

# 行政院國家科學委員會補助專題研究計畫成果報告

非使用價值與動機:

再生性資源的開發與保育之動態分析

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# 行政院國家科學委員會專題研究計畫成果報告

## 非使用價值與動機：

## 再生性資源的開發與保育之動態分析

### Nonuse Value and Motives : A Dynamic Analysis on the Exploitation and Conservation of Renewable Resources

計畫編號：NSC 89-2415-H-032-033

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#### 一、中文摘要

這項研究探討了根源於再生性資源管理的存在價值的動機在環境公共財的提供時的角色。研究發現,非家長式利他與家長式利他的不同動機下可能導致因共有資源問題而引起的不同程度的資源之過度開發資源的管理與開發。若考慮存在價值 那麼 資源的最適數量將因不同型態的利他動機而有所差異。

關鍵詞：非家長式利他 家長式利他 存在價值 再生性資源 多物種資源

#### Abstract

This study analyzes the theoretical aspects of altruistic motives stemming the existence values of species in the management of renewable resources and the provision of environmental public goods with a dynamic framework. It characterizes the conditions that non-paternalistic and paternalistic altruism could lead to different levels of over-harvesting of natural resources and/or under-provision of environmental public goods caused by the problem of common property. The inclusion of existence values in the determination of optimal populations may also vary with whether the altruist is a resource user. By extending to a multispecies framework, it is found that the type of biological interaction between different species will be important for enhancing or diminishing the effects of the inclusion of existence values on optimal populations.

Keywords: non-paternalistic altruism, paternalistic altruism, existence value, renewable resource, multispecies resource

#### 二、緣由與目的

In recent years, the inclusion of existence values

(non-use values) for natural resources and environmental goods in benefit-cost analysis of public decisions has raised numerous concerns. In particular, the problem of potential double counting stemming from altruistic motives has substantially undermined the validity of contingent valuation method (CVM) based on survey data for measuring existence values. The altruistic motives for individuals to place existence values on natural resources and environmental public goods are often distinguished as non-paternalistic and paternalistic altruism. As shown in previous studies, different types of altruism could lead to enormous differences in the outcome of benefit-cost analysis when the existence values are allowed to be included. Thus, to enhance the validity of CVM, the specification of survey design, benefit estimation and respondents' motives become significant. Nevertheless, most previous studies focus on the decomposition of resource's benefits into use values and non-use values in a static framework, and therefore, the dynamic analysis in the management of renewable resources associated with altruistic motives remains largely unexplored. This paper is intended to incorporate the altruistic motives of exploiters toward resources' existence into the dynamic analysis. By doing so, the optimal conditions for the exploitation of renewable resources can be characterized with the inclusion of altruistic motives. To some extent, unlike most traditional models deriving resource's benefits solely from harvesting values, the results of this study will be valuable for the policy making on issues of resource exploitation and preservation.

#### 三、結果與討論

The primary purpose of this study is to investigate the theoretical aspects of altruistic motives in a dynamic framework of resource management. Following earlier

studies, the model can be defined with an objective function including arguments of harvest, stock of the resource, and altruist's concern over others' well-being. By solving the optimization problem, the efficiency condition can be obtained according to both non-paternalistic and paternalistic altruism settings. Then, the impacts of altruistic motives on the efficient provision of the existence of a natural resource will be captured. In addition, the model will be extended to a multispecies framework (e.g. Lotka-Volterra predator-prey model) by allowing two different species with ecological interdependence in the resource dynamics. Likewise, whether altruistic motives have any effect on the efficiency condition can be known through solving the optimization problem. Further, it is possible to characterize the effect of ecological externality caused by harvesting the ecologically interdependent species on optimality. Depending on what type of interaction prevails between different species, ecological externality caused by harvesting will have different impacts on the outcome of the model. It is found that non-paternalistic and paternalistic altruism could lead to different levels of over-harvesting caused by the problem of common property. The inclusion of existence values in the determination of optimal populations may also vary with whether the altruist is a resource user. Moreover, in the multispecies framework, the results suggest that the biological interaction between species will enhance or diminish the effects of the inclusion of existence values on optimal populations.

#### 四、計畫成果自評

It is found that different types of altruism might lead to different levels of over-harvesting caused by the problem of common property resource in a single-species model. As a result, the motives of altruism will not have any impact on the determination of species' optimal populations only when the altruist places a same value on his concern about others' well-being regardless of the sources of satisfaction. If nonpaternalistic and paternalistic concerns generate different values to the altruist, then the inclusion of resources' existence values in the benefit cost analysis as well as the management of

resources will vary with different types of altruistic motives. Moreover, when the altruist is not a resource user but a pure conservationist, the nonpaternalistic altruism will more likely lead to a higher level of harvesting than the case when the altruist is also a resource user. This is because of the fact that the non-paternalistic altruist does not exclude the well-being of others resulting from harvesting. Consequently, when the altruist is not a resource user, non-paternalistic altruism is also more likely to lead to a higher level of harvesting and a lower level of species' optimal population for the social planner in the case of cooperation than those with paternalistic altruism.

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