国家自然科学基金委员会
National Natural Science Foundation of China

Beijing Institute of Technology
School of Management &Economics

The George Washington University
School of Engineering & Applied Science

Proceedings of 2010 International Conference on Risk and Reliability Management

(RRM 2010)

October 23rd –25th, 2010
Beijing, China

Financial Supporter
National Natural Science Foundation of China
Co-organizer
School of Management and Economics,
Beijing Institute of Technology
School of Engineering and Applied Science,
The George Washington University

Edited by
Jinlin LI
Thomas A. MAZZUCHI

北京理工大学出版社
BEIJING INSTITUTE OF TECHNOLOGY PRESS

Proceedings of 2010 International Conference on Risk and Reliability Management

(RRM 2010)

October 23rd – 25th, 2010
Beijing, China

Edited by
Jinlin LI
Thomas A. MAZZUCHI

北京理工大学出版社
BEIJING INSTITUTE OF TECHNOLOGY PRESS

图书在版编目（CIP）数据

2010年风险与可靠性管理国际会议论文汇编 = Proceedings of 2010 International Conference on Risk and Reliability Management：英文 / 李金林，(美) 马沙治主编. —北京：北京理工大学出版社，2010.10

ISBN 978-7-5640-3877-9

Ⅰ. ①2… Ⅱ. ①李… ②马… Ⅲ. ①风险管理-国际学术会议-文集-英文 Ⅳ. ①F272.3-53

中国版本图书馆CIP数据核字（2010）第192377号

出版发行 / 北京理工大学出版社
社　　址 / 北京市海淀区中关村南大街5号
邮　　编 / 100081
电　　话 / (010)68914775(办公室)　68944990(批销中心)　68911084(读者服务部)
网　　址 / http：// www. bitpress. com. cn
经　　销 / 全国各地新华书店
印　　刷 / 保定市中画美凯印刷有限公司
开　　本 / 787毫米×1092毫米　1/16
印　　张 / 24.5
字　　数 / 483千字
版　　次 / 2010年10月第1版　2010年10月第1次印刷
印　　数 / 1~1000册　　责任校对 / 陈玉梅
定　　价 / 136.00元　　责任印制 / 边心超

ACKNOWLEDGEMENT

The conference gratefully acknowledges the support of organizations below.

Sponsors

School of Management and Economics, Beijing Institute of Technology
School of Engineering and Applied Science, The George Washington University
The National Natural Science Foundation of China

Co-organizers

Systems Engineering Society of Beijing
The Reliability Branch of OR Society of China

Host

School of Management and Economics, Beijing Institute of Technology

ORGANIZATIONAL COMMITTEE

Chair

Jinlin Li
School of Management and Economics, Beijing Institute of Technology, China

Thomas A. Mazzuchi
School of Engineering and Applied Science, The George Washington University, USA

Organization Committee
Baolong Ma (Beijing Institute of Technology, China)
Claudio Demartini (Politecnico di Torino, Italy)
Fang Qiu (Beijing Institute of Technology, China)
Huiling Li (American Education Association, USA)
Xinhua Ji (Beijing Institute of Technology, China)

Program Committee

Alan G Hawkes (School of Business and Economics Swansea, UK)
Botang Han (Beijing Institute of Technology, China)
Bo Yu (Harbin Institute of Technology)
Donghua Zhu (Beijing Institute of Technology, China)
Dongping Yang (Beijing Institute of Technology, China)
Fanchen Meng (Beijing Institute of Technology, China)
Fiorenzo Franceschini (Politecnico di Torino, Italy)
Guangming Hou (Beijing Institute of Technology, China)
Guangping Hui (Nanjing University of Science and Technology)
Haiyan He (Beijing Institute of Technology, China)
Huiwen Wang (Beijing University of Aeronautics and Astronautics)
Isabel Martínez Torre-Encisot (Universidad Autónoma de Madrid, España)
Javier Bilbao García (Universidad Complutense de Madrid, España)
Jhon C. S. Tang (Asian Institute of Technology, Thailan)
Jian Li (Beijing Institute of Technology, China)

Jin Hong (Beijing Institute of Technology, China)
Lirong Cui (Beijing Institute of Technology, China)
Michael Dowling (University of Regensburg, Germany)
Nanding Yang (Northwestern Polytechnical University)
Peiwu Dong (Beijing Institute of Technology, China)
Pingqing Liu (Beijing Institute of Technology, China)
Qiang Zhang (Beijing Institute of Technology, China)
Lun Ran (Beijing Institute of Technology, China)
Reinhard Meckl (University of Bayreuth, Germany)
Sergio Rossetto (Politecnico di Torino, Italy)
Shufang Xiao (Beijing Institute of Technology, China)
Sifeng Liu (Nanjing University of Aeronautics and Astronautics)
Tienan Zhang (Harbin Engineering University)
Tritos Laosirihongthong (Thammasat University, Thailand)
Yiming Wei (Beijing Institute of Technology, China)
Yun Liu (Beijing Institute of Technology, China)
Zhaohua Wang (Beijing Institute of Technology, China)
Zhaojun Kong (Beijing Institute of Technology, China)
Zhijun Yan (Beijing Institute of Technology, China)
Zhixiang Li (Beijing Institute of Technology, China)

Welcome Message from the Conference Chairs

We are very pleased to present to you the conference proceedings that contain all papers presented at 2010 International Conference on Risk and Reliability Management (RRM 2010). This is the second conference in the series of RRM conferences; it brings together researchers and practitioners from many countries and regions. The diversity of research topics covered events that can be seen in the Conference Program.

The RRM 2010 to be held in Beijing, China in October 23-25, 2010, is hosted by School of Management & Economics, Beijing Institute of Technology. It is sponsored simultaneously by School of Management & Economics, Beijing Institute of Technology and School of Engineering & Applied Science, The George Washington University. Systems Engineering Society of Beijing and the Reliability Branch of OR Society of China are co-organizers of the conference. The conference also is supported by the National Natural Science Foundation of China (NSFC). The objective of the 2010 RRM Conference is to provide a forum for academics and practitioners from all over the world to share the results of recent researches, as well as visions and experiences in the field of risk management and reliability.

Focused on risk management and reliability, the proceedings present result of theoretical research or application case studies. They range from mathematical modeling to engineering applications. We are particularly happy to see many young researchers presenting their research findings at this event. These papers are grouped under different session names.

We are very grateful to all authors and session chairs for contributing actively in this conference. We should also acknowledge that the conference secretariat and student assistants for their efforts in promoting and assisting in organizing this conference.

Finally, we appreciate the support of School of Management & Economics, Beijing Institute of Technology, School of Engineering & Applied Science, The George Washington University, the National Natural Science Foundation of China (NSFC), Systems Engineering Society of Beijing and the Reliability Branch of OR Society of China.

We hope that you enjoy the conference, and look forward to meeting you again in the next conference in the near future.

Conference Chairs:

Jinlin Li
School of Management & Economics, Beijing Institute of Technology

Thomas A. Mazzuchi
School of Engineering & Applied Science, The George Washington University

Contents

Analysis of Rangeland Resources in China's Mountain Areas for Mitigating Global Warming

BAO Wen

(Business School, Chengdu University of Information Technology, Chengdu 610103, China)

Abstract: China's rangelands account for about 41.67% of the total land area in the country. As one of the major terrestrial ecosystems, grasslands play an important role in the carbon cycle in China. Most of China's rangeland ecosystems are distributed in the mountain areas of China. Changes in rangelands management could have a significant impact on the country's carbon balance. Implementation of practices with positive carbon storage outcomes may have a major bearing on the economics of livestock production, and may be limited by social and cultural factors. Carbon gains could be obtained from increases, or reduction in losses, of plant biomass, and from accumulation, or reduction in losses, of soil carbon.

Key words: rangeland resources; China; global warming

CLC number: TP374.2 **Document code:** A **Article ID:** 0770

Introduction

Rangelands cover 41.67% of the area of China mostly in vast, continuous areas in the north and northwest with temperate continental arid climates and on the Tibetan-Qinghai Plateau at very high elevations[1]. China's rangeland resources are mainly distributed in the Qinghai-Tibet Plateau, the Inner Mongolia Plateau, the Loess Plateau, the Tianshan Mountains in Xinjiang, the Altai Mountains, the Pamirs, the mountains surrounding the Sichuan Basin, the Daxinganling, the Xiaoxing'anling, the Changbai Mountain area, and mountain areas of southern China (see Tab.1)[2]. The 3.92 million km^2 of rangelands in China provide 16.3% of the world's total rangeland which cover about a fifth of the world's land surface. Natural grassland ecosystems may contribute as much as 20% of total terrestrial production to provide an annual sink of about 0.5 Pg carbon[3]. Consequently they have received attention as their condition may significantly influence regional climates and the global carbon cycle[4].

Tab.1 Rangeland resources in China's mountain areas 10^4 hm^2

Year	Mountain areas							Total
	Northeast mountain area	Huang-Huai-Hai mountain area	Inner Mongolia Plateau and mountain area along the Great Wall	Loess Plateau mountain area	Gansu-Xinjiang mountain area	Tibetan Plateau mountain area	Rangeland in mountain areas of southern China	
2007	1 031	181	3 850	1 250	5 678	12 349	6 797	31 136

1 Challenge in the Development of Mountain Rangeland Resources

The role of rangeland in improving the ecological environment and maintaining ecological balance is mainly embodied in three aspects, that is, the leading role in comprehensive management of all types of degraded land, the main role in comprehensive management of scientific development in mountain areas, and the special role in recreation of beautiful mountains and rivers and the development of recycling economy. The sustainable use of rangeland resources means that the grassland resources should not only meet the needs of contemporary people but also not prevent future generations from their own needs. That is to say, the rangeland resources should not only ensure the normal people's needs in production and living in mountain areas but also meet their needs in ecological safety, that is, maintain the virtuous circle of the rangeland eco-economic system. With the increasing population and the gradual improvement of living standards, more and more attention has been paid to how to make full use of rangeland resources and improve their economic and ecological benefits as much as possible, so as to continuously improve the human standard of living and maintain a good living environment. Rangeland degradation, as a worldwide problem, is not only an eco-environmental problem but also a socio-economic issue. This is because rangeland degradation is often together with the fragile ecological environment and unsustainable development. Actually, in many cases, rangeland degradation indicates the failure relationship among population, resources and environment[5]. In mountain areas, rangeland degradation is closely related to over-population, climate changes, meager natural resources, inadequate investment, poor governance, extensive management, and the development concept concentrating on development but ignoring governance. The risk of rangeland degradation is a real but an easily overlooked problem. Rangeland degradation is not only an agricultural natural disaster but also closely related to the country's ecological security and water security. Generally speaking, rangeland areas are not suitable for farming and reclamation of rangeland may cause serious land degradation of mountain areas. The productivity (biomass yield) of these grasslands is highly influenced by summer rains. Primary productivity in this cold arid region is low compared to more temperate, moist regions. Consequently, these rangelands are prone to overutilization and degradation. A frequently repeated statistic is that 90% of China's grasslands are degraded to some extent[6] and studies from Qinghai and Tibet report that 23% and 17.2% of the total grassland areas are moderately or severely degraded. The productivity of rangelands has been adversely affected due to misuse and overgrazing. n accordance with the National Grassland Ecosystem Construction Planning and National Grassland Monitoring Report 2007, China's ecological environment of rangeland presented the overall deterioration and local improvements in 2007.

2 Rangelands and Carbon Cycle

Livestock and pastures are among the principle components of many livelihood systems throughout the mountain areas of China. Generally, the grazing of cattle, sheep, goats, and yak in forests and highland pastures can be found throughout the region. However, permanent pastures where rangeland activities are more important than agricultural farming are mainly distributed in arid zones of the Tibetan Plateau. In areal terms, vast areas of pastures are located mainly on the Qinghai-Tibet Plateau. Rangelands are the predominant vegetation type, representing one of the largest continuous rangeland regions in the world. The rangelands store some 25% of China's total soil carbon[7]. The Plateau has a critical influence on regional weather systems. Rangelands cover more than half of the Plateau's total land area. The more than 100 million ha of Rangeland are the basis for the pastoral and agropastoral livelihoods of more than 5 million people. Almost 75% of these rangelands fall into the two categories of alpine meadow (58.8 million ha) and alpine steppe (37.8 million ha), following a declining precipitation gradient going from east to west. The rangelands of China have been subjected to a variety of impacts through pastoral development in the last 60 years and these may provide a number of opportunities for management intervention.

Grazing land management has been included as one of the options under Article 3.4 for Annex 1 parties to account for anthropogenic greenhouse gas emissions by sources and removals by sinks under agreements on the Kyoto Protocol. In China, grazing of rangelands is the most extensive land use, and changes in rangelands management could have a significant impact on the country's carbon balance (see fig. 1). Implementation of practices with positive carbon storage outcomes may have a major bearing on the economics of livestock production, and may be limited by social and cultural factors. Carbon gains could be obtained from increases, or reduction in losses, of plant biomass, and from accumulation, or reduction in losses, of soil carbon. An estimate for the USA suggests that improved management of rangelands could provide gains of 0.1–0.3 t $ha^{-1}year^{-1}$ and avoid loses of 43 Mt/year[8]. However, there is considerable uncertainty surrounding the

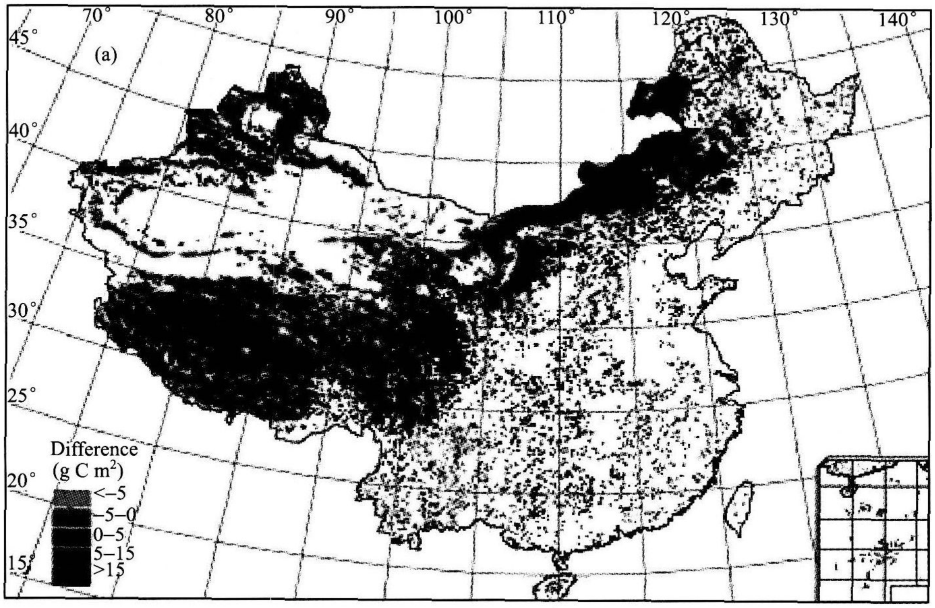

Fig.1 Carbon sinks in the rangelands of China[9]

magnitude and reliability of management-induced sinks in arid and semi-arid rangelands. These environments are highly sensitive to climatic cycles that may create periods of nil gain, or drought and degradation episodes that could result in significant carbon losses.

3 Rangelands Management for Carbon Sequestration

Rangeland ecosystems are very complex, both in terms of vegetative community and soils, making it difficult to adequately characterize the carbon sink, and hence, short-term changes due to management or environmental changes. Soil erosion also can affect rangeland soil carbon distribution but generally does not result in soil carbon loss to the atmosphere. Erosion can cause changes in carbon storage if mineralization rates are different in source and depositional areas, or if reductions in plant productivity in source areas exceed gains in depositional areas. Rangelands are a large repository of soil carbon because of their high carbon density and the vast land area they occupy. Throughout the world, improved rangeland management strategies and practices could greatly increase soil carbon sequestration, while greatly improving their production potential and other environmental benefits. Management of rangelands has been included in land-based mechanisms for reduction of greenhouse gas emissions. The management factors include reserves and rehabilitation, grazing management, control or spread of woody weeds and introduction of browse shrubs[10], ecological compensation mechanism. The impact of these factors may be influenced by frequency of good and poor growth years, frequency of droughts and be discounted due to social and economic barriers to adoption.

3.1 Reserves and rehabilitation

The exclusion of livestock and feral animals and the use of an appropriate fire regime may enable rangeland productivity and carbon stocks to increase. Benefits from conversion of cropland to grassland under the Conservation Reserve Program (CRP) in the USA may be as high as 0.3 t $ha^{-1}year^{-1}$, but rates may be much slower and vary with management and locations[11]. Effects may be less beneficial where the landscape has already been modified by ingress of exotic and indigenous woody weeds forming a vegetation state offering little opportunity for further carbon gains.

3.2 Grazing management

Heavy grazing can damage or kill palatable shrubs and trees, and degrade the understory rangelands[12]. Since soil carbon content is dependent upon inputs of organic matter from senescent vegetation and root turnover, destruction of this vegetation reduces or removes inputs and leads to exposure of surface soil to erosion and increased oxidation of carbon. Heavy grazing pressure may cause major changes in carbon distribution after about 4 years, representing a relatively rapid loss. Whilst grass basal cover can recover quickly with favorable climatic conditions and reduced grazing pressure, soil carbon recovery is slower. Thus, soil carbon stocks in rangelands are sensitive to the management of total grazing pressure, and sustainable grazing management is important for avoidance of soil carbon losses.

3.3 Exotic woody browse shrubs

Establishment of exotic and native woody browse plants and fodder trees in grazing systems might result in substantial increases in above-ground biomass. The tactical use of browse to reduce grazing pressure on associated pasture may increase carbon stocks through increased perennial plant density (e.g., grass basal cover) over the whole grazing property. However, the use of fodder trees to feed animals in extended droughts can result in substantial decline in tree biomass. Furthermore, the retention of this stock on pasture at the break of drought reduces the regeneration of grasses and shrubs potentially leading to a decline in soil carbon and an overall decline in carbon stocks.

3.4 Ecological compensation mechanism

In order to rectify market failures, the Chinese government has formulated many policies and planning about rangeland ecological construction. As suggested by National "Eleventh Five-Year" Plan, an ecological compensation mechanism should be established according to the principle that people who develop and protect the grassland will be benefited and compensated. It is necessary to improve the eco-compensation policy and establish an ecological compensation mechanism as soon as possible. In addition, ecological compensation should be considered in the central and local fiscal transfer payment, and national and local departments should set up ecological compensation pilots. As further rose by Suggestion on promoting sustaining and health development of animal husbandry industry from State Council (Nation, 2007) No.4, it is essential to explore and establish rangeland eco-compensation mechanism and maintain ecological safety. Although the Chinese government has compensated for the grassland ecosystem, a set of systematic, scientific and rational ecological compensation mechanism has not yet been established due to the complexity of the interest adjustment related to ecological compensation. Moreover, pasture culture should be restored, and the trend of ecological deterioration of rangeland in mountain areas should be basically controlled. Although China has carried out a large-scale rangeland ecological construction since 1998, rangeland ecological environment still shows the overall deterioration and partial improvement in 2007. Eco-compensation is the approval to the_acknowledgment to rangeland ecosystem which reflects the value of rangeland ecological resources, makes up for the inadequacy of funds for rangeland resource construction, and promotes a coordinated development of human and nature.

4 Conclusions

Rangeland ecosystems in China mountain areas are very complex and rangelands are a large repository of soil carbon because of their high carbon density and the vast land area they occupy.

Throughout the world, improved rangeland management strategies and practices could greatly increase soil carbon sequestration.

Acknowledgement

This work is supported by the Scientific Research Foundation of CUIT (KYTZ201030) and the Recycling Economy Research Center of Sichuan Province (XHJJ-0902). This support is gratefully acknowledged.

References

[1] DAHV and CISNR. Rangeland resources of China [M]. Beijing: China Agricultural Science and Technology Press, 1996:346. (in Chinese)

[2] Wen BAO. Human Carrying Capacity of Rangeland Resources in China Mountain Areas. Animal Husbandry and Feed Science [J], 2009, 1(4-5): 7-10.

[3] Scurlock JMO, Hall DO. The global carbon sink: a grassland perspective [J]. Global Change Biology, 1998,4: 229-233.

[4] Hall DO, Ojima, DS, Parton WJ, Scurlock JMO. Response of temperate and tropical grasslands to CO_2 and climate change [J]. Journal of Biogeography, 1995,22: 537-547.

[5] Wen BAO. Eco-taxes and Sustainable Utilization of Grassland Resources [J]. Animal Husbandry and Feed Science, 2009,1(3): 44-48.

[6] Harris, RB. Rangeland degradation on the Qinghai-Tibet plateau: A review of the evidence of its magnitude and causes [J]. Journal of Arid Environments, 2009, 74(1):1-12

[7] Wang, GX; Qian, J; Cheng, G; Lai, Y. Soil organic carbon pool of grassland soils on the Qinghai-Tibetan Plateau and its global implication [J]. Science of the Total Environment, 2002,291: 207-217.

[8] Schuman, G.E., Janzen, H.H., Herrick, J.E. Soil carbon dynamics and potential carbon sequestration by rangelands [J]. Environmental Pollution, 2002,116:391-396

[9] The potential carbon sinks in the rangelands of China [EB/OL].http://www.kepu.net.cn/gb/special/200912_01_gbhg/wz/s04.html.

[10] Jiangwen Fan, Huaping Zhong, Warwick Harris, Guirui Yu, Shaoqiang Wang, Zhongmin Hu, Yanzhen Yue. Carbon storage in the grasslands of China based on field measurements of above- and below-ground biomass [J]. Climatic Change, 2008, 86: 375-396.

[11] Burke, I.C., Lauenroth, W.K., Coffin, D.P. Soil organic matter recovery in semiarid grasslands: implications for the Conservation Reserve Program [J]. Ecological Applications, 1995,5:793-801.

[12] McIvor, J.G., Ash, A.J., Cook, G.D. Land condition in the tropical tall grass pasture lands. 1. Effects on herbage production [J]. Rangeland Journal, 1995,17: 69-85.

Optimize Public Transit Situation in Xi'an International Port Zone Based on Queuing Theory

CHANG Yao[1], YANG Maosheng[2]

(1. School of Management, Xi'an University of Architecture & Technology, Shaanxi 710055,China;
2. School of Management, Xi'an University of Architecture & Technology, Shanxi 710055,China)

Abstract: Pedestrian flow and public transit status are analyzed in Xi'an international port zone. A rational model based on deterministic queuing theory is presented for analyzing pedestrian flow and bus quantity. Then, application of this method is demonstrated by using a hypothetical data from above-mentioned model. Finally, a method of sensitivity analysis is used to discuss the impact of uncertain factors and find more effective ways to optimize resources.

Key words: Xi'an international port zone; queuing theory; passion distribution; public transit optimizing

CLC number: F570.3 **Document code:** A

1 Introduction

As a key city of Western Development, Xi'an has gain a national focus on promoting its constructions. With its strategic location, convenient transportation and inclusive city development strategies, Xi'an has become an important economic center and the western transport hub to promote the region's economic and urban development. Cooperation with Shanghai, Xi'an international port zone is order to build China's largest inland port; it will greatly enhance the region's economic strength, contribute to China's western logistics distribution, container business and other functions.

Xi'an international port zone is located in the Xinzhu town Baqiao district. This new town holds 4 million people, the establishment of the international port zone will bring large amount of people logistics, then the travel of local residents and external workers will face tremendous communication problems. However, the region's public transport situation is not optimistic: At present Xi'an has 197 bus lines, only 10 lines of which cover Baqiao District, merely take up 5% of the total number; The bus which could reach the international port zone building is fewer, you can only take 233 bus to get off at fog village bus stop, then walk some hundreds meters towards north. Usually the fog village stop has a large people flow and the car is always crowded. If the bus situation is not improved in time it will greatly restrict the development of the international port zone.

This paper is designed to address questions above, use queuing theory to set up a rational

---

1 **Sponsored by** Shanxi Provincial Key Discipline Projects Fund

Biography CHANG Yao (1986—), graduate student, 15991987374, yaoyao305@hotmail.com