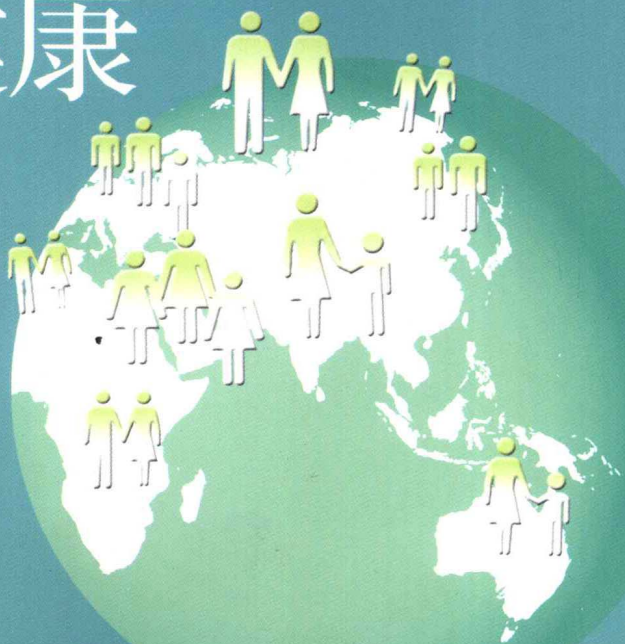


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编著

全球 环境变化 与健康

Global Environmental
Change and Health



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内容提要

全球环境变化条件下的人类安全与健康是国际上密切关注的新问题,本书着眼于全球环境变化的大背景,介绍了关于环境变化与健康问题研究的国际进展,特别分析了中国面临的健康问题与风险,为解决当前面临的环境变化与健康问题提供对策。

本书提出我们正面临全球环境变化的严峻现实,阐述了全球环境变化与健康联系的基本原理,从多角度介绍了全球环境变化对健康影响研究的国际动态,重点分析了全球环境变化条件下中国的健康风险,并提出积极应对环境变化与健康风险挑战的对策建议。

本书视角宽广,国际动态把握准确,国内问题分析中肯,具有前瞻性和警世性,可供关心环境变化与健康的各界人士、从事环境保护、公共卫生、社会发展的管理者、决策者以及大专院校师生和相关研究人员参考。

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序

全球环境变化,特别是气候变化是当今国际社会普遍关注的全球性问题。最新的评估表明,100 年来全球平均地表气温上升接近 1°C ;最近 50 年升温率几乎是过去 100 年的 2 倍;20 世纪全球海平面上升了约 0.17 m;许多地区降水量在过去的 100 年间发生了显著变化;全球变暖的地区和时间正在增加;而全球变暖主要是人类活动的结果。

全球环境变化增加了自然和社会经济系统的脆弱性。应对全球气候变暖,大气臭氧层的损耗、生物多样性的减少与生态退化、土地利用格局与环境质量的改变(水资源短缺与污染、土地荒漠化、森林退化等)和人口的急剧增长等社会人文环境的变化,针对碳/能源、食物、水等世界性关键问题,各国学者从多领域开展了整个地球系统的综合研究,以减缓全球环境变化及其对自然与社会经济系统的风险。

我国气候变化趋势与全球变暖的总趋势基本一致。但严重的是,过去 50 年,我国地理环境变化的幅度和速率都显著超过历史上的任何时期,由人类活动所导致的环境问题已经显现,有些是不可逆转的变化。环境变化对社会发展构成的阻碍,有些尚未被认识,其潜在威胁可能更为严重。在未来全球变暖的背景下,我国将面临能源结构性匮乏、矿产资源短缺、水危机、耕地与粮食保障、快速城市

化、环境质量恶化等诸多挑战,健康安全的风险将会进一步加剧,社会和谐发展将承受更大的压力。

全球环境变化条件下的人类安全与健康问题,是 20 世纪末提出的重要问题。气候变化、生态退化,人口激增与迁移,特别是工业化、城市化规模的不断扩张,不仅引发资源耗竭问题,而且加剧了空气、水、土壤的污染,同时带来一系列健康问题。随着全球自然和人文环境的变化,由不良生活方式引起的慢性疾病越来越多,疾病谱已明显改变;同时,大城市拥挤的居住环境、就业竞争的压力、贫富差距等,影响人的精神状态,并带来诸多安全与健康风险。

环境变化与健康是全球性的问题。所谓全球性问题,首先,是指该问题在世界每个国家和地区均会发生与存在;第二,某一国家或地区发生并存在的问题,必然会影响到其他国家或地区;再者,本国或本地区特殊性问题的解决,也是对世界范围解决该问题的促进;最后,只有着眼于全球,才会从根本上解决本国或地区的问题。

随着全球自然和人文环境的变化,全球环境变化与健康研究不但关注疾病传播分布和环境中的水、大气、土壤、食物污染对健康的影响,而且更加关注面向地球生态系统长期变化、全球环境变化(自然的和人文的)对敏感人群健康的综合影响研究,以及国家或区域的响应措施。

我国的环境变化与健康问题,是在全球环境变化和我国社会经济迅速发展的背景下产生的,健康危害通常表现为环境多介质、多因素的综合作用,环境健康问题的区域性明显,问题的难点在于环境变化对健康的影响较难评价和预测。

鉴于全球环境变化与健康问题是新近出现的挑战性问题,亟需加强环境变化与健康研究,提出应对环境变化与健康风险的对策,同时让公众认识这一问题的严重性,促进从决策者到我们每一个人都自觉采取行动,减缓环境变化与健康风险。

基于对这一问题的敏感性,我国一批从事环境变化研究的科学工作者,根据自己的研究积累,编写了关于环境变化与健康风险的简要读本。本书分析了国际发展趋势和最新研究进展,集成研究了全球变化条件下社会、经济、人文因素的相互影响,重点阐述了我国面临的气候变化与健康;土地利用变化、生态退化与健康;水资源短缺和水质恶化双重威胁健康;农村环境质量变化与健康;城市化与健康等紧迫问题;同时,提出综合解决当今环境变化与人类健康风险的对策。

人与环境关系内涵的改变要求我们从新的角度认识和评价环境变化及其影响,特别是对人类健康的影响。我们需要正确地认识环境变化,采取积极的措施减缓负面变化及其健康风险,从根本上保护我们人类自己。

刘燕华

前 言

随着人口增长、社会经济发展和科学技术进步,人类活动对地球环境的影响越来越强烈,特别是全球人口在进一步增加,人类开发与利用自然资源的能力不断扩展,更大规模地改变着地球环境。人类活动引起自然界的變化,而自然界的變化又影响人类社会的变化,进一步影响人类的生存。人类生存的地球环境正在迅速变化。

提起环境变化,人们自然会联想到人口爆炸、资源耗竭、生态退化、水危机、环境污染、灾害频发以及气候变化等随处可见的问题,这些问题表明,人类正面临着全球环境变化的挑战,特别是全球环境变化的影响对我们已经成为现实的挑战。但是,对于现实挑战中我们面临的健康问题,却很少有人把它与全球环境变化联系起来。

全球环境变化与健康是国际上近年来愈加密切关注的新问题。这一问题之所以被提出,是因为当今各种新疾病频繁出现,同时一些已经消灭或者减弱的疾病又重新流行,并快速在全球范围流行,随着全球气候变暖和人类活动对生态系统的破坏加剧,传染病的威胁有不断增加的趋势;另外,环境中有毒污染物增多,被污染的动植物食品、饮水和空气使人罹患癌症或其他疾病,是近年来各类疾病发病率增加的重要原因;还有,由于生活水平提高,膳食结构、饮食习惯等生活方式的改变,慢性病发病率持续上升,

相关危害因素严重。因此,全球环境变化条件下的人类安全与健康问题,已经成为国际全球变化研究发展的重要方面。

为了深刻认识全球环境变化与健康问题,本书着眼于全球环境变化的大背景,介绍了关于健康问题研究的国际进展,特别分析了中国面临的健康问题与风险。我们试图从地理环境与人的整体观出发,从自然与人文结合上,现实与发展结合上,问题与对策结合上,阐述全球环境变化与健康风险,力求做到视角宽广,国际动态把握准确,国内问题分析中肯,具有前瞻性和警世性。

本书内容共分为5章,第1章提出我们正面临全球环境变化的严峻现实;第2章阐述了环境变化与健康联系的基本原理;第3章从多角度介绍全球环境变化对健康的影响,以及国际研究动态;第4章重点分析了全球环境变化条件下中国的健康风险;最后,第5章提出应对环境变化与健康风险挑战的对策建议,特别强调多学科交叉研究,多部门综合管理的紧迫性。

本书是在王五一、Thomas Krafft、Mark Rosenberg 和杨林生共同讨论的基础上编写的。从2001年起,我们作为国际地理联合会健康与环境专业委员会的主要成员,就一起开展了关于全球环境变化与健康的合作研究。本书的基本思想框架就是在综合研究的基础上形成的。同时,参加本书编撰工作的还有谭见安、方修琦、吴绍洪、葛全胜、李海蓉、李永华、韦朝阳、冯福建、虞江萍、叶必雄等。

本书的编写得到了科技部领导的关心与大力支持,得到科技部国际合作项目专项(2007DFC20180)和科技部

“十一五”科技支撑计划课题(2007BAC03A11-07)的资助,特此表示衷心的感谢。另外,李海蓉和徐建辉承担了全书的编辑工作,在此一并致谢。

由于全球环境变化与健康是新近发展和提出的问题,编写者在对这一学科前沿特点的把握上尚存在不足,错误与疏漏在所难免,敬请读者批评指教。通过本书,如果使广大读者认识到全球环境变化与健康风险的严重性,提高了行动的自觉性,我们将感到无比欣慰,也算尽了自己的微薄之力。

王五一 杨林生

Foreword

Dr. Thomas Krafft¹ and Dr. Mark W. Rosenberg²

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At the end of August 2008, the Intergovernmental Panel on Climate Change (IPCC) celebrated its 20th anniversary of contributing to global understanding of how not only climate change, but environmental changes in general, are altering the world in which we live. Over the 20 years, Assessment Reports were published in convincing fashion in 1990, 1995, 2001 and 2007 to make policy makers and the public alike aware that climate change is significantly affecting both urban and rural environments. Complementing the Assessment Reports have been a series of Special Reports since 1995 on topics as wide-ranging as: *The Regional Impacts of Climate Change*; *Aviation and the Global Atmosphere*; *Methodological and Technological Issues in Issues in Technology Transfer*; *Emission Scenarios*; *Land Use, Land-Use Change and Forestry*; *Safeguarding the Ozone Layer and the Global Climate System*; and *Carbon Dioxide Capture and Storage* (see <http://www.ipcc.ch/>).

Originally organized into three working groups (Fig. 1), the IPCC has defined a set of key terms; “impacts,” “vulnerability,” “adaptation,” and “mitigation” for researchers who are trying to understand how environmental changes are affecting the urban and

rural places within their respective countries.

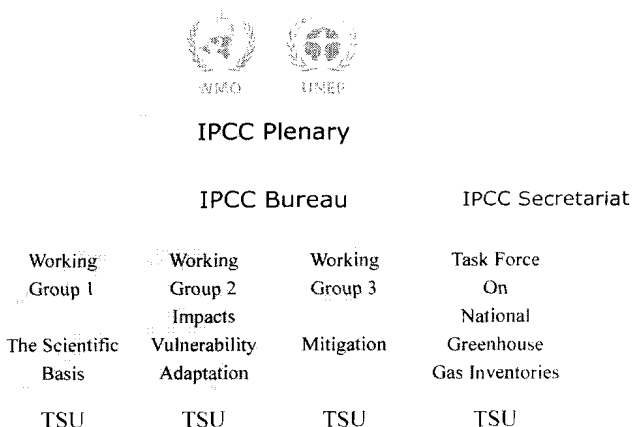


Fig. 1 The Organization of the Intergovernmental Panel on Climate Change

(Modified from <http://www.ipcc.ch/about/how-the-ipcc-is-organized.htm>.)

7 November 2008)

Climate change impacts are “the effects of climate on natural and human systems” where a distinction can be drawn between *potential impacts*, “all impacts that may occur given a projected change in climate without considering *adaptation*”, and *residual impacts*, “the impacts of climate change that would occur after *adaptation*” (IPCC AR4 Synthesis Report, 2007). In addition, the IPCC draws distinctions among *aggregate impacts*, *market impacts* and *non-market impacts*. The *aggregate impacts* are the “total impacts across sectors and/or regions ..., for example, the total number of people affected, or the total economic costs” (IPCC AR4 Synthesis Report, 2007). *Market impacts* “can be quantified in monetary terms, and directly affect *Gross Domestic Product*” (IPCC AR4 Synthesis Report, 2007). In contrast, *non-market impacts* “affect *ecosystems* or human welfare, but that are not expressed in monetary terms, e.g., an

increased risk of premature death, or increases in the number of people at risk of hunger”(IPCC AR4 Synthesis Report, 2007).

The impacts of climate change, the aggregate impacts on sectors or regions, and the market and non-market impacts on economies, ecosystems and human welfare are and will depend on *vulnerability*, *adaptation*, and *mitigation*. The IPCC defines *vulnerability* in terms of climate changes as “the degree to which a *system* is susceptible to, and unable to cope with, adverse effects of *climate change*, including *climate variability* and extremes” (IPCC AR4 Synthesis Report, 2007). Reducing impacts and the vulnerability of systems depends on adaptation and mitigation efforts. *Adaptation* are the “initiatives and measures to reduce vulnerability of natural and human systems against actual or expected climate *change effects*” while *mitigation* is the “technological change and substitution that reduce resource inputs and emissions per unit of output” (IPCC AR4 Synthesis Report, 2007).

A first way that *Global Environmental Change and Health* can be read then is that it follows in the tradition of the IPCC and its key ideas of not only climate change, but more broadly speaking environmental change. The book documents the regional impacts of environmental change on locally vulnerable populations in urban and rural China. It is a comprehensive analysis of how actions in the past have created the environmental impacts today that are affecting people’s health and an argument for adaptation and mitigation efforts to be made.

The IPCC has also been instrumental in encouraging an earth systems science/human systems science approach to thinking about environmental issues and their impacts (Fig. 2). As such, the IPCC has set the “gold standard” for inter-, multi-, trans-disciplinary thinking on environmental issues and their impacts. *Global Environmental*

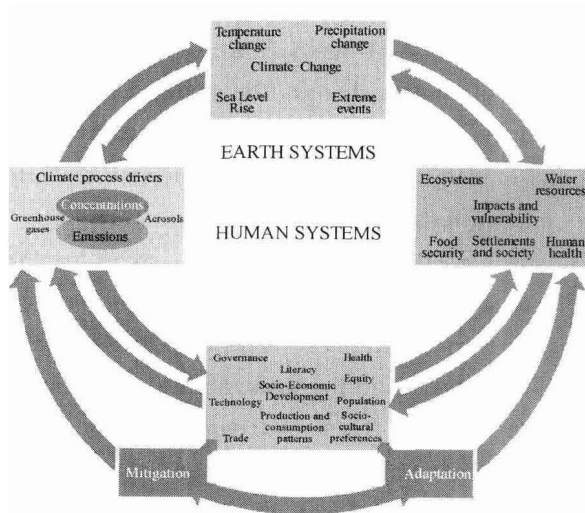


Fig. 2 The Interrelation between Earth Systems and Human Systems

(Downloaded from <http://www.ipcc.ch/graphics/graphics/syr/figi-1.jpg>,

7 November 2008)

Change and Health can be read a second way as following in the traditions of the IPCC in setting out the climate change and other environmental process drivers that have changed the regional ecological systems that have then had impacts on human health. At the same time, *Global Environmental Change and Health* also sets out how human systems (especially population growth and urbanization) have created feedback loops affecting earth and human systems and ultimately human health in China.

A third way or reading *Global Environmental Change and Health* is to read it as a reflection of how the importance of health and the environment has evolved as an increasingly key theme in medical and health geography. Between 1998 and 2000, Mark Rosenberg, a medical and health geographer, along with others from

medical and health geography and other health, natural and social science disciplines organized four interdisciplinary workshops on the theme of *Setting an Agenda for Research on Health and the Environment* (Rosenberg *et al.*, 2000). This was followed up by another consensus building workshop on health and the environment in 2002 organized by medical and health geographers, Thomas Krafft and Mark Rosenberg, and Rick Bissell, an emergency services specialist (Krafft *et al.*, 2002).

The research being done in medical and health geography is no longer the simplistic and crude determinism of the first half of the 20th century, but ranges from the sophisticated measurement of psycho-social health impacts of living near facilities where the potential short and long term environmental risks are great to linking geographic variations in air pollution to varying rates of asthma and respiratory diseases while controlling for the social determinants of health (see Gatrell, 2002 and Meade and Earickson, 2000 for their overviews of health and medical geography respectively and the prominence that health and the environment play in both books).

The theme of health and the environment has also been of major interest to the International Geographical Union (IGU) for the past 28 years; first in creating a working group and then in setting up a commission, which is now starting its third cycle of eight years. In its mission statement for 2008 to 2012, the IGU Commission on Health and the Environment states:

Members of the IGU *Commission on Health and the Environment* (CHE) carry out research on health and health care in the natural and built environment recognizing the importance of gender and diversity in a globalizing world. Three strategic foci for 2008 to 2012 are: 1) the

analysis of quality of life with an emphasis on health, health care, and the environment at various geographic scales; 2) the links among global change, health, and environment and 3) urban health and the role of migration and immigration. These foci reflect outcomes of the previous work carried out by CHE (2000–2008) and the new initiatives of IGU's support of the Year of the Planet Earth (IYPE), IHDP Task Force on Global Change and Human Health, the Earth System Science Partnership's Joint Project on Global Environmental Change and Human Health, and ICSU's Planning Group on Health and Well-being in the Changing Urban Environment.

Global Environmental Change and Health reflects how medical and health geography have evolved as a sub-discipline of geography in general and especially in China. *Global Environmental Change and Health* can therefore be read as the latest thinking in medical and health geography in China.

In 2006, the four global change programs, Diversitas, the International Geosphere-Biosphere Programme (IGBP), the International Human Dimensions Programme on Global Environmental Change (IHDP) and the World Climate Research Programme (WCRP), launched the Earth System Science Partnership on Global Environmental Change and Human Health (ESSP GECHH) to encourage cross-cutting research on six themes: atmospheric composition changes and their health impacts; land use/land cover changes and human health issues; infectious disease and global environmental changes; food-producing systems and health; urbanization and health; and vulnerability, social representation and resilience building (Fig.3, see Global Environmental Change and Human Health, 2007). Whether

by design or not, *Global Environmental Change and Health* touches on each of these themes. A fourth way of reading the book is then as a wide-ranging and cross-disciplinary examination of environmental change and its impacts on health in China.

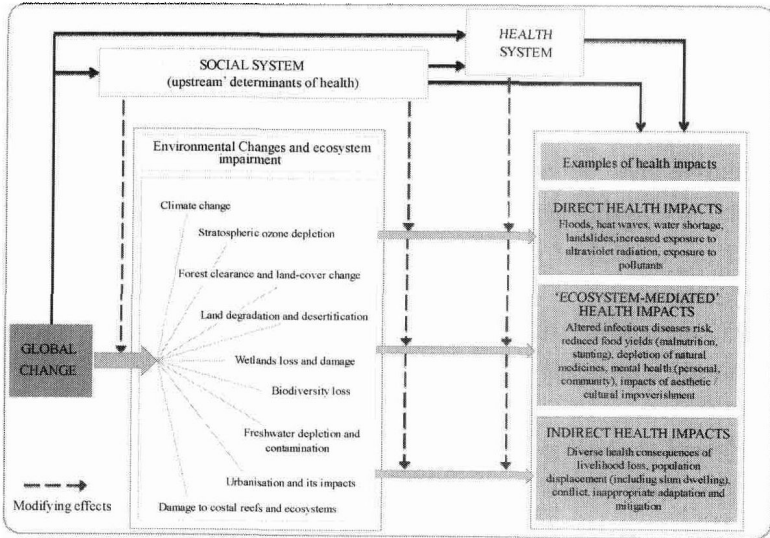


Fig.3 Global Environmental Changes on Health

(IHDP Advisory Group on Global Change and Health; modified from IPCC 2007, AR 4, WG 2, WHO 2005, Millennium Ecosystem)

In 2008, the eyes of the world were on Beijing as the people of China hosted the 29th Olympiad. One of the great stories of the Olympics was the efforts to improve the air quality during the Olympics to ensure the success of the athletes of all countries. In doing so, the Beijing Olympics raised global awareness of the challenges that not only the Chinese face, but that everyone faces to improve environmental conditions locally, nationally and globally to reduce the impacts on human health. A fifth way *Global Environmental Change and Health* can be read is as an important contribution

to our understanding of these challenges, efforts that are being made to reduce the impacts on human health, and efforts that will need to be made to continue to improve the health and the environment of the Chinese people.

We have suggested five ways to read *Global Environmental Change and Health*. There are, no doubt, other ways that one might read this book but there can be no disagreement that anyone who does read *Global Environmental Change and Health* will read a comprehensive and compelling analysis of the challenges that the Chinese people face as they confront the environmental impacts that currently affect the regions of China and their implications for human health.

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