

An aerial photograph showing a river on the left and a multi-lane highway on the right, with some vehicles visible. The image is tinted green.

ECONOMIA DO MEIO AMBIENTE

Mercados Construídos e Valoração Contingente

Kolstad

Capítulo 10

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Preferências Declaradas

- Frequentemente métodos baseados em preferências reveladas não podem ser usados para se estimar o valor da qualidade ambiental.
- Preferências reveladas não capturam valores de uso indiretos:
 - Valor de existência
 - Valor de herança
 - Valor altruístico

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Valoração Contingente

- Entrevista com indivíduos para se tentar estimar o valor do meio ambiente, através da construção de cenários.
- Pergunta-se a indivíduos o quanto eles pagariam por um bem ambiental, se um mercado para tal bem existisse (valor contingente à existência de um mercado).
- Ganhou popularidade nas décadas de 1980 e 1990 com o requerimento que análise de benefício-custo fosse feita para leis/regulação nos Estados Unidos.

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Controvérsia e Melhores Práticas

- Muitos economistas questionaram a validade de estudos de VC, porque eles são hipotéticos e envolvem escolhas sem restrições orçamentárias reais (mais sobre problemas da VC abaixo).
- Em 1992, a U.S. National Oceanic and Atmospheric Administration (NOAA) organizou um painel de economistas para discutir a validade do método e fazer recomendações com relação a melhores práticas para estudos de VC.

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Cenário de Mercado

- Especifica-se um bem/mal ambiental, Ex.: pergunta sobre qualidade do ar em geral vs. visibilidade ou concentração de ozônio troposférico.
- Indica-se as consequências do poluente para o indivíduo.
- Especifica uma melhoria plausível e indique que ela vem com um custo.
- Especifica o “veículo”. Ou seja, o processo que conecta o pagamento à melhoria.
- Ex: Pagamento aparecerá como acréscimo à conta de água e será usado pela cia de água e esgoto da cidade para limpar a água.
- Importante lembrar ao entrevistado que substitutos existem (se de fato eles existirem).

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Método de Elicitação

- Pergunta direta (qual é o maior preço indivíduo está disposto a pagar).
- Problema: Não somos familiares com esse tipo de pergunta, mesmo quando mercados existem.
- “Bidding game”:
 1. comece com um preço e pergunte se indivíduo está DAP.
 2. Não → abaixe o preço e pergunte novamente.
 3. Sim → aumente o preço e pergunte novamente).
Problema: viés do ponto de partida.

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Método de Elicitação

- Cartão de pagamento.
- Viés potencial no intervalo entre valores.

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Cartão de Pagamento

지불카드 5

-세후소득 월90~110만원 미만-

(정부의 다른 공공정책에 한 달 평균 지불하는 세금)

0	24,000	
100	26,000	
250	28,000	
500	30,000	← 교육
750	35,000	
1,000	40,000	
1,500	45,000	← 국방
2,000	50,000	
3,000	55,000	
4,000	60,000	← 보건
5,000	65,000	
6,000	70,000	
7,000	75,000	← 도로
8,000	80,000	
9,000	85,000	
10,000	90,000	
12,000	95,000	
14,000	100,000	← 주택
16,000	120,000	← 사회보장 및 복지시설
18,000	140,000	
20,000	160,000	
22,000	200,000	

Payment Card 5

Monthly Household Income after Taxes

900,000—1,100,000 Won

(Average Monthly Amount in Taxes Paid for Some Public Programs)

0	24,000	
100	26,000	
250	28,000	
500	30,000	← Education
750	35,000	
1,000	40,000	
1,500	45,000	← Defense
2,000	50,000	
3,000	55,000	
4,000	60,000	← Health
5,000	65,000	
6,000	70,000	
7,000	75,000	← Road & Highway
8,000	80,000	
9,000	85,000	
10,000	90,000	
12,000	95,000	
14,000	100,000	← Housing
16,000	120,000	← Social Security & Welfare
18,000	140,000	
20,000	160,000	
22,000	200,000	

An aerial photograph showing a river on the left and a multi-lane highway on the right, with several cars visible. The image is used as a background for the title.

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Método de Elicitação

- Escolha discreta ou referendo (NOAA):
Mostre uma opção de pagamento para o indivíduo e pergunte se ele/ela está disposto(a) a pagar.
- Problema: um número grande de entrevistas é necessário (custo).

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Referendo/Escolha Discreta

FIGURE 1
An Illustrative Choice Question

Home #1: Imagine your home modified to fit this description.

Features						
	Lot size	House size	Average elementary school class size	Public or natural areas in Harbor Area	Harbor Area environmental condition	House price
Compared to your current home:	Smaller by 15%	Smaller by 15%	Smaller by 2 students	Smaller by 20%	Additional pollution	Less expensive by 10%

Which do you prefer?

- ☐ The home described above
- ☐ My current home

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Referendo/Escolha Discreta

Program A	Program B
\$5 extra / month	\$10 extra / month
10 % of the electricity you use	25 % of the electricity you use
from WIND	from BIOMASS

___ **A** I would choose program **A** and pay \$5 extra per month.

___ **B** I would choose program **B** and pay \$10 extra per month.

___ **C** I support these programs in general, but my household would/could not pay for either option A or B.

___ **D** I would not choose either of these programs.

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Outras Considerações

- Administração da pesquisa: correio, telefone, pessoalmente (NOAA) – todas têm vantagens e desvantagens.
- Desenho da amostra: amostras aleatórias para representar diferentes grupos.
- Estimação da função de DAP: coleta de informação relevante e uso de técnicas estatísticas apropriadas.

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Problemas com VC

- Entrevistados podem indicar uma DAP para passar uma boa impressão para o entrevistador.
- Entrevistados podem indicar uma DAP que na realidade reflete que ele/ela dá valor a provisão de bens para a sociedade, ao invés do quanto ele/ela valoriza o indicador de qualidade ambiental.
- Natureza hipotética: não somos familiares com trocas de dinheiro por qualidade ambiental.

Valoração Contingente

- Apesar da resistência inicial com métodos de preferência declarada, vários estudos sugerem que métodos de preferências declaradas e reveladas produzem resultados similares.
- VC é amplamente usada e aceita como um método de valoração estabelecido.

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Valoração Contingente Experimento de Escolha

Econometria - Introdução

An aerial photograph showing a river on the left and a multi-lane highway on the right, with several cars visible. The image is used as a background for the top section of the slide.

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Demanda por Bem Público

- Utilidade $u(x,q)$
 - x : bem privado
 - q : bem público (qualidade do ar, água, parque, etc.)
- Utilidade indireta
$$v(p,q,y) = \max_x \{u(x,q) | p \cdot x \leq y\}$$
 - p : preço do bem privado (bem de mercado)
 - y : renda

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Demanda por Bem Público

- Suponha que a quantidade do bem público aumente de q para q^* (ex.: melhora na qualidade do ar, $q^* > q$). Disposição a pagar (DAP) definida como:

$$v(p, q^*, y - DAP) = v(p, q, y)$$

- Ou seja, disposição a pagar (DAP) é a máxima redução na renda que deixa o indivíduo indiferente entre (a) qualidade ambiental menor “ q ” e renda maior “ y ” e (b) qualidade ambiental maior “ q^* ” e renda menor “ $y - DAP$ ”.

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Escolha Discreta (Experimento de Escolha)

FIGURE 1
An Illustrative Choice Question

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Escolha Discreta (Experimento de Escolha)

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Valoração Contingente Práticas Recomendadas (NOAA)

- Design conservador (evitar perguntas que inflacionem DAP)
- Pergunte sobre disposição a pagar (DAP não DAR)
- Formato de referendo/voto (sim/não/não sei)
- Descrição precisa do cenário/política pública/veículo
- Pre-teste de fotografias
- Não se esqueça de bens substitutos
- Pergunte por que respondeu sim/não
- Outras perguntas (renda, atitude sobre ambiente, etc. – ajudam a interpretar resultados)
- Entrevistado compreende o questionário/problema?

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Valoração Contingente Random Utility Model

- Utilidade indireta como função de renda (y), características individuais (z) e componente estocástico (ε).
- Utilidade indireta da opção i para o indivíduo j : $v_{ij} = v_i(y_j, z_j, \varepsilon_{ij})$
- Indivíduo j escolhe opção 1 em vez de opção 2 se: $v_1(y_j, z_j, \varepsilon_{1j}) > v_2(y_j, z_j, \varepsilon_{2j})$

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Valoração Contingente

Random Utility Model

- A disposição a pagar do indivíduo j (DAP_j) pela opção 1 é tal que:

$$v_1(y_j - DAP_j, z_j, \varepsilon_{1j}) = v_2(y_j, z_j, \varepsilon_{2j})$$

- Ou seja, se perguntado se pagaria DAP_j acima para passar da opção 2 para a opção 1, o indivíduo responderia “sim”.

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Valoração Contingente Random Utility Model

- Não observamos a parte estocástica da utilidade indireta do indivíduo.
- Observamos apenas as respostas “sim” ou “não” e podemos apenas fazer afirmações probabilísticas sobre “sim” ou “não”.

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Valoração Contingente Random Utility Model

- Questionário: “você estaria disposto a pagar x para passar da opção 2 para a opção 1?”
- $$\begin{aligned} Pr(sim_j) &= Pr(v_1(y_j - x_j, z_j, \varepsilon_{1j}) > v_2(y_j, z_j, \varepsilon_{2j})) \\ &= Pr(v_1(y_j - x_j, z_j, \varepsilon_{1j}) - v_2(y_j, z_j, \varepsilon_{2j}) > 0) \end{aligned}$$

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The Willingness to Pay for Property Rights
for the Giant Panda: Can a Charismatic
Species Be an Instrument for Nature
Conservation?

Andreas Kontoleon and Timothy Swanson

Land Economics (2003)

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ABSTRACT

- This paper presents the results from a contingent valuation (CV) that elicited willingness to pay (WTP) of OECD citizens, for the conservation of the Giant Panda.
- The study investigates the extent to which such a charismatic species can be used to promote wider biodiversity conservation.
- There exists an internally consistent WTP for the purchase of property rights of the habitat required for the conservation of the panda.
- This WTP is shown to consist largely of the value placed on the “naturalness” of the species, implying that the symbolic nature of the panda might be a potential instrument for greater biodiversity conservation

An aerial photograph showing a river flowing through a landscape, with a multi-lane highway running parallel to it on the right side. The image is used as a background for the title slide.

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Contexto

- The case of the Giant Panda is a critical test for whether the flagship species approach works for general nature conservation.
- The species is one of the most widely recognized and cherished •flagship species in the world.
- It is also highly endangered, with fewer than 1,000 individuals remaining in the wild in Sichuan Province, China.
- The primary cause of this endangerment is habitat disruption.⁵ It has been estimated that the rate of habitat disruption in the panda reserves has proceeded at a pace of 5% per annum, over the past two decades.

An aerial photograph showing a river on the left and a multi-lane highway on the right, with some vehicles visible. The image is used as a background for the title.

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Contexto (cont)

- Despite being such a prominent •flagship species, current conservation efforts for the panda are not focused on habitat conservation but increasingly rely on captive breeding programs in ex situ facilities.
- Funding for the panda is increasingly allocated to panda preservation alone.
- Does this mean that society is unwilling to provide funding for the natural habitat of the panda, even despite its relatively unique status?
- If this is the case for the panda, it is difficult to imagine an instance in which the •flagship approach might be turned to the purpose of general habitat conservation.

An aerial photograph showing a river on the left and a multi-lane highway on the right, with some vehicles visible. The image is used as a background for the title.

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Estrutura

- The first part of our study investigates the WTP for panda lands provided for the sole purpose of panda conservation
- The second part of our study examines the nature of this •flagship-inspired demand for habitat. In the spirit of Loomis and White (1996), we view the demand for panda habitat as a possible form of derived demand for general biodiversity conservation.
- Third we investigate the ability of respondents to recognize the existence of a value for panda habitat in the absence of the •flagship species. That is, to what extent is the •flagship species a necessary instrument for the conservation of its habitat?
- We find that there is some evidence to support the proposition that the WTP for the panda habitat would not exist, if the panda did not exist.

An aerial photograph showing a river flowing alongside a multi-lane highway with several cars. The river is on the left, and the highway is on the right, separated by a grassy area.

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Abordagem

- In order to assess the nature of this derived demand, we decompose the WTP for the conservation of the giant panda into two components:
 1. its **quantitative** component (the WTP for preserving the stock levels of the species);
 2. its **qualitative** component (the WTP for the quality of environment in which the species resides).
- We determine the relative proportion of the value of panda habitat that is attributable to these quantitative and qualitative components. We further examine this qualitative component of the WTP for panda habitat. We investigate the extent to which there is a value flowing from the “naturalness” of the habitat, and the extent to which it is a logically distinct entity from the other values.

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Valoração Contingente

- A contingent valuation study was designed and implemented in 1998 that examined the relative magnitude of the types of values held by non-Chinese for conserving the Giant Panda and its habitat.
- Three conservation policy scenarios were valued.
- The total WTP for each scenario was defined as the value for the simultaneous change in the quantity (stock) and the quality (living environment) of the species from the current reference to a new level.

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WTP

$$\begin{aligned} WTP(q^0, q^1) = & e(p, q_1^0, q_2^0, u^0) \\ & - e(p, q_1^1, q_2^1, u^0). \end{aligned} \quad [1]$$

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Cenário 1



FIGURE 1
FIRST CONSERVATION SCENARIO: PANDAS IN CAGES (100 SQ. M.) (PHOTOGRAPH BY THE AUTHORS.)

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Cenário 2



FIGURE 2
SECOND CONSERVATION SCENARIO: PANDAS IN PENS (0.5 HA. PER PANDA) (PHOTOGRAPH REPRINTED FROM CHINESE GIANT PANDA, PUBLISHED FOR THE CHENGDU ASSOCIATION FOR EXTERNAL CULTURAL EXCHANGES BY CHENGDU PRESS.)

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Cenário 3



FIGURE 3
THIRD CONSERVATION SCENARIO: PANDAS IN THEIR NATURAL HABITAT (400 HA). NOTE: THESE FIGURES ARE A SUBSET OF THE VISUAL AIDS USED IN THE FINAL SURVEY. (PHOTOGRAPH REPRINTED FROM CHINESE GIANT PANDA, PUBLISHED FOR THE CHENGDU ASSOCIATION FOR EXTERNAL CULTURAL EXCHANGES BY CHENGDU PRESS.)

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Estatísticas descritivas

TABLE 1

SAMPLE SUMMARY STATISTICS OF WTP RESPONSES FOR ALTERNATIVE PANDA CONSERVATION SCENARIOS

	WTP for Cage Scenario (US\$)	WTP for Pen Scenario (US\$)	WTP for Reserve Scenario (US\$)	WTP for Panda Conservation When Probability of Success Is Low (US\$)
Mean	3.90	8.43	14.86	0.10
Median	1.00	5.00	10.00	0
Standard deviation	5.34	10.13	15.69	0.43
Minimum	0.00	0.00	0.00	0
Maximum	30.00	75.00	100.00	3
% of zero responses	37.05	24.59	7.54	95
Sample size	305	305	305	305

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Random effects Tobit model

TABLE 2
RANDOM EFFECTS TOBIT MODEL OF WTP FOR ALTERNATIVE PANDA
CONSERVATION SCENARIOS

Variable	WTP Pandas			
	Coef.	Std. Err.	t-value	P-value
Animal welfare index ^a	3.690	0.728	5.070	0.000
Program index ^b	2.129	0.811	2.626	0.009
Income (logs) ^c	7.845	1.095	7.162	0.000
Land (in logs) ^d	1.314	0.071	18.538	0.000
Constant	-68.554	7.917	-8.659	0.000
LnL		-2808.4134		
Wald chi2(4)		497.91		
Prob > chi2		0.0000		
N		915		

^a Attitudinal index capturing latent sentiments of sympathy towards animals. Constructed on the basis of factor analysis of responses to attitudinal questions on animal welfare sentiments. Questions that factored together were: Willingness to wear fur; Willingness to use cosmetic tested on animals; Willingness to support ban on leg hold traps; Willingness to support animal welfare society. See Kontoleon (2003) for details of factor analysis.

^b Index of subjective assessment of the credibility of the panda conservation programs. Calculated by taking the average score of five-point Likert scale answers to the questions: What kind of support do you think the Wolong Panda Conservation Program would receive from foreigners visiting China? Do you think that the airport tax increase described above is a fair method of financing the expenses connected with the implementation of the Wolong Panda Conservation Program?

^c Personal disposable annual income in logs (in 1998 US Dollars).

^d Log of land where land takes on the values of land specified in the three scenarios.

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WTP/hectares

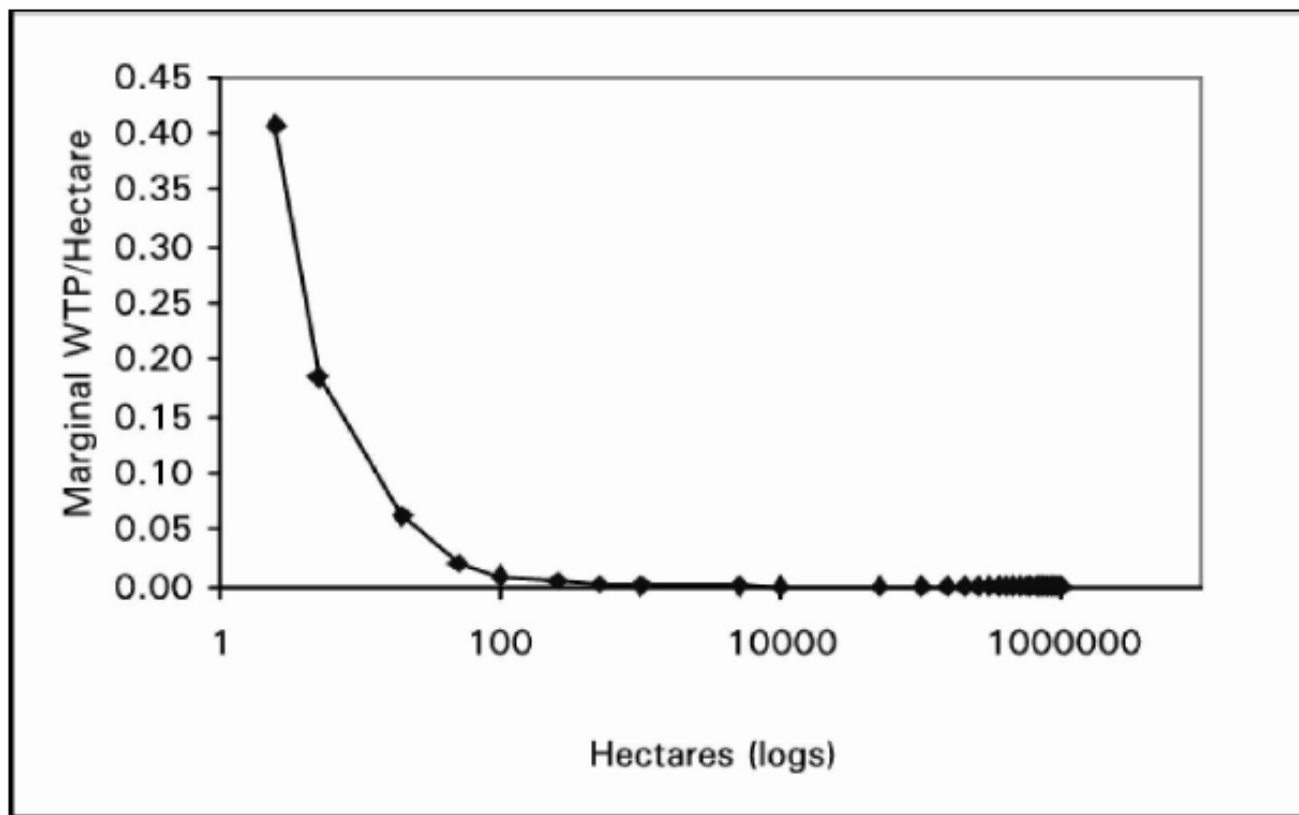


FIGURE 4
PREDICTED DIMINISHING MARGINAL WTP/HECTARES FROM RANDOM EFFECTS TOBIT

An aerial photograph showing a river flowing alongside a multi-lane highway with several cars. The image is used as a background for the title.

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charismatic species x ecosystems

- 2 approaches: “species” and “ecosystems”
- Species: focuses on the protection, both (in situ and *ex situ*) of *endangered*, often high profile, species.
- Ecosystems: The latter seeks to conserve entire ecosystems (irrespective of whether they host any high profile species) with the sole aim of preserving as much diversity as possible.
- **Irrespective of which approach is preferable at a normative level, brief consideration of the results of this study and the prevailing conservation policies indicates that the construct of the charismatic species is now a “fact of life.”**

An aerial photograph showing a river flowing alongside a multi-lane highway with several cars. The river is on the left, and the highway is on the right, separated by a grassy area.

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charismatic species x ecosystems (cont.)

Metrick and Wietzman (1996):

1. 54% of all wildlife funding in the United States is devoted to the conservation of just 1.8% of all listed endangered animals.
 2. the amount of funding spent on the conservation of a particular species does not depend on ecological criteria (such rarity and degree of endangerment), but rather on the public appeal and “charisma” of the species.
- **Therefore, the fate of nature conservation is now inextricably interlinked with the fate of particular charismatic species.**

An aerial photograph showing a river on the left and a multi-lane highway on the right, with some vehicles visible. The image is used as a background for the title.

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Efeitos adversos da flagship approach

- The construct of the important endangered species has been created and sold, and policymakers now are going to have to live with the phenomenon.
- The issue to consider here concerns the costs that this construct imposes on the campaign for general nature conservation.
- **That is, to what extent is the flagship approach limited in its capacity to contribute to wider biodiversity conservation?**

An aerial photograph showing a river flowing alongside a multi-lane highway with several cars. The image is used as a background for the title slide.

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Condições para a F.A. funcionar

- Van Kooten and Bulte (2000) identify two conditions for the •flagship approach to be generally conducive to nature conservation:
 1. habitats that are species rich in one taxon must also be species rich for others;
 2. and rare and endangered species should occur in species-rich areas.
- **Yet, more often than not, neither of these conditions are met in the instance of charismatic species.**

An aerial photograph showing a river on the left and a multi-lane highway on the right, with some vehicles visible. The image is tinted green.

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Evidências

- Many studies show that the •flagship approach has little positive effect on biodiversity conservation (for widely accepted ecological definition of biodiversity).
- This is so because biodiversity hot spots do not usually host •flagship species.

An aerial photograph showing a river flowing alongside a multi-lane highway with several cars. The river is on the left, and the highway is on the right, with a grassy area in between.

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Implicações

- Given that the flagship approach is not capable of delivering higher levels of biodiversity conservation, policymakers may be faced with trade-offs between conserving diversity per se and conserving certain rare (and perhaps high profile) species.
- Alternatively, the policymaker might attempt to educate the population to discard the “charismatic species” approach (at the risk of destroying some WTP for nature conservation).
- A third alternative might be to attempt to create some new charismatic species that are more closely associated with the various biodiversity hotspots.
- **Perhaps it is time to replace the panda (as the symbol of international nature conservation) with a beetle?**