The Importance of Equity in the Design of PES Schemes

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What is Equity?

Focus of the study:

Distributive justice

The fairness of the allocation of resources/ welfare

(there may be different kinds of resources and different recipients)

Fair distribution of income/ wealth

Interpersonal justice

Equality principle – egalitarianism – material wealth is distributed equally to all individuals (other notions as well)

John Rawls' maximin criterion (difference principle) – the greatest benefit should be to the least advantaged members of society

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- Model specification
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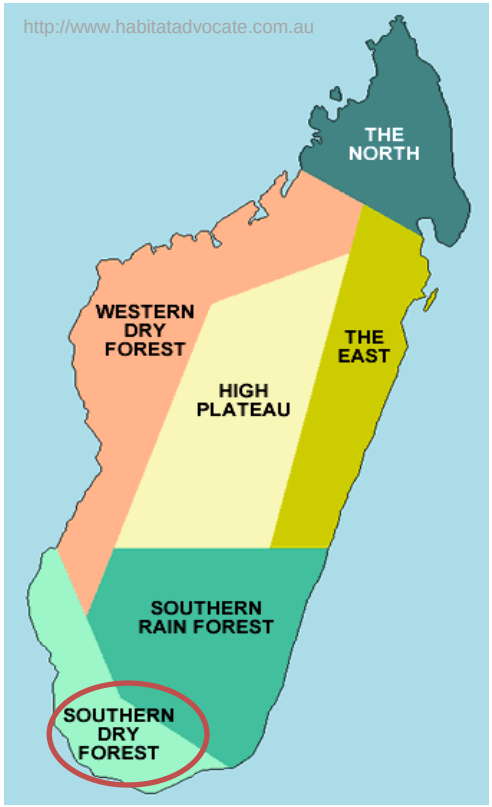
Motivation

- In the discussion of payments for ecosystem services (PES) schemes efficiency (cost-effectiveness) plays an important role.
- Distributional aspects, which may well be present in each PES scheme, however, receive much less attention.
- In accord with Tinbergen rule - one policy can achieve only one target - equity issues are usually left aside when analyzing the efficiency of PES.
- Since the distributional aspects of PES schemes may have an effect not only on the acceptance of such schemes among the beneficiaries from the payments but also among those who pay for the schemes, it is important that they are analyzed along with the efficiency aspects.
- My research question is in simple terms how important distributional issues are for PES design from the viewpoint of potential distant donors for PES.

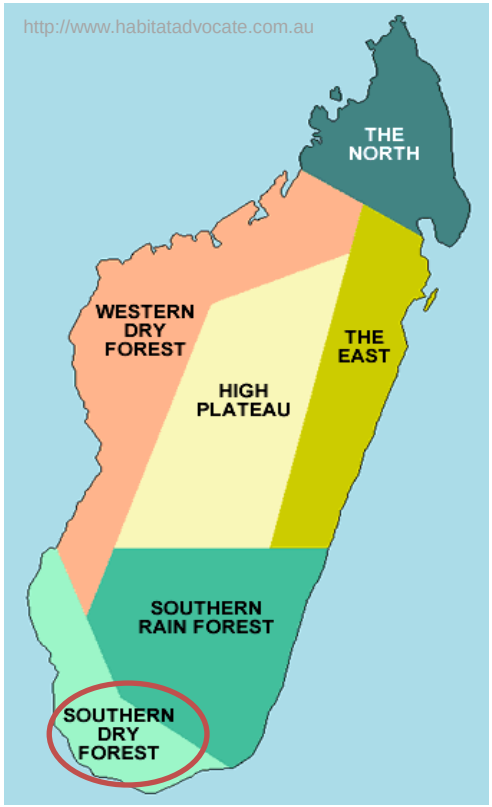
Objectives



Description of the study scenario:

- Madagascar's forests among the most biologically rich and unique in the world.
- However, forest cover has decreased by about 40% in the last 50 years.
- Especially **Madagascar's spiny forests in the southern part of the island provide a habitat for numerous endemic species**.
- **The spiny forest** is being rapidly destroyed for use as firewood, charcoal and building material or as cattle fodder.
- Its **area has decreased by about 27% in the last 50 years**.

Objectives



Description of the study scenario:

Problems:

- Poverty of the local population,
- Problem of overuse and deterioration of the dry spiny forest and thus
- Loss of endemic biodiversity,
  e.g. the radiated tortoise is critically endangered and many lemurs are endangered species.

Objectives

Proposed solution:

- Implementing a PES scheme for the conservation and sustainable management of the dry spiny forest in the Mahafaly region (south Madagascar).
- A conservation fund is to be established for collecting the necessary payments, which is to be managed by an NGO.
- To help the very poor local population, fair distribution of the payments can be considered.
- The goal of the survey is to assess:
  - whether international (distant) donors are willing to pay for such a project
  - whether taking into account distributional aspects is important for international donors

Methodology

- Discrete Choice Experiment (DCE)
- Analysing the influence of distributive justice issues on the WTP (compensating variation) for the improvement of forest management and conservation of the dry spiny forest in South Madagascar.
- Nested logit model (NLM)

Identification of Attributes and Levels

Selection of attributes:

Project:

A Fund for Conservation of the Dry Spiny Forest in South Madagascar (protection of biodiversity)

Attributes:

Forest area conserved

(the larger the area, the better biodiversity protection)

Distribution of payments - who gets the payments

(depends on the administrative entities/ communes where the PES will be implemented)

Donation amount (annual payments over 5 years)

Identification of Attributes and Levels

Assignment of levels for each attribute:

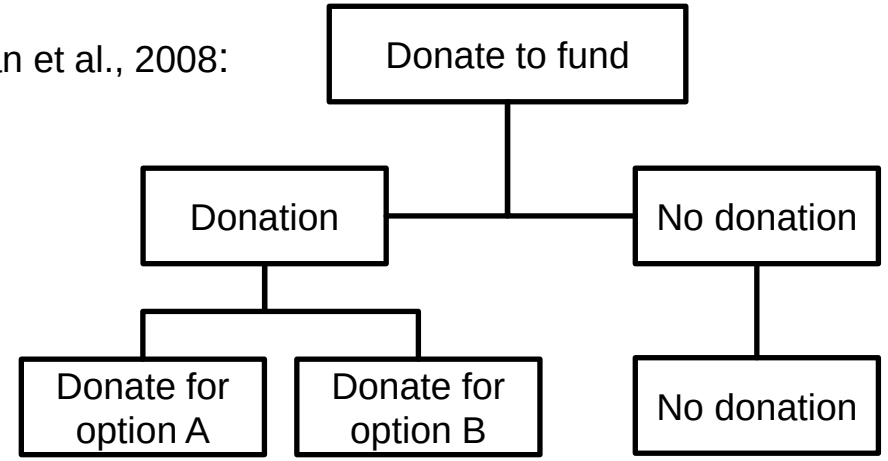
Attributes/ Characteristics of the alternatives	Levels of attributes	**Distributive justice issues/** relation to theories of fairness
Forest area conserved	3.000 ha, 5.000 ha, 7.000 ha	
Distribution of payments (who gets the payments)	The village assemblies decide (in commune Itampolo) → **the richer get more**	**Inequality**
(depends in some cases on the commune in which the project will be implemented)	The village assemblies decide (in commune Beheloka) → **the poor get more**	**John Rawl's maximin criterion**
	The conservation agency distributes staple food → **everyone gets the same**	**Equality**
Annual Donation over a 5-year period (in € per year)	5 €, 10 €, 15 €, 25 €, 50 €, 100 €	

Model Specification

Nested logit model (NLM)

- The donation alternatives compete to a greater extent with each other than they do with the no-donation alternative.
- IIA (independence of irrelevant alternatives) assumption can be partially relaxed
- In the study the no-donation alternative will be in one nest and the other alternatives into a different nest.

Adapted from Ryan et al., 2008:



Model Specification

Specification of the NLM

→ Basic model (based on Ryan et al., 2008):

The indirect utility function underlying the model is given by:

$$V = \beta_1 FOREST + \beta_2 NEAR + \beta_3 WILD + \beta_4 NEAR \cdot WILD + \beta_5 DONATION$$

Whether or not the no donation option is chosen is expressed as follows:

$$Donate = \beta_1 ASC + \beta_2 INCOME + \beta_3 MEMBER + \beta_4 ENVmember + \beta_5 DonEnv + \beta_6 DonPoverty + e$$

Model Specification

Specification of the NLM

→ Segmented model (based on Ryan et al., 2008):

To account for different marginal valuation of cost of higher income groups, the DONATION variable in the basic model is split into 3 DONATION variables.
(DON1 accounts for the preferences of the lowest income group and DON3 – for the highest income group).

The indirect utility function for this model is:

$$V = \alpha_{FOREST} + \alpha_{URBAN} + \alpha_{EQUAL} + \alpha_{WILD} + \alpha_{SEQUAL} + \alpha_{DON1} + \alpha_{DON2} + \alpha_{DON3}$$

Experimental Design

Choice of experimental design – combining the levels of the attributes into a number of alternative scenarios (profiles):

- **Complete factorial design** –

  for 2 attributes with 3 levels and 1 attribute with 6 levels

  → **$3x3x6 = 3^2 6 = 54$ profiles**

- **Fractional factorial design** – main effects, interactions neglected.

  Reduction of the 54 profiles to 18 profiles possible

Experimental Design

	Attributes		
Profiles	AREA	DISTR	DONATION
1	0	0	0
2	0	1	1
3	1	0	2
4	1	2	3
5	2	1	4
6	2	2	5
7	0	0	5
8	0	2	4
9	1	1	0
10	1	2	1
11	2	0	3
12	2	1	2
13	0	1	3
14	0	2	2
15	1	0	4
16	1	1	5
17	2	0	1
18	2	2	0

Orthogonal array from Kuhfeld, Warren F. – SAS service:

Design:

- orthogonal (main effects)
- and balanced

Experimental Design

Construction of choice sets:

- Based on the experimental design:

  18 choice sets with 3 alternatives – A, B, and C;
  C being the no-donation alternative

- The A alternative is the fractional factorial, the B alternative is constructed from A by shifting.

Experimental Design

Construction of choice sets – alternative B created from A by shifting:

Choice set	Alternative A			Alternative B		
1	3	unequal	5	5	equal	10
2	3	equal	10	5	rawls	15
3	5	unequal	15	7	equal	25
4	5	rawls	25	7	unequal	50
5	7	equal	50	3	rawls	100
6	7	rawls	100	3	unequal	5
7	3	unequal	100	5	equal	5
8	3	rawls	50	5	unequal	100
9	5	equal	5	7	rawls	10
10	5	rawls	10	7	unequal	15
11	7	unequal	25	3	equal	50
12	7	equal	15	3	rawls	25
13	3	equal	25	5	rawls	50
14	3	rawls	15	5	unequal	25
15	5	unequal	50	7	equal	100
16	5	equal	100	7	rawls	5
17	7	unequal	10	3	equal	15
18	7	rawls	5	3	unequal	10

Experimental Design

Sample choice card:

For which alternative way of spending the collected funds would you be willing to donate, if either? Please choose alternative A, B, or C.			
	A	B	C
Forest area conserved	**3000 ha**	**7000 ha**	**No donation**
Distribution of payments – who gets the payments	**the poor get more**	**everyone gets the same**	
Donation amount (EUR per year over a 5-year period)	**5**	**15**	
Tick one box	☐	☐	☐

Survey

Questionnaire development:

- Debriefing questions on:
  - respondents‘ opinions on the policy of interest
  - on the importance of environmental protection in general and for protection of biodiversity and the natural environment for the respondent
  - on previously made donations
  - on donations previously made for environmental projects and poverty alleviation projects
  - on membership in an environmental organisation
- Socio-economic questions:
  - gender, age, household income, education, occupation etc.

Survey

Choice of survey procedure and sample size and conduct of survey:

- Pretest: with students
- Survey:
  - Questions to be administered on paper **in a group setting**
  - **Sample size: about 300** individuals from the city of Cottbus, only residents of Cottbus to be surveyed

Rules of thumb on choice of sample size Orme (2010):

N جي 300 or lower if only hypothesis developing intended

$$N \text{ جي } 500 \text{ عي} \frac{\text{ب ْ ؤ إ}}{\text{أ ئ ـ ا إلهيؤ ـ إ}}$$

NLEV – largest number of levels

NALT – number of alternatives per choice set

NTASK – number of choice tasks

Topics for Discussion…

- Design
- Model
- Group setting for CE
- Sample size
- Pretest with students

Thank you for your attention!