ICOPE
enhancing sustainable oil palm

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Smallholders and the Environment

An Assessment Tool and Integrated Index for Sustainable Oil Palm Production

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Acknowledged by:
Department of Agriculture Republic of Indonesia
IPOB
RSPO Roundtable on sustainable Palm Oil

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Summary

- ✓ **An initiative for an international network on agro-environmental indicators and sustainability index for oil palm production;**
- ✓ **An emphasis on 'impact measurement', according to ICOPE'10 thematic;**
- ✓ **A detailed introduction to a proposed method for 'integrated farm sustainability assessment';**
- ✓ **A set of case studies for testing applicability and allowing critical review of the proposed approach;**
- ✓ **An opportunity for smallholders to equating their managerial capacities with large scale organizations, favoring a fairer playing field for certification and market insertion.**

✓ **The Roundtable for Sustainable Palm Oil (RSPO) has strived to assemble the main stakeholders of the sector to propose a set of Principles, Criteria and Indicators (PC&I) for promotion of "*Institutional Social Responsibility*" in palm oil production.**

✓ **This very commendable and carefully negotiated procedure lists eight Principles, each comprising a set of Criteria and Indicators (PC&I) that can be checked for conformity relative to production practices and business relations, providing the bases for certification.**

✓ **A complementary environmental management procedure is now being proposed in a cooperation involving Cirad** (Unité Performance des Systémes de Culture de Plantes Pérennes)**, Embrapa and partners, in an international network aiming to:**

(i) preparing farmers / plantations for certification,

(ii) checking the impacts effected by PC&I adequacy at the field level (i.e., document improvements),

(iii) environmental management decision making on how to promote continuous improvement (Principle 8).

To be amenable as an environmental management and certification preparation tool, an integrated indicator system must conform with a series of requisites:

- Allow assessments in the most diverse rural contexts (from smaller to larger, from family-tended to technically advanced landholdings), in varied environmental settings, at the specific scale of the rural establishment;

- Include indicators relative to the ecological, economic, socio-cultural *and* management aspects implicated with local sustainable development, meeting the demands of consumers / environmental sectors (and the diversity of PC&I for oil palm);

- Express results in a simple and straightforward manner to farmers, rural entrepreneurs, decision-makers, and the general public;

- Facilitate the detection of *critical control points* for management correction;

- Be constructed in a user-friendly interface, capable of offering an integrated sustainability index, so contributing toward environmental management and eco-certification, according to the demands of farmers / producers, their organizations and stakeholders in general.

- **A proposed solution:**

Weighted environmental impact assessment system for Oil Palm (APOIA-OilPalm)

APOIA-OilPalm

Sustainability dimensions

Landscape Ecology

Environmental Quality

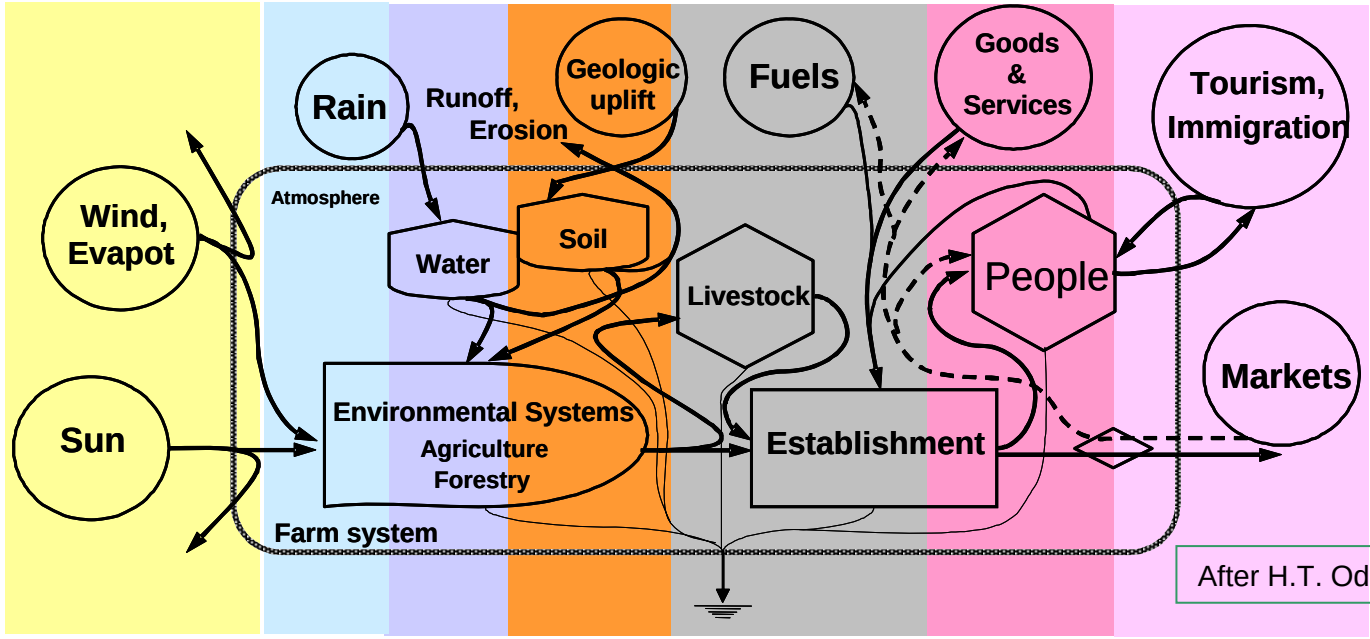
(atmosphere, water, and soil)

Socio-cultural Values

Economic Values

Management and Administration

A systemic, *adequate* and *sufficient* set of objective, quantitative indicators.



1 Landscape Ecology

1 Natural habitats physiognomy and status
2 Management of agricult. production areas
3 Management of confined activit/anim husbandry
4 Preservation of HCV habitats
5 Ecological corridors
6 Degraded areas reclamation
7 Landscape diversity
8 Productive diversity
9 Incidence of vectors of endemic diseases
10 Extinction risk of relevant species
11 Fire hazard
12 Geotechnical hazard

2 Environmental Quality

Atmosphere

13 Particles/smoke
14 Odor
15 Noise
16 Carbon oxides
17 Sulfur oxides
18 Nitrogen oxides

Groundwater

30 Fecal coliforms
31 Nitrate
32 Conductivity

Water

19 Dissolved O2
20 Fecal coliforms
21 BOD5
22 pH
23 Nitrate
24 Phosphate
25 Turbidity
26 Chlorophyll a
27 Conductivity
28 Visual pollution
29 Pesticides potential impact

Soil

33 Organic matter
34 pH
35 Phosphate
36 K exchangeable
37 Exchangeable Mg (& Ca)
38 Potential acidity
39 Sum of cations
40 Cation Exchange Capacity
41 Volume of bases
42 Erosion

3 Economic Values

51 Establish net income
52 Diversity of income sources
53 Income distrib.
54 Current indebtedness
55 Land value
56 Dwelling quality

4 Sociocultural Values

43 Access education
44 Access basic services
45 Consumption stand.
46 Access sport leisure
47 Conservation legacy
48 Employment quality
49 Occupational safety
50 Qualif. employment

5 Management

57 Manager profile & dedication
58 Commercialization conditions
59 Wastes management
60 Management of chemical inputs & residues
61 Best management practices & efficiency
62 Monitoring & Documentation
63 Local community relations
64 Institutional relationships

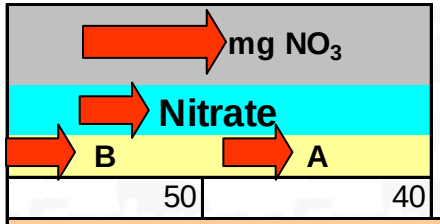
- **The original system (*APOIA-NovoRural*) has been extensively tested elsewhere in varied contexts *and* in oil palm evaluation, before being adapted to conform with RSPO's PC&I;**
- **The aim is to provide an expeditious field assessment that can be immediately translated into a PC&I conformity checklist, while remaining as a documented, objective and quantitative sustainability assessment for conditions observed in the field;**
- **The focus is to foster environmental performance, while supporting recommendations on agricultural management for sustainability.**
- **The present moment is of promoting field trials and dialogue with stakeholders and users, to adapt the system to their particular needs and submit to their approval.**

APOIA-OilPalm

• **The 'rural establishment' (i.e., landholding, plantation) is the spatial scale of evaluation, which is performed analytically and quantitatively in a field survey supported by an integrated set of scaling-checklists;**

- **Sustainability indices are calculated and expressed as utility values (0-1.0), with sustainability conformity level standardized at 0.7 according to environmental standards and socioeconomic benchmarks;**

Typical scaling checklist for Indicator assessment and Utility valuation



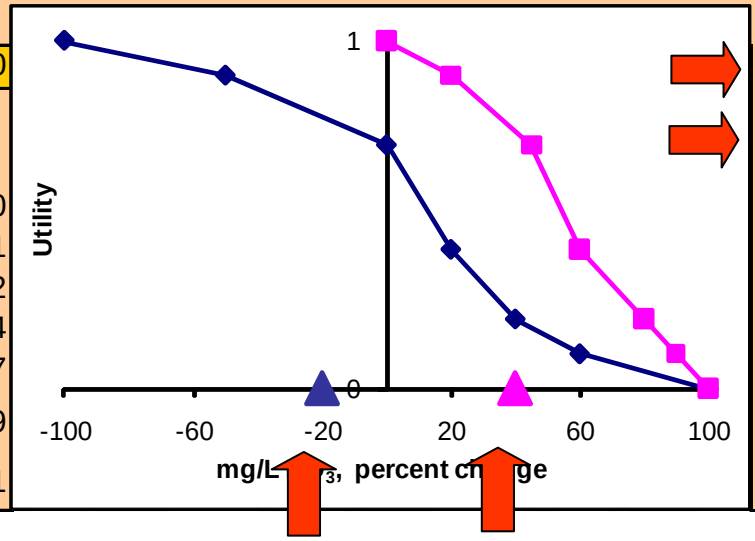
NO_3 Index 1=

Percent change NO_3

-20

INO_3 2 = 40

INO_3 1	INO_3 2	Utility
100	100	0
60	90	0,1
40	80	0,2
20	60	0,4
0	45	0,7
-50	20	0,9
-100	0	1



Best fit equation for Utility

1. Sinusoidal fit: y=a+b*cos(cx+d)

2. Quadratic fit: y=a+bx+cx^2

Coefficients:

a =	0,56	a =	1,028
b =	0,58	b =	-0,0070
c =	0,02	c =	-3,24E-05
d =	1,33		

U-INO_3 1= 0,92

U-INO_3 2= 0,70

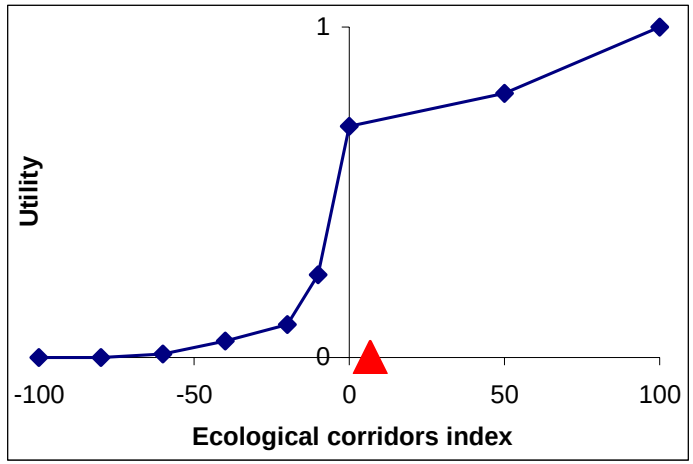
Each indicator is constructed according to appropriate field variables, utility correspondence table and transformation function

Ecological corridors / Habitat fragmentation	Table of total area of natural habitats and number of fragments preserved	
	Total area (ha) of natural habitats in the establishment	Number of fragments or patches
	B A	B A
	50 58	4 3

Ecological corridors index = (area A/frag A)-(area B/frag B)

IEcC = 6,80

IEcC	Utility value
-100	0
-80	0
-60	0,01
-40	0,05
-20	0,1
-10	0,25
0	0,7
50	0,8
100	1



Best fit equation for Utility

Logistic model: y=a/(1+b*exp(-cx))

Coefficients:

a = 0,90

b = 0,32

c = 0,20

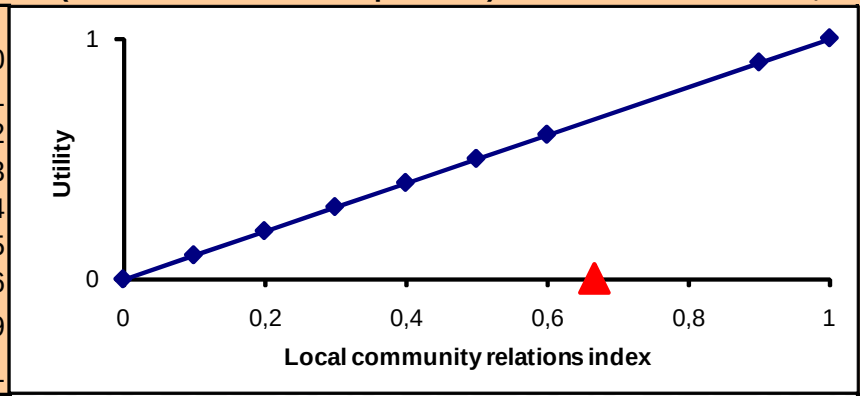
U-IEcC= 0,83

Several indicators have been included to represent specific Criteria and Indicators proposed by RSPO

Local community relations	Table of Local community relations attributes (insert 1 for affirmative)					
	Mechanisms to ensure respect of stakeholders representa-tives	Existence of mutually agreed system for conflicts resolution	Mechanisms for prevention of discrimination of any kind	Mechanisms for prevention of sexual harrassment and respect to reproductive rights	Mechanisms for warranting fairness in contractual agreements	Contributions to local sustainable development
Attribute occurrence	1		1	1	1	

Local community relations index (sum of attributes/total possible) = 0,67

ILCRel	Utility
0	0
0,1	0,1
0,2	0,2
0,3	0,3
0,4	0,4
0,5	0,5
0,6	0,6
0,9	0,9
1	1



Best fit equation for Utility

Linear fit: y=a+bx

Coefficients:

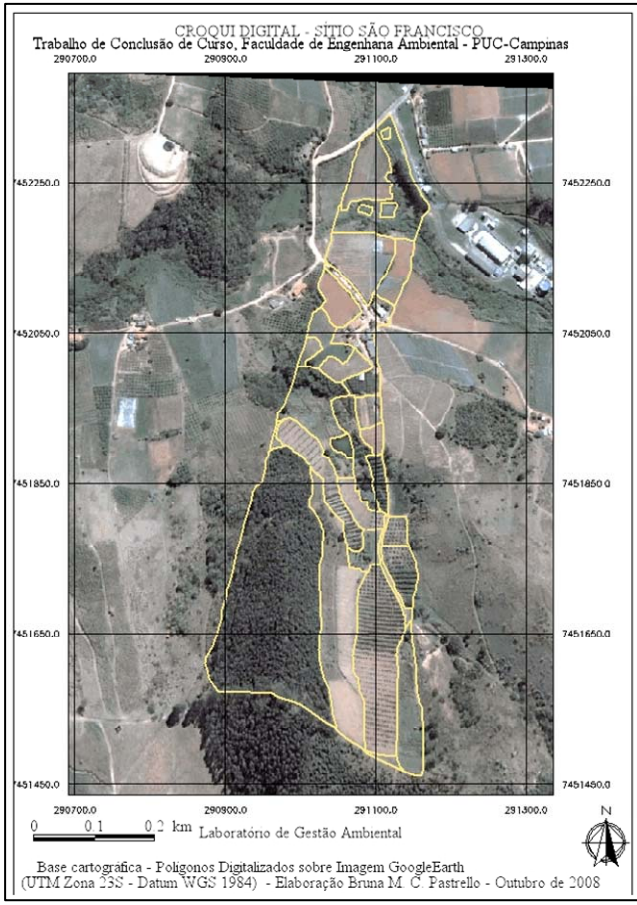
a = 0,00

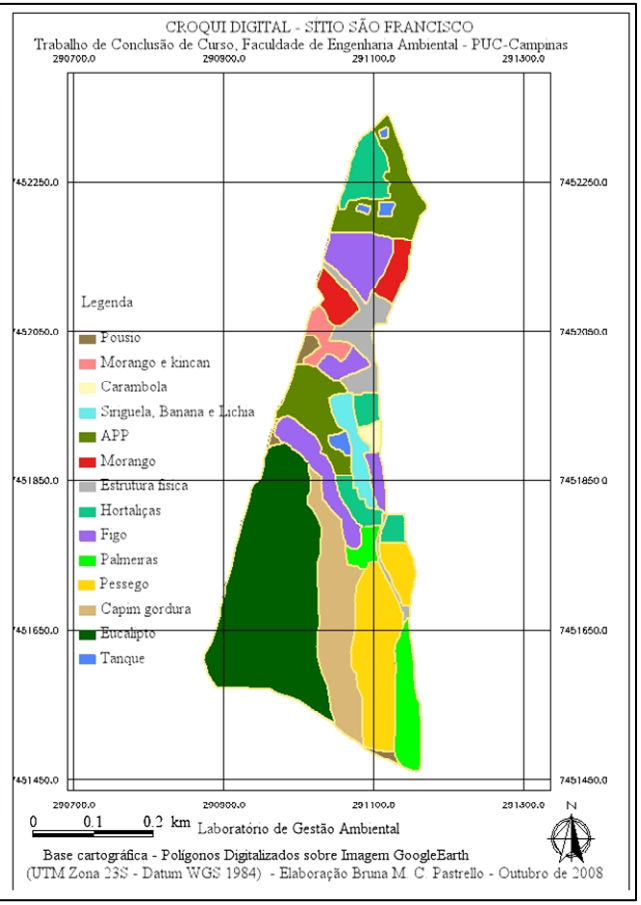
b = 1,00

U-ILCRel= 0,67

Field survey, sampling, and interview

Land uses, natural habitats, agricultural production areas and Rural establishment layout





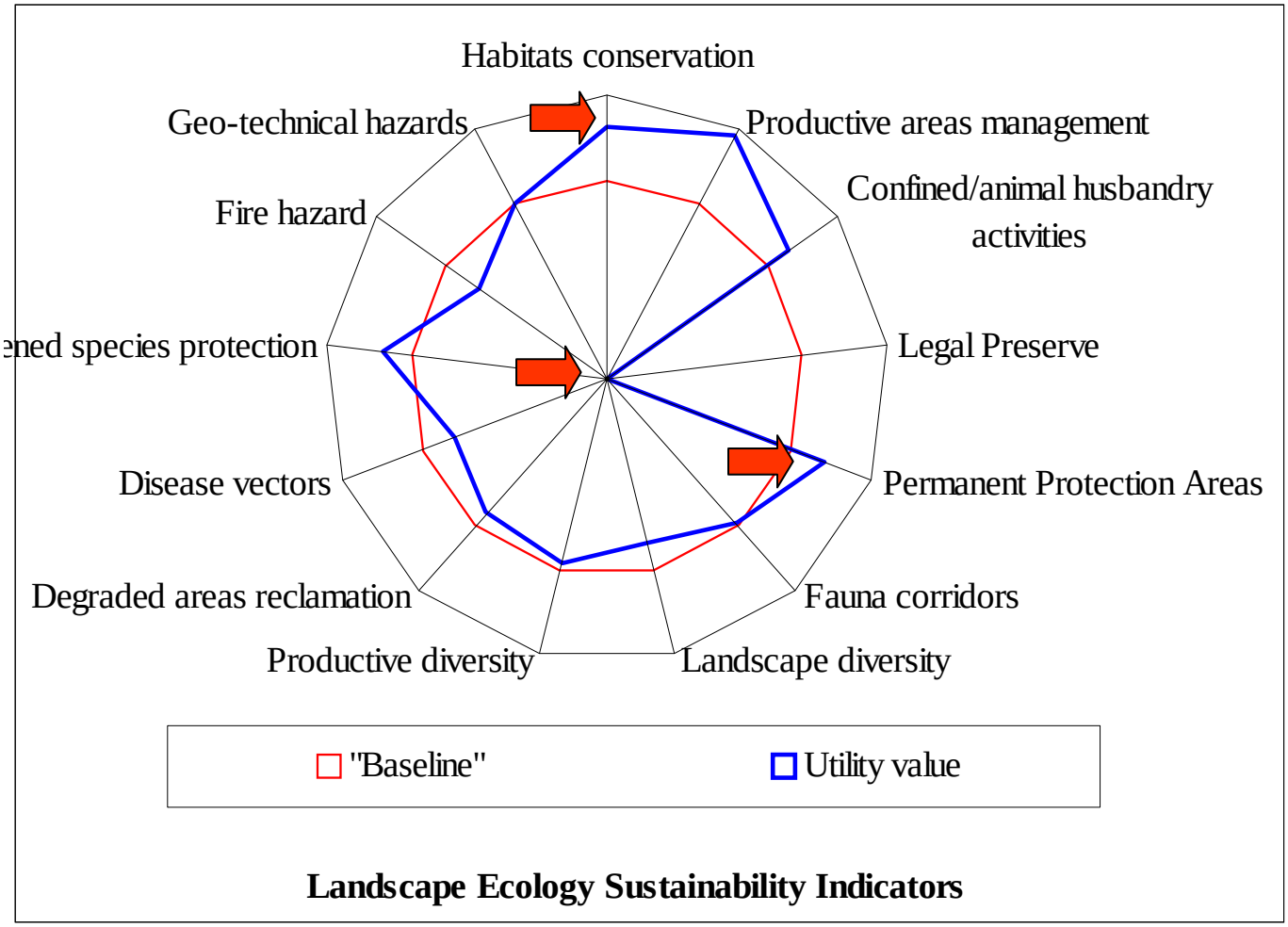
- **Example of *"Environmental Management Report"* issued to the farmers, which includes a CD-ROM with all complementary field results and recommendations.**

A preliminary case study: environmental management in a rural establishment dedicated to oil palm production in Santo Antônio do Tauá (PA - Brasil)

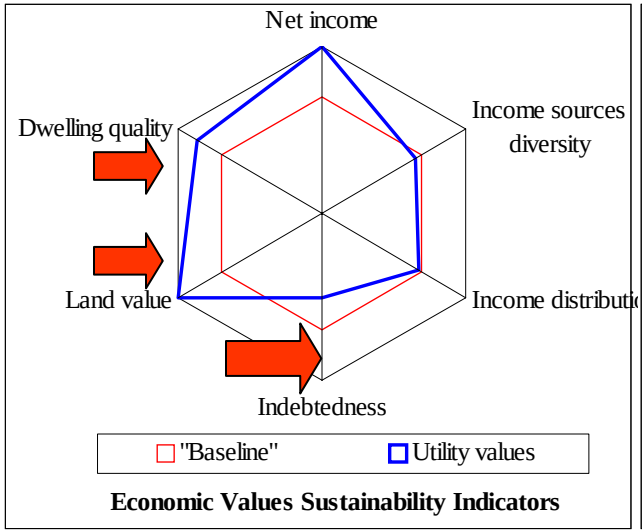
• Landscape Ecology Dimension

A very diversified farm

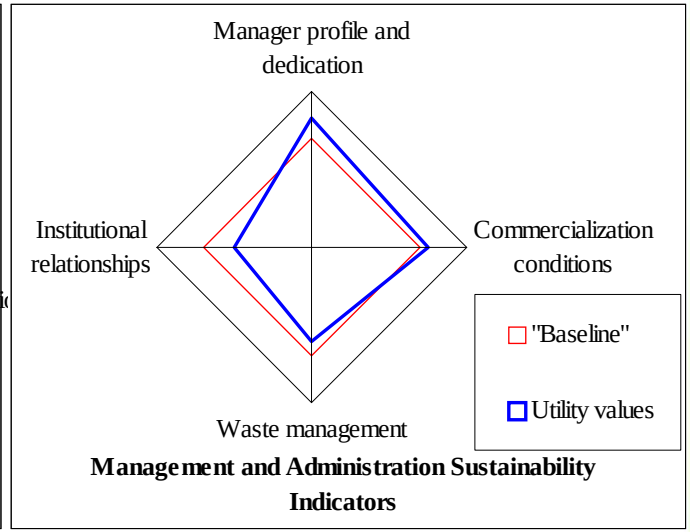
Mean sustainability index = 0.67



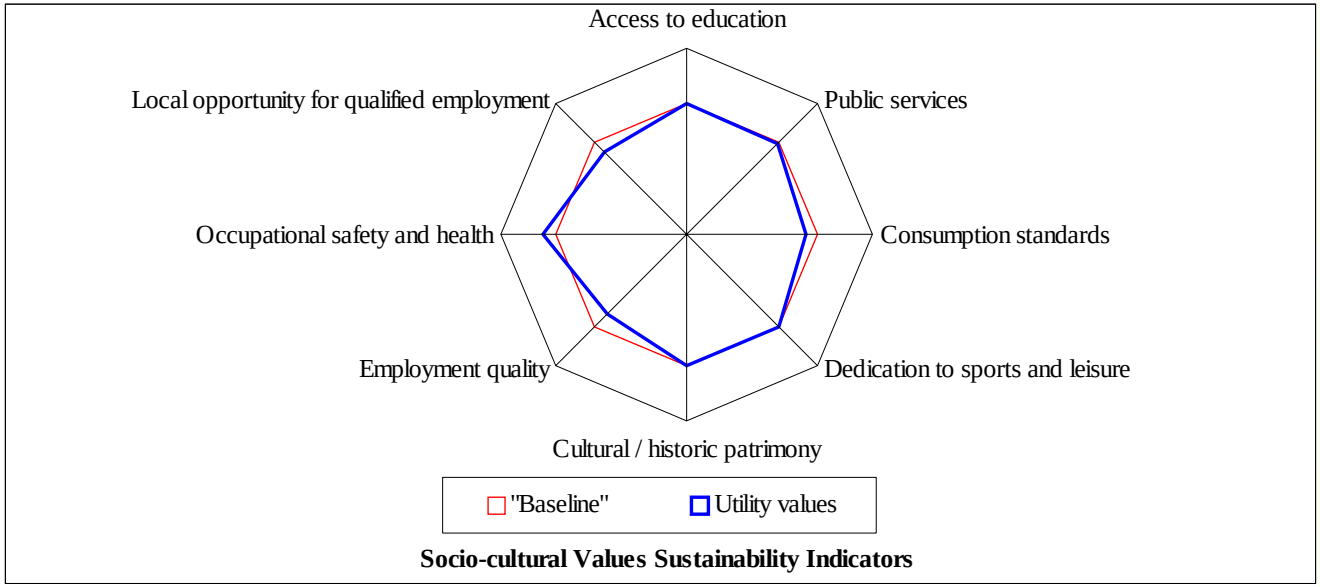
- **Economic Values mean = 0.78**
- **Socio-cultural Values mean = 0.68**
- **Management and Administration mean = 0.67**



Economic Values Sustainability Indicators

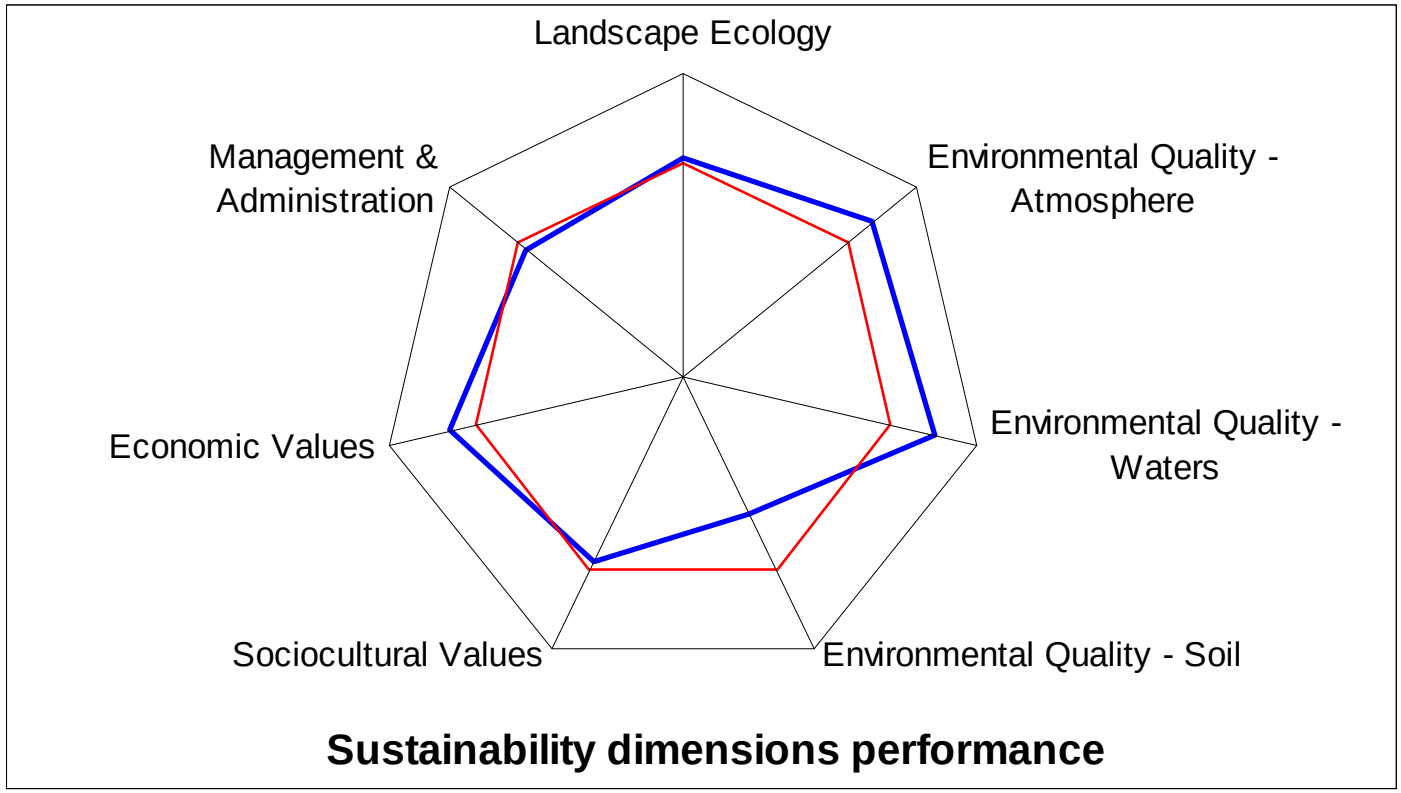


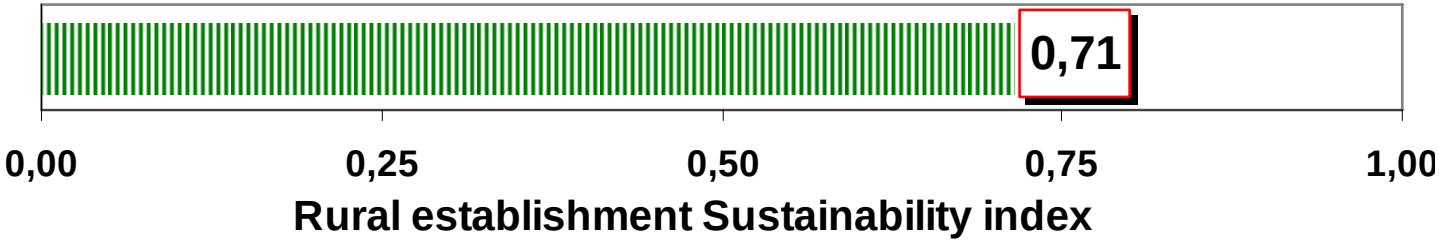
Management and Administration Sustainability Indicators



Socio-cultural Values Sustainability Indicators

Oil palm production at Ishihara Farm





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Integrated farm sustainability assessment for the environmental management of rural activities

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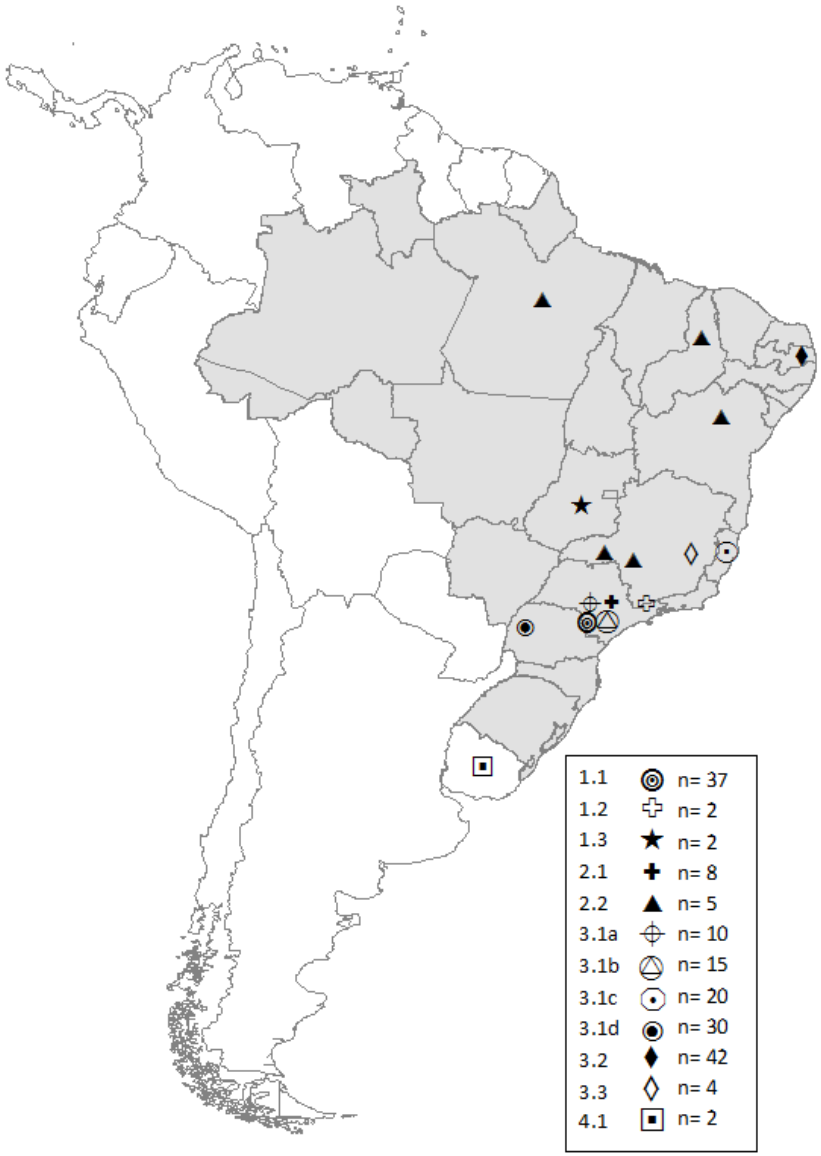
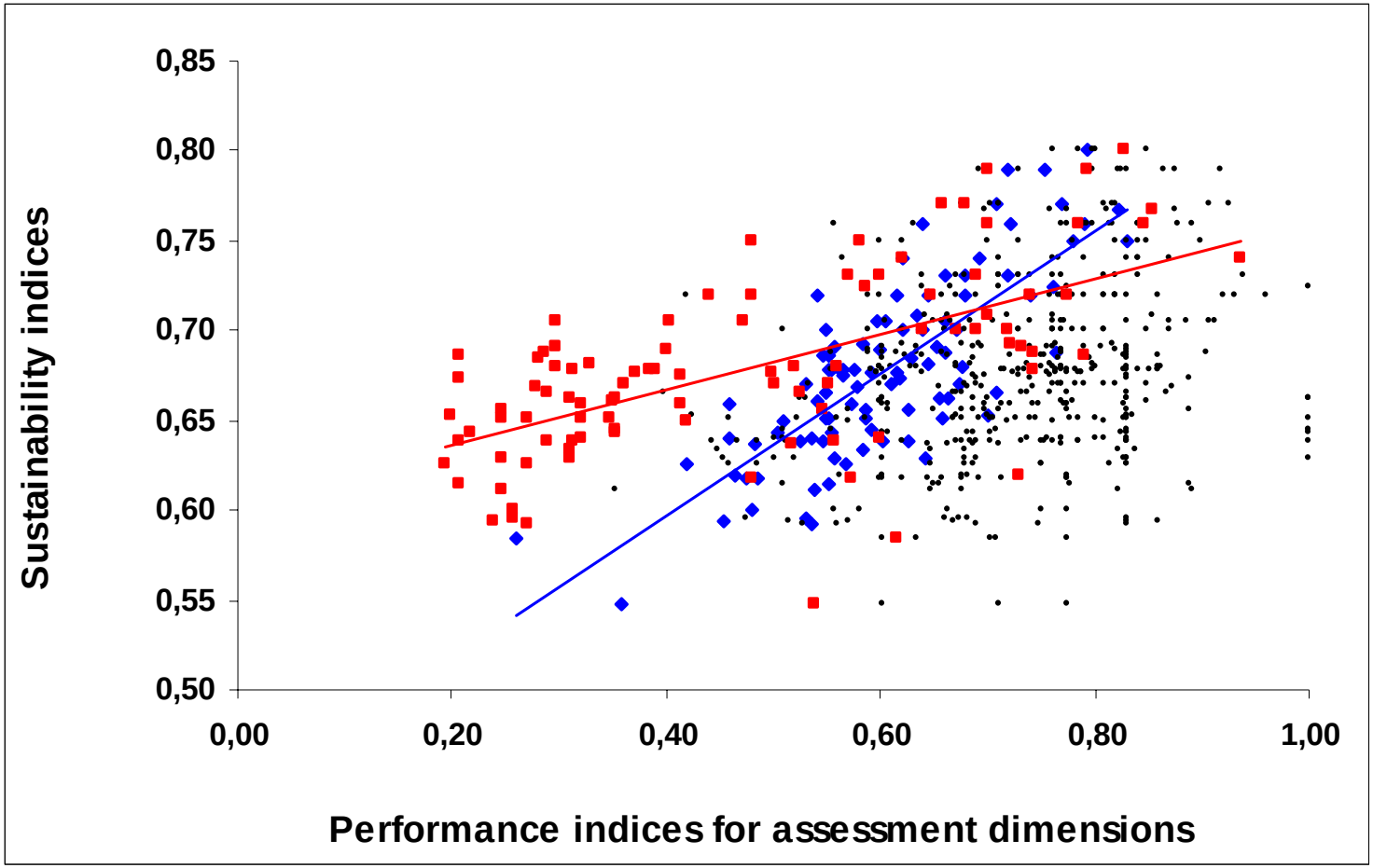
ABSTRACT

Farmers have been increasingly called upon to respond to an ongoing redefinition in consumers' demands, having as a converging theme the search for sustainable production practices. In order to satisfy this objective, instruments for the environmental management of agricultural activities have been sought out. Environmental impact assessment methods are appropriate tools to address the choice of technologies and management practices to minimize negative effects of agricultural development, while maximizing productive efficiency, sound usage of natural resources, conservation of ecological assets and equitable access to wealth generation means. The 'system for weighted environmental impact assessment of rural activities' (APOIA-NovoRural) presented in this paper is organized to provide integrated farm sustainability assessment according to quantitative environmental standards and defined socio-economic benchmarks. The system integrates sixty-two objective indicators in five sustainability dimensions — (i) Landscape ecology, (ii) Environmental quality (atmosphere, water and soil), (iii) Sociocultural values, (iv) Economic values, and (v) Management and administration. Impact indices are expressed in three interpretation levels: (i) specific



Scope of analysis	Case study	References
1. Specific agricultural production system / activity	1.1 Family farming sustainability – horticulture, agro-tourism, fee-fishing	Rodrigues et al., 2003b; Rodrigues et al, 2006b
	1.2 Integrated Fruit Production	Buschinelli et al., 2007; Calegario et al., 2009
	1.3 Precision agriculture	Rodrigues et al., 2008b
2. Agricultural productive sectors	2.1 Ostrich farming	Rodrigues et al., 2007a; Rodrigues et al., 2008a
	2.2 Oleaginous crops for biodiesel	Rodrigues et al., 2007b; Rodrigues et al., 2009b
3. Territorial environmental management	3.1 Organic agriculture and agro-tourism sustainable management	Rodrigues et al., 2006a
	3.2 Rural activities in the Mamanguape Protection Area	Rodrigues et al., 2008c
	3.3 Rural establishments around the Caratinga Biological Station	Lino et al., 2009
4. Countrywide rural development program	4.1 Integrated natural resources and biodiversity management project, Uruguay	Rodrigues and Moreira-Viñas, 2007a;b



• Results of case studies carried out with the APOIA-NovoRural system (n= 177), showing the distribution of sustainability and impact indices.
• Dimensions with stronger correlations, i.e., Landscape ecology (♦ - coef corr = 0.78) and Management & administration (■ – coef corr = 0.62) are emphasized.

APOIA-OilPalm Field trials in Indonesia - Nucleus (Libo) and Plasma areas (smallholders)

Follow up on the training seminar at SMARTRI

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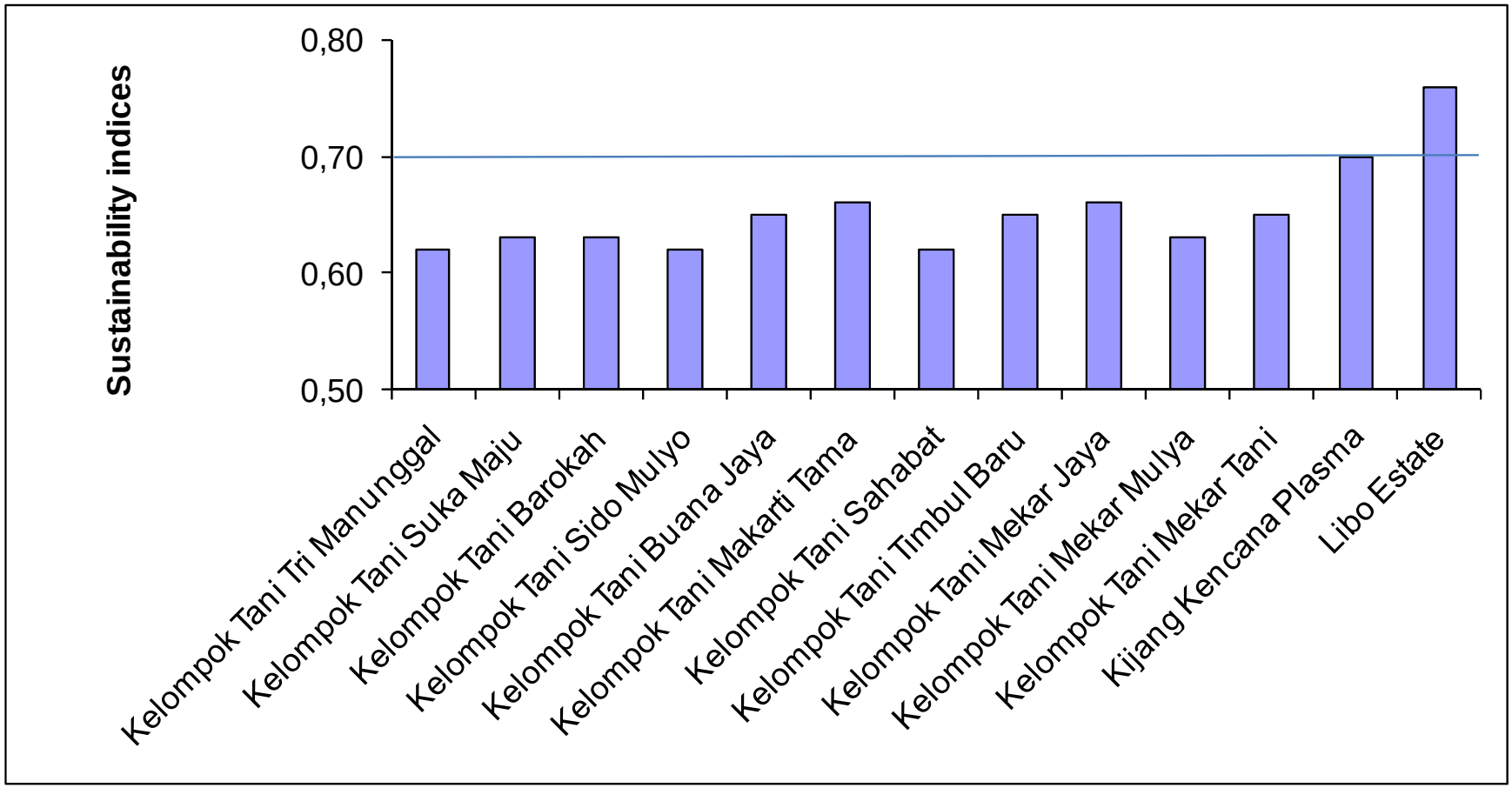
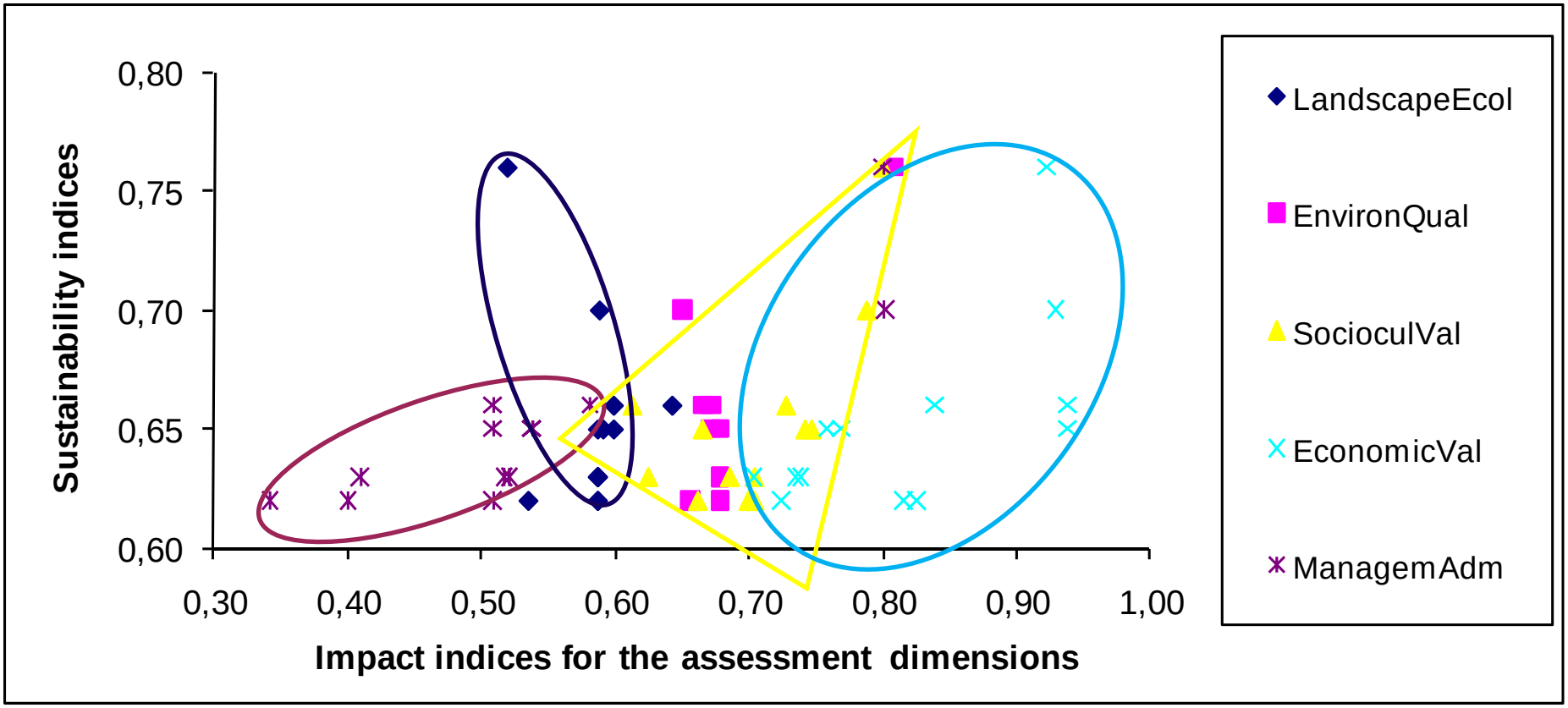


Case study results: sustainability indices for selected oil palm landholdings in Riau, Indonesia.



Case study results:

- ✓ **opportunity for improvement in Management indicators;**
- ✓ **important negative impact on Landscape ecology;**
- ✓ **general improvement in the indicators of Sociocultural values;**
- ✓ **important positive impact in the indicators of Economic values;**

Conclusions

- The impact assessment and ensuing sustainability index proposed by the APOIA-OilPalm system can be a practical, expeditious, inexpensive step in the preparation for eco-certification, according to RSPO-defined PC&I;

- High levels of correlation were observed between the sustainability indices and all sustainability dimensions except Landscape ecology (negative correlation -0.36) implying that sustainability attributes have been attained at the expense of nature conservation (no surprise, and particular indicators, such as HCVH and Protection of relevant ecological species, may preclude certification);

- The simultaneous involvement of smallholders and large scale establishments, with data analysis carried out altogether, imply good malleability both for the set of indicators and for the composite sustainability index provided by the APOIA-OilPalm approach.

Profile

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