocean waters - less than 5 mm in diameter and leave behind stony-nica soil leading to seawater slightly alkaline. A large volume of water increases speed; line, in the range of 7.5 to 8.4. Moves stones and materials from the bottom, scrubs pH of the water environment is an element that beds and forms new jars and canals. As ve-can exert a powerful effect on distribution and in locity it reduces both the width, depth and volume of the abundance of organisms. Increased water acidity increases, yl and deorganic substances can affect organisms as directly, by the composition accumulating in the background. Thus, the shape of its effect on physiological processes, as in the flow changes depending on the speed of the current, direct, affecting the concentration of metals weighs- The wind generates waves in large lakes and in Toxic. PH tolerance limits vary depending on the discovery. Resistance to wind surfaces clears plant or animals, but most calm aquatic organisms cause them to produce ripples. They are unable to survive and multiply at a lower pH as it continues to blow, the wind generates more pressure up to 4.5. A factor that contributes greatly to the inability of the more sloping side of ripples, and they aquatic organisms tolerate pH-sized wave conditions starting to grow. As winds high concentrations of aluminum waters become more intense, severed and short deacidal waves appear. Aluminium is highly toxic to many speci-of-all sizes that continue to grow as they absorb aquatic life and therefore it generates more energy. When the waves reach a point where the total population is in the aquatic population. the energy that wind supplies is equal to the energy that Aluminium is insoluble when the pH is neutral or basic. lost in the switch, become waves with foam inDevable aluminum represents in high concentrations of ridges. The stronger the rocks, soils, rivers and wind deposits, the higher the waves, the lakes. Under normal pH conditions, concentration-waves that break down on the beach do not form aluminum in the water lakes are very low. There is no water coming from distant seas. Each particle dewww.FreeLibros.org-Chapter4 Ambient 81 81 ecologia 6ta edicion smith pdf gratis