

三江源国家公园旅游碳排放研究

王冰¹, 陈美兰¹, 李郊¹, 罗亚培¹, 张佳琪¹, 郑鑫¹, 石金莲², 杨绮君²

(1. 国家林业和草原局产业发展规划院, 北京, 100010; 2. 北京工商大学, 北京, 100048)

摘要: 三江源是我国设立的首批国家公园之一, 是我国青藏高原生态安全屏障的重要组成部分, 也是全球气候变化的敏感区和影响显著区。作为国家公园的重要功能之一, 游憩是实现全民公益性的一大途径。生态环境的脆弱性决定了三江源国家公园需要科学规划、完善生态旅游体系, 明晰旅游业碳排放总量与结构特征, 并对未来生态旅游提出对策建议, 这对于响应中国双碳目标与推动国家公园生态旅游可持续发展具有重要意义。本研究以三江源国家公园为研究区, 基于生命周期评价理论(LCA), 创新性使用手机信令数据, 采用旅游碳排放测算模型, 计算了长江源园区、澜沧江源园区、黄河源园区的交通、餐饮、旅游活动碳排放和住宿的碳排放, 分析了游客概况和碳足迹热点, 探讨了旅游活动主要碳足迹的时空特征及其影响机制, 为完善三江源国家公园生态旅游提供数据支撑和决策依据。研究发现, 旅游客源主要来自于周边省份和东部地区, 各个园区的客源分布存在一定差异; 游客的性别构成偏向男性, 男女比例近似为 3:1; 游览天数以两日游人数最多。长江源园区旅游热点区域主要位于园区东部, 沿着 G109 国道东侧分布; 澜沧江源园区旅游热点区域主要位于园区东部的三江源国家公园-大猫谷自然体验区域, 在西部有少量分布在阿多乡等村庄, 并沿着道路呈现规律分布; 黄河源园区的旅游热点区域呈现较为离散的特点, 除沿道路分布外, 也有景点聚集的特征。三江源国家公园旅游总碳排放为 1680014kgCO₂, 其中, 黄河源园区的旅游总碳排放为 702460kgCO₂, 高于另外两个园区。澜沧江源园区的人均碳排放最高, 为 54.18kgCO₂/pep, 这与参与的旅游活动和资源消耗有关。黄河源园区日人均碳排放最高, 为 15.36kgCO₂/day。长江源园区的人均交通碳排放最高, 黄河源园区的人均餐饮碳排放最高, 澜沧江源园区的人均旅游活动和人均住宿碳排放最高。基于上述分析, 从倡导团体旅游、使用清洁能源、规范游客行为、充分利用现有设施、优化旅游线路和产品等方面提出三江源国家公园生态旅游碳减排对策。

Study on carbon emissions from tourism in Sanjiangyuan National Park

WANG Bin¹, CHEN Meilan¹, LI Jiao¹, LUO Yapei¹, ZHANG Jiaqi¹, ZHENG Xin¹, SHI Jinlian², YANG Qijun²

(1. Industrial Development and Planning Institute, NFGA, Beijing, 100010; 2. Beijing Technology and Business University, Beijing, 100048)

Abstract: The Sanjiangyuan, one of the first group national parks established in China, is an important part of the ecological security barrier of the Qinghai-Tibetan Plateau, as well as a sensitive area and an area of significant impact of global climate change. As one of the important functions of the national park, recreation is a major way to realize the public welfare for all. The vulnerability of the ecological environment determines that the Sanjiangyuan National Park needs to plan scientifically, improve the ecotourism system, clarify the characteristics of the total carbon emissions and structure of the tourism industry, and put forward countermeasures and suggestions for the future of ecotourism. It is significant for responding to China's dual-carbon goals and promoting the sustainable development of ecotourism in national parks. Taking Sanjiangyuan National Park as the study area, based on the theory of Life Cycle Assessment (LCA), the innovative use of mobile phone signal data, and the adoption of the tourism carbon emission measurement model, this study calculated the carbon emissions from transportation, catering, tourism activities, and accommodation in the Yangtze River Source Park, the Lancang River

Source Park, and the Yellow River Source Park. The spatial and temporal characteristics of the main carbon footprints of tourism activities and their influence mechanisms were explored to provide data support and decision-making basis for improving ecotourism in Sanjiangyuan National Park. The study found that tourism sources mainly come from neighboring provinces and the eastern region, and there are some differences in the distribution of sources in each park. The gender composition of tourists is skewed in favor of males, with an approximate male to female ratio of 3:1. The number of days visited is highest for two-day tours. The tourism hotspot area of the Yangtze River Source Park is mainly located in the east of the park and distributed along the east side of National Highway G109. The tourism hotspot area of the Lancangjiang River Source Park is mainly located in the natural experience area of Dacang Valley in the east of the park, with a small number of them distributed in villages such as Aduo Township in the west and regularly distributed along the roads. The tourism hotspot area of the Yellow River Source Park is more discrete and characterized by the gathering of attractions in addition to the distribution along the roads. The tourist hotspot areas in the Yellow River Source Park are more discrete, and are characterized by the gathering of attractions in addition to the distribution along the roads. The total carbon emission from tourism in Sanjiangyuan National Park is 168,014 kgCO₂, of which the total carbon emission from tourism in the Yellow River Source Park is 702,460 kgCO₂, which is higher than the other two parks. The Lancang River Source Park has the highest per capita carbon emission of 54.18 kgCO₂/pep, which is related to the tourism activities and resource consumption involved. The Yellow River Source Park had the highest daily per capita carbon emission of 15.36 kgCO₂/day. The Yangtze River Source Park has the highest per capita carbon emissions from transportation, the Yellow River Source Park has the highest per capita carbon emissions from food and beverage, and the Lancang River Source Park has the highest per capita carbon emissions from tourism activities and per capita carbon emissions from lodging. Based on the above analysis, carbon emission reduction countermeasures for ecotourism in Sanjiangyuan National Park are proposed in terms of advocating group tourism, using clean energy, regulating tourists' behaviors, making full use of existing facilities, and optimizing tourism routes and products.