

Green Poverty Alleviation in Poor Minority Areas of Western China

# **Environmental Impact Statement for Demonstrating Cultivation Plan of Jarrah Dayun in Hetian, Xinjinag**



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## **ABSTRACT**

The GOC-UNDP GPA aims at the poverty alleviation in rural area of western China through the combination of eco-environmental rehabilitation and energy development based on environmental friendly technologies. As one of the three pilot projects, a cultivation plan of 9000-mu Jarrah Dayun is going to be implemented in three counties (Pishan, Luopu, Hetian) of Hetian, Xinjinag. This project is expected to alter the extreme dependency of local economy on natural resources and to rehabilitate and strengthen the fragile eco-system, while directly increasing the income of poverty-stricken population. According to the expected outputs this pilot project, a comprehensive assessment of potential environmental impacts is mandatory before the cultivation, which has been undertaken by the University of Regina in Canada.

This task was implemented by the application of Life Cycle Assessment (LCA) and based on the data from the previous baseline survey in Hetian conducted by an expert panel. During the assessment, the life cycle components of Jarrah Dayun Cultivation were determined, various potential environmental impacts were identified, the impact degrees were quantitatively assessed, and an overall evaluation of the comprehensive impacts was produced as well as suggestions on the alleviation of impacts.

Firstly, an introduction of fundamental concepts and methodological framework of LCA was delivered, and a short review regarding the worldwide LCA research and application was also presented. Then, according to the national and ISO LCA standards, the assessment process is composed of four phases: a) Goal Definition and Scoping; b) Inventory Analysis; c) Impacts Assessment; and d) Results Interpretation.

The system boundary was determined to include the whole process of LCA cultivation from the nursery management to the harvest of Dayun. The functional unit was set as one mu (0.16 acre approximately) 3-year Jarrah that could produce Dayun steadily. Data for inventory analysis was

mainly from the results of baseline survey, supplementing by those from an additional small survey and various professional literatures.

Based on the SETAC and US-EPA classification scheme, eight impact categories were identified: i) resources depletion, referring to water resources and land resources; ii) climate change, resulting from the production and application of various chemical and organic fertilizers; iii) water quality, covering impacts on both surface runoff and ground water; iv) air quality and local climate; v) soil quality; vi) human toxicity, covering the impacts on occupational health from the applications of two pesticides – Cyhalothrin and Methidathion; vii) ecological toxicity and viii) local bio-diversity .

Assessment results showed that the pilot project would not cause any noticeable impacts on land resources, water quality, air quality, soil quality, ecological health and bio-diversity. Results also suggested that the depletion of water resources, release of greenhouse gas and impacts on occupational health could not be ignored, which were then quantitatively analyzed through characterization and weighting addition.

During the assessment of impact on water resources depletion, an innovative parameter – Water Resources Pressure Coefficient – was introduced to describe the tension between local water supply and demand. Results showed that the greatest impact on resources depletion would take place in Pishan County with an index value of 109.68, mainly due to the relatively low efficiency of water consumption and low quantity of water resources in this county. As for the category of climate change, Hetian County was determined as the one with greatest contribution to global warming (355.04) among the three counties, because of the great quantity of fertilizers that would be applied. Luopo County has the highest value (43.48) of impact index when assessing the toxic effect of pesticides.

After normalization and weighting addition, an overall index was generated to characterize the integrated impacts of the proposed Jarrah Dayun cultivation in each county, of which high value refers to the great impact on local environment and resources. The index values of Pishan, Luopo and Hetian were 35.52, 29.56 and 34.92 respectively. This result was verified to be partly consistent with the reported productivity of Dayun in the three counties. The assessment results

demonstrated that the pilot project in Hetian will not exert any serious impacts on local environment or cause any extreme depletion of local resources.

Finally, regarding the identified impacts, suggestions were presented for the impact mitigation such as improving irrigation efficiency, optimizing fertilizer application, enhancing groundwater extraction and exploring ecological control of insect pests.

中国西部边穷地区绿色扶贫计划  
新疆和田红柳大芸示范项目  
环境影响评价报告



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## 摘 要

中国政府和联合国开发计划署共同实施的绿色扶贫计划以生态环境重建和能源发展为切入点，以环境友好的先进科学技术为主要输入，通过“绿色扶贫”策略将扶贫和改善生态环境以及农村能源发展结合起来，以求建立适合西部少数民族贫困地区的科技、能源和扶贫相结合的全新区域发展机制。该计划的示范项目之一是在新疆和田地区三个县推广种植 9000 亩红柳大芸，协助当地减少对自然资源的过度使用，恢复和加强脆弱的生态系统，同时为贫困人口直接创造增收机会。本项目是和田示范项目的组成部分，基于绿色扶贫项目的基本原则和要求，在种植活动正式开展之前对潜在的环境影响进行全面的辨识和科学的评价。评价工作由加拿大里贾纳大学承担。

本项目的评工作以基线调查的成果为主要数据基础，采用国际上先进的生命周期评价方法，分析了红柳大芸种植活动生命周期的各个环节，识别了不同层次、不同类型的潜在环境影响，并对影响强度进行了定量评估，最终对示范项目的总体环境效应形成了科学的认识，并针对如何消除或减弱这些环境影响提出了建设性意见。评价报告首先介绍了生命周期方法的基本概念和技术框架，并简要总结了国内外的研究和应用状况。依照 ISO 和国家标准，评价过程分为四个阶段，即目的与范围确定、清单分析、影响评价和结果解释。

红柳大芸种植项目的影响类型划分为资源耗竭、全球气候变化、水环境质量、大气环境质量、土壤状况、人体毒性、生态毒性和生物多样性等 8 类。评价结果显示，示范项目不会造成土地资源的恶性消耗，在水环境质量、大气环境质量、土壤状况、生态毒性和生物多样性等方面均不存在值得关注的影响；示范项目在水资源消耗、温室气体排放和人体毒性等方面将存在一定的影响，而且影响水平因县而异。

本项目对所识别的三类潜在影响通过特征化过程予以量化评价，并采取加权平均的方法给出各项目县的综合影响水平。在水资源耗竭方面，本项目主要考虑水资源在灌溉过程中的消耗，并引入水资源压力系数以表征以表征各地满足水资源需求的紧张程度，结果显示皮山县的资源耗竭影响最为显著，指标特征值为 109.68；在气候变化方面，本项目主要考虑肥料（包括各类化肥和有机肥）的生产和使用过程中所排放的温室气体，结果表明和田县的气候变化影响最为显著，指标特征值为 355.04；在人体毒性方面，本项目主要考虑两类杀虫剂（功夫和杀扑磷）对职业人群的非致癌性长期健康影响，结果中以洛浦县的特征指标值 43.48 为

最高。通过标准化和加权综合过程获得了示范项目在各项目县的综合影响水平，皮山县、洛浦县和田县的综合值分别为 35.52，29.56 和 34.92，并与目前各县的大芸亩均产量有一定吻合。评价结果说明，示范项目的种植活动不存在严重的环境影响，对当地资源不造成恶性消耗。

针对所识别的三类潜在影响，本项目建议采取多种技术措施予以改善，包括改善灌溉方式、加大地下水开发力度、制定合理的施肥制度和探索虫害的生态防治方法等。