1. Record Nr. UNINA9910830679103321

Titolo	Check dam construction for sustainable watershed management and planning / / edited by Zhanbin Li, Peng Li, Yang Yu, Peng Shi, and Guillaume Piton
Pubbl/distr/stampa	Hoboken, NJ : , : Wiley, , 2022 ©2022
ISBN	1-119-74244-7 1-119-74243-9 1-119-74242-0
Edizione	[First edition,]
Descrizione fisica	1 online resource (xii, 307 pages)
Disciplina	627/.8
Soggetti	Dams - Design and construction Soil conservation Watershed management
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Notes on Contributors -- Preface -- Section I Dam Development -- Chapter 1 The Formation and Development of a Dam System in a Small Watershed in the Loess Plateau -- 1.1. INTRODUCTION -- 1.2. HISTORICAL EVOLUTION OF DAM SYSTEM CONSTRUCTION IN THE LOESS PLATEAU -- 1.2.1. Western Zhou Dynasty -- 1.2.2. Ming and Qing Dynasty -- 1.2.3. The Period of the Republic of China -- 1.3. CONSTRUCTION AND DEVELOPMENT OF CHECK DAMS SINCE THE FOUNDING OF THE PEOPLE'S REPUBLIC OF CHINA -- 1.3.1. First Stage (1949-1957) -- 1.3.2. Second Stage (1958-1970) -- 1.3.3. The Third Stage (1971-1985) -- 1.3.4. The Fourth Stage (1986-1995) -- 1.3.5. The Fifth Stage (After 2000) -- 1.4. CHARACTERISTICS OF CHECK DAM CONSTRUCTION IN THE NEW PERIOD -- 1.4.1. Carrying Out Dam System Construction and Comprehensive Watershed Management Simultaneously -- 1.4.2. Establish of Typical Demonstration Dam System from Point to Region -- 1.4.3. Enriching and Developing the Theory of Check Dams and Standardizing Construction -- 1.5. ACHIEVEMENTS IN THE

CONSTRUCTION OF CHECK DAMS IN THE LOESS PLATEAU -- 1.5.1. Development History of Check Dam Construction in the Loess Plateau -- 1.5.2. Distribution According to Key Areas of Water and Soil Erosion -- 1.6. EVOLUTION AND ITINERARY OF THE DAM SYSTEM IN A TYPICAL SMALL WATERSHED -- 1.6.1. Historical Analysis of the Evolution of Jiuyuangou Dam System -- 1.6.2. Historical Analysis of Wangmaogou Dam System Evolution -- 1.7. CONSTRAINTS ON THE SAFETY AND STABILITY OF DAM SYSTEMS IN SMALL WATERSHEDS IN THE LOESS PLATEAU -- 1.7.1. Existing Check Dams' Severe Aging, and Low Capacity for Flood Control and Sediment Reduction -- 1.7.2. Unreasonable Layout, Unsuitable Facilities, and Low Standards of Dam System -- 1.7.3. Severe Salinization and Low Utilization Rate of Dam Land.
1.7.4. Lagging Management and Maintenance of Check Dams -- 1.7.5. Construction Period and Quality Affected Because of the Lag in Preliminary Work -- 1.7.6. Imperfect Theory of Dam System Construction and Certain Key Technical Problems Remain Unresolved -- References -- Chapter 2 Water and Soil Conservation by Check Dam Construction -- 2.1. Introduction -- 2.2. Method -- 2.3. Flood Detention and Water Storage Effects of the Check Dam System -- 2.3.1. Infiltration Characteristics Under Different Land-Use Conditions -- 2.3.2. Impact of Check Dam on the Runoff Process in Watersheds -- 2.4. Analysis of Sediment Retention and Water Storage by Check Dam System -- 2.4.1. Precipitation Analysis -- 2.4.2. Sediment Retention of Dam Systems in Small Watersheds -- 2.5. Analysis of Sediment Retaining Measures on Slopes in Small Watersheds -- 2.6. Analysis of Water Storage and Utilization of Dam Systems in Small Watersheds -- 2.7. Effects of Check Dam on Water and Soil Conservation in the Wuding River Watershed -- 2.7.1. Check Dam Construction in Wuding River Watershed -- 2.7.2. Long-Term Changes in Precipitation, Runoff, and Sediment in Wuding River Watershed -- 2.7.3. Simulation of Check Dam on Runoff and Sediment Regulation by SWAT Model -- 2.8. Discussion -- 2.9. Conclusion -- References -- Chapter 3 Regulating the Effect of a Check Dam Systemon Sediment Redistribution -- 3.1. Introduction -- 3.2. Method -- 3.3. Particle-Size Analysis of Sediment in Dams -- 3.3.1. Statistical Characteristics of Soil Particle Size in Dams -- 3.3.2. Texture Classification of Sediment in Dam -- 3.3.3. Coarseness of Soil Particles in Dams -- 3.4. Soil Particle and Fractal Characteristics in Dams -- 3.4.1. The Fractal Dimension Distribution of Soil Particles in Dams -- 3.4.2. Relation Between the Fractal Dimension and the Composition of Soil Particles in Dams.
3.5. Relation Between Soil Particles' Fractal Dimension and Soil Properties -- 3.6. Sedimentation Characteristics of Different Types of Single Dams -- 3.6.1. Sedimentation Characteristics of Dams with a Drainage Structure -- 3.6.2. Sedimentation Characteristics of Dams with a Spillway -- 3.6.3. Sedimentation Characteristics of Check Dams -- 3.7. Sedimentation Characteristics of Dam According to Dam System -- 3.7.1. Sedimentation Characteristics of Dams Under Different Cascade Modes -- 3.7.2. Sedimentation Characteristics Under Different Channel Levels -- 3.7.3. Sedimentation Characteristics Under Different Dam Systems -- 3.8. Soil Sedimentation Characteristics of the Dam System -- 3.9. Conclusion -- References -- Chapter 4 An Analysis of Sediment Sources and Water-Sediment Retarding Effects of Check Dams -- 4.1. Introduction -- 4.2. Method -- 4.3. Sediment Source Identification in Typical Small Basins -- 4.3.1. Sediment Sources in the Yuanzigou Basin of Inner Mongolia -- 4.3.2. Sediment Sources in the Yuanping Basin of Hengshan County -- 4.3.3. Sediment Sources for the Nianyangou Basin in Suide County -- 4.4. An Analysis of Sediment

Sources in a Small Basin of the Loess Plateau -- 4.4.1. The Huangfuchuan Basin -- 4.4.2. Wuding River Basin -- 4.4.3 Yanhe River Basin -- 4.4.4 Other Basins -- 4.5. Flood Detention and Sediment Trapping Effect of Check Dams Following a Typical Rainstorm in Suide on July 26 in 2017 -- 4.5.1. The Typical Rainstorm in Suide on July 26 in 2017 -- 4.5.2. Check Dam Construction in the Rainstorm Area on July 26 in Northern Shaanxi Province -- 4.5.3. Flood Detention and Sediment Trapping of Check Dams -- 4.5.4. Characteristics and Causes of Check Dam Damage Under Heavy Rain -- 4.6. Sand Blocking Effect of Check Dams in the Typical Rainstorm of Suide County on July 15 in 2012 -- 4.6.1. Rainstorm Flood in Suide on July 15. 4.6.2. Sediment Retention Analysis of Check Dams During the Rainstorm in Jiuyuangou Basin on July 15 -- 4.6.3 Sedimentation Characteristics of Dams During the Rainstorm Flood -- 4.7 Conclusion -- References -- Chapter 5 The Regulation of Check Dam System in Erosion Dynamic Process -- 5.1. Introduction -- 5.2. Method and Materials -- 5.2.1. Governing Equations and Numerical Schemes -- 5.2.2. Overflow Weir Treatment -- 5.2.3. Research Site and Data -- 5.2.4. Scenarios Overview -- 5.2.5. Evaluation Metrics -- 5.2.6. Performance Metrics of Model Accuracy -- 5.3. Quantitative Assessment of Check Dam System Impacts on Catchment Flood Characteristics -- 5.3.1. Flood Simulation in the Wangmaogou Catchment -- 5.3.2. Peak Discharge and Runoff Volume -- 5.3.3. Runoff Lag Times -- 5.3.4. Maximum Discharge and Corresponding Location Along the Main Channel -- 5.3.5. Relationship Between Channel Connectivity and Outlet Runoff Characteristics -- 5.4. The Regulation of Check Dam System in Erosion Dynamic Process -- 5.4.1. Dynamic Parameters of Channel Erosion -- 5.4.2. Average Velocity of Runoff Varies Along the Channel -- 5.4.3. The Shear Stress of Runoff Varies Along the Channel -- 5.4.4. The Runoff Power Varies Along the Channel -- 5.4.5. The Runoff Kinetic Energy Varies Along the Channel -- 5.4.6. The Runoff Erosion Power Varies Along the Channel -- 5.5. Variation Process of Hydrodynamic Parameters Before and After the Silt Dam with Time -- 5.5.1. Variation Process of Velocity -- 5.5.2. Variation Process of Runoff Shear Stress -- 5.5.3. Variation Process of Runoff Power -- 5.5.4. Variation Process of Runoff Kinetic Energy -- 5.6. Conclusion -- References -- Section II Dam Erosion Processes and Dynamics -- Chapter 6 The Mechanism of Erosion Reduction by Check Dam -- 6.1. RESEARCH PROBLEM AND WORKING CONDITION DESIGN -- 6.1.1. Problem Description. 6.1.2. Working Condition Design -- 6.1.3. Model Building -- 6.2. PEAK CUTTING AND FLOOD DETENTION EFFICIENCY OF WARPING DAMS -- 6.2.1. Storage Capacity Threshold for Spillway Control -- 6.2.2. Peak Cutting and Flood Detention Efficiency of Dam Site Control -- 6.3. SILT INTERCEPTION EFFICIENCY OF SILT DAM -- 6.3.1. Sediment Interception Efficiency -- 6.3.2. Direct Sedimentation Efficiency of the Dam -- 6.3.3. Indirect Erosion Reduction Efficiency of Dam -- 6.4. DIFFERENCES IN SCOURING AND SILTING PATTERNS ON THE DAM -- 6.4.1. Erosion and Deposition Process on the Dam -- 6.4.2. Final Distribution Law of Sediment -- 6.5. CONCLUSION -- REFERENCES -- Chapter 7 The Mechanism of Water Damage of Check Dam -- 7.1. Introduction -- 7.1.1. Water Loss Characteristics and Cause Analysis of Check Dams in Loess Plateau -- 7.1.2. Analysis on the Forms and Causes of Check Dam Break -- 7.1.3. Development History of Check Dams on the Loess Plateau -- 7.2. Experiment on Dam Damage Mechanism Caused by Cavitation Erosion of Water Discharge Structure -- 7.2.1. Overview of the Experiment -- 7.2.2. Results Analysis -- 7.3. Safety Stability Analysis of Check Dam -- 7.3.1.

Explanation of the Theoretical Model -- 7.3.2. Results of Numerical Simulation Calculation -- 7.4. Simulation of Check Dam Break -- 7.4.1. Description of Model -- 7.4.2. Result Analysis -- 7.5. Conclusion -- References -- Chapter 8 Flood Control Risk Assessment on Warping Dam Systems -- 8.1 Introduction -- 8.2 Composition and Determination of Flood Control Risk Assessment System for Warping Dams -- 8.2.1 Construction of Risk Assessment Index System for Warping Dams -- 8.2.2 Assessment Index Calculation and Standardization -- 8.2.3 Indicator Weight Determination Based on Fuzzy Analytic Hierarchy Process -- 8.3 Flood Control Risk Assessment of Warping Dam System in Jiuyuangou Watershed. 8.3.1 Risk Calculation and Risk-Level Standard Classification.

Sommario/riassunto

"This reference book summarizes the current knowledge about check dams as key soil and water conservation structures in some of the most sensitive and vulnerable ecosystems in the world, as exemplified by the Mediterranean area and the Chinese Loess Plateau. Check Dam Construction for Sustainable Watershed Management and Planning provides basic knowledge on check dam design and watershed planning, the use of advanced modelling techniques and decision-making support tools, and discusses challenges in dam construction and how to overcome them. Sections I and II focus on the experiences gained from the erosion hotspots in the Chinese Loess Plateau, whereas Section III expands the scope to other regions with different functions for check dams, including headwater ecosystems and alpine environments. Volume highlights include: - Advantages and limitations of ecological engineering efforts during long-term watershed restoration - Case studies from Austria, China, France, Iran and Japan - A thorough discussion of dam erosion dynamics and processes - Recent technologies such as isotope tracers, long-term in-situ monitoring in conjunction with GIS and field observation platforms With its systematic coverage of all aspects of dam construction and maintenance, this unique reference can support decision making by local authorities and can also be used as a professional guide for ecologists, hydrologists and water resource managers"--