

The amazing palm

from biological model to poverty alleviation

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Sustainability questions research

- Poverty alleviation
- People's rights
- Workers' rights
- Land grabbing
- Public policies
- Ethical investments
- Public/Private Partnership



- Agroecology
- Breeding
- Waste management
- Precision Agriculture
- Best agricultural practices
- GreenHouse Gas mitigation
- Integrated Pest Management
- Environmental services

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**ECOLOGICAL
INTENSIFICATION**

An original model for Biologists



A giant perennial grass

Monocotyledoneous

Areaceae (Palmaceae)

Two cultivated species

Elaeis guineensis

Elaeis oleifera

Interspecific hybrid

Two different oils

Palm oil (palmitic)

Kernel oil (lauric)

An original model for Agronomists



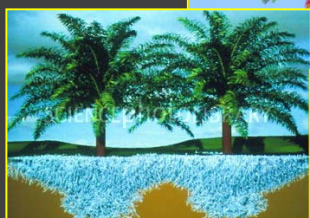
- The oil factory

- Almost 10X productivity compared to other oil crops
- Two different oils for different uses
- A non-GMO virgin oil



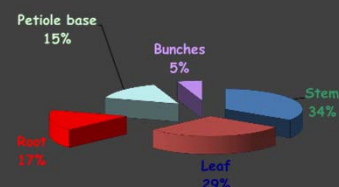
- The robust fellow

- Adaptable to various different cropping systems
- No systematic use of pesticides



- The biomass factory

- Outstanding photosynthetic capacity
- High productivity of aboveground/underground biomass
- Impact on soil biology and structure
- Bunches account for 5% only of total biomass



An original model for social studies



✓ Which prerequisites for efficient poverty alleviation?

- Where, when, how and how much ?
- Winners and losers

✓ Which model?

- Nucleus/Estate
- Agroindustrial
- Outgrowers



✓ Which role for multi-stakeholders initiatives ?

✓ A role for Governments?

✓ Which standards : RSPO, MSPO, ISPO ...

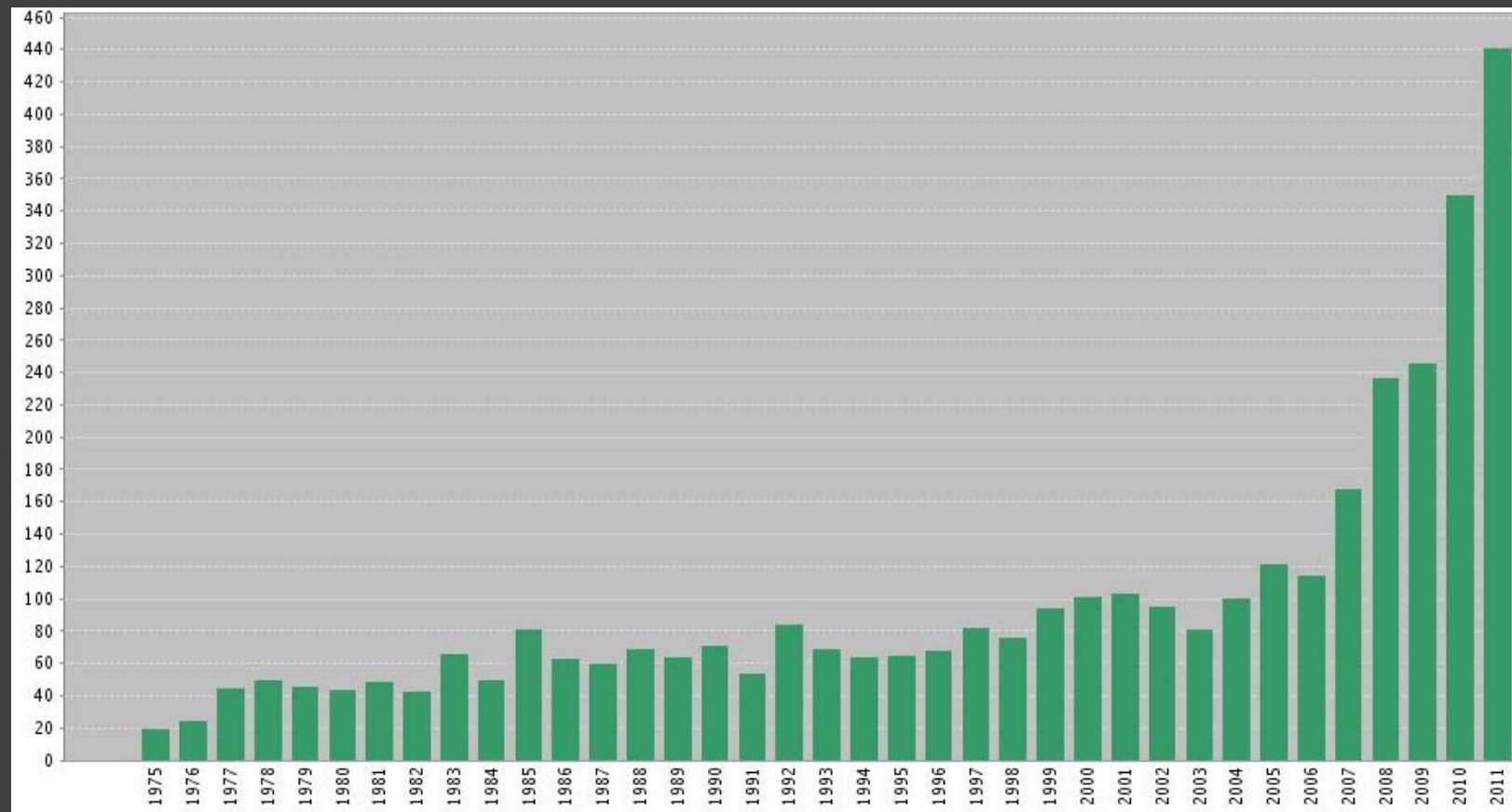
✓ Social impacts on the long term (FELDA, Malaysia)

The Four Oil Palm Truths



1. Demand for oil palm will continue to increase in response to a growing and increasingly affluent global population.
2. Oil palm is one of the most profitable land uses in the humid tropics.
3. Oil palm plantations store more carbon than alternative agricultural land uses.
4. Native biodiversity within oil palm plantations is far lower than the natural forests they often replace.

The oil palm literature boom



Published peer-reviewed articles on *oil palm* . Source Web of Science

Spatially explicit scenario analysis for reconciling agricultural expansion, forest protection, and carbon conservation in Indonesia

Lian Pin Koh¹ and Jaboury Ghazoul

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Edited by Stephen Polasky, University of Minnesota, St. Paul, MN, and accepted by the Editorial Board May 3, 2010 (received for review January 14, 2010)

Palm oil is the world's most important vegetable oil in terms of production quantity. Indonesia, the world's largest palm-oil producer, plans to double its production by 2020, with unclear impli-

preservation scenario whereby expansion proceeded in sequence from degraded lands, through agricultural lands and secondary forests, to primary forests; (iv) a carbon conservation scenario

Biodivers Conserv (2010) 19:999–1007
DOI 10.1007/s10531-009-9760-x

ORIGINAL PAPER

Addressing the threats to biodiversity from oil-palm agriculture

David S. Wilcove · Lian Pin Koh

Meta-analysis of prospective cohort studies evaluating the association of saturated fat with cardiovascular disease^{1–5}

Patty W Siri-Tarino, Qi Sun, Frank B Hu, and Ronald M Krauss

Regulatory Mechanisms Underlying Oil Palm Fruit Mesocarp Maturation, Ripening, and Functional Specialization in Lipid and Carotenoid Metabolism^{1[W][OA]}

Timothy J. Tranbarger^{2*}, Stéphane Dussert², Thierry Joët, Xavier Argout, Marilyne Summo, Antony Champion, David Cros, Alphonse Omore, Bruno Nouy, and Fabienne Morcillo



Contents lists available at SciVerse ScienceDirect

Global Food Security

journal homepage: www.elsevier.com/locate/gfs



Oil palm expansion transforms tropical landscapes and livelihoods

Jeffrey Sayer^{a,*}, Jaboury Ghazoul^b, Paul Nelson^a, Agni Klintuni Boedhihartono^a

Collaborative Research



- Quantify the effect of habitat complexity in maintaining biodiversity, ecosystem function and ecosystem services within oil palm
- Develop novel experimental approaches for partitioning the effects of habitat structural complexity and aspects of biodiversity on ecosystem functioning
- Predict and model optimal cover of understory and epiphyte vegetation in oil palm plantations so as to maximise biodiversity and economic profitability through ecosystem services.

Stability of Altered Forest Ecosystems (SAFE) Project (2010-2020)



SAFE is slated to be the **world's largest ecological experiment** both in terms of size and breadth of ecological processes.



A major contribution to **sustainable palm oil management and the conservation of biodiversity,**

A major contribution to sustainable plantation management, the implementation of the Roundtable on Sustainable Palm Oil (RSPO) guidelines and the conservation of biodiversity in agricultural landscapes



The Socially and Environmentally Sustainable Oil palm Research (SEnSOR)

An integrated multi-disciplinary research programme designed to fill key knowledge gaps in testing and developing the RSPO's Principles and Criteria for sustainability in oil palm agriculture.

1. Soil and Water
2. Greenhouse Gases and Air Quality
3. Biodiversity
4. Participatory Processes and Rights
5. Livelihood

SPOP : Sustainable development of Palm Oil Production

Designing strategies from improved knowledge on oil palm cropping systems

- To generate knowledge and toolkits aimed at assessing economical, environmental and human impacts of various different oil palm farming systems
- To assess the sustainability of present farming systems and to propose improved systems
- To involve farmers and stakeholders into the research protocol, through the implementation of participative methods
- To implement multi-agents modelling





Research Networks

Sharing indicators for sustainable palm oil production

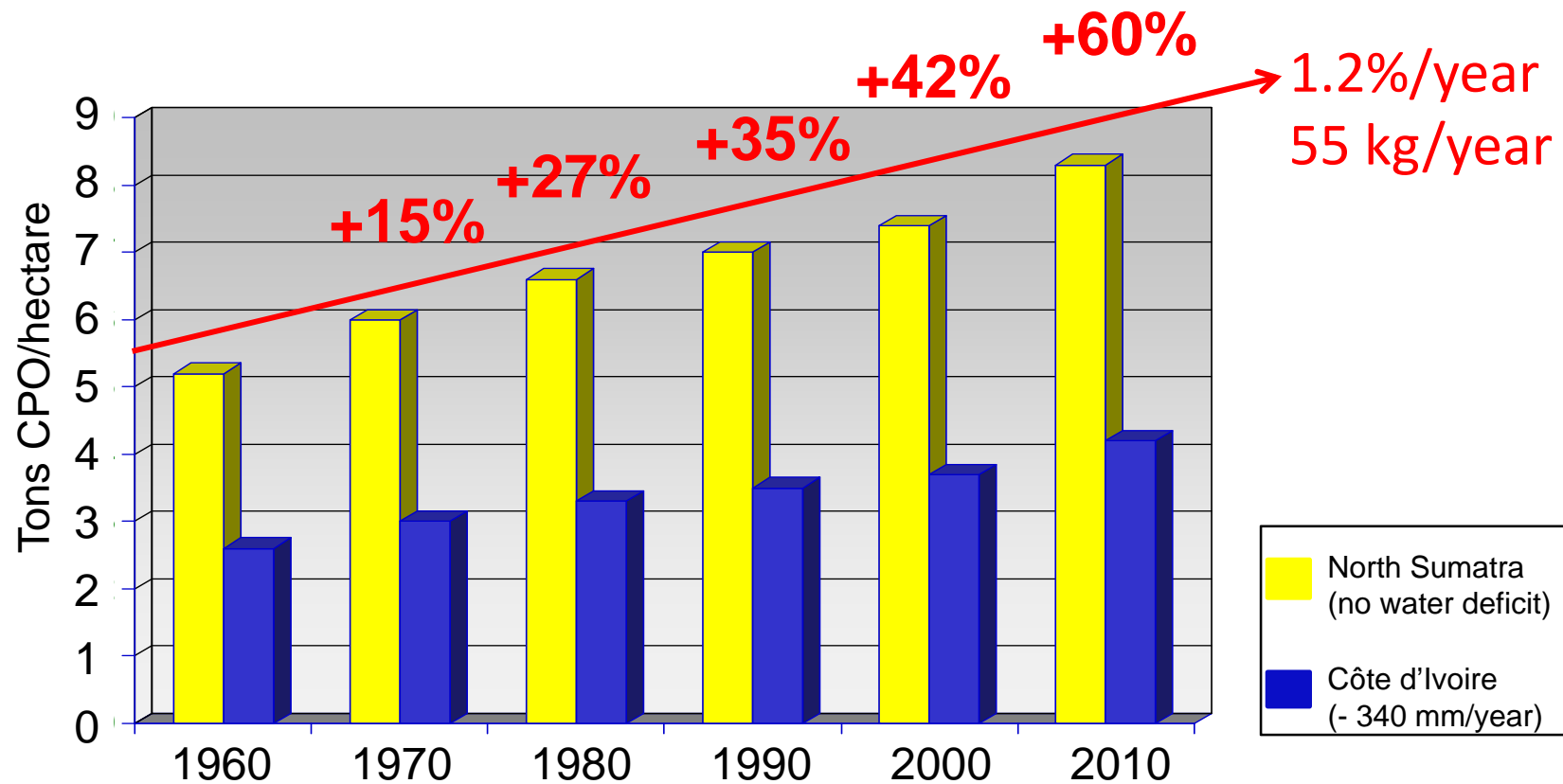


The **PALMINET web platform** was launched in 2011 by the international network on sustainable palm oil indicators coordinated by Cirad.

- to inform stakeholders,
- to pool research and share experience
- to foster the creation of indicators and tools for sustainable development.
- to encourage new partnerships

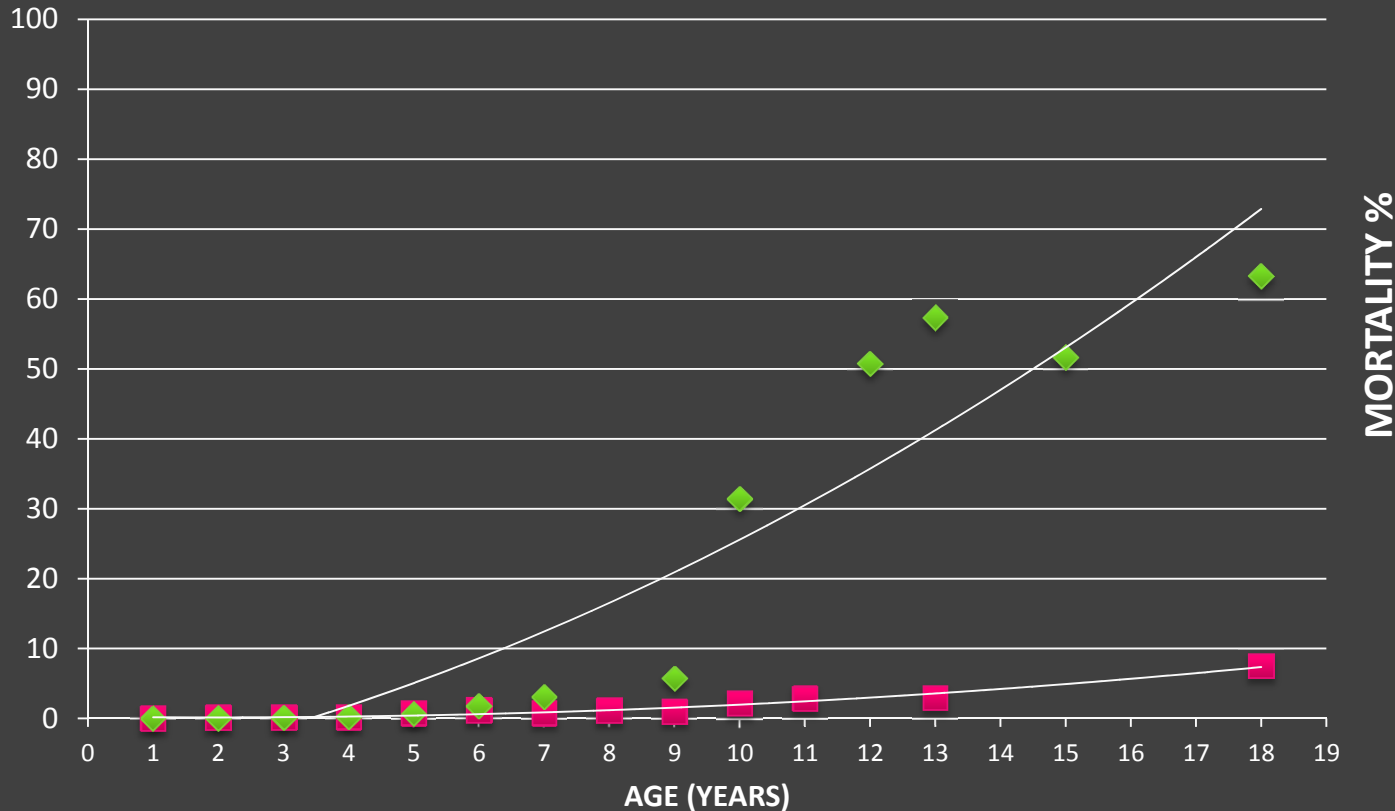
Having an impact (1)

An appropriate combination of breeding and BAP strategies



Having an impact (2)

An appropriate breeding strategy



In Latin America, Bud Rot (PC) is controlled by developing interspecific *E. oleifera* x *E. guineensis* hybrids.

Having an impact (3)

Adapting oil palm quality to markets



Fatty Acid		High Oleic Palm Oil	Palm Oil	Olive Oil	Soybean Oil
Lauric	C12:0	0,13	0,35		
Miristic	C14:0	0,80	1,2		
Palmitic	C16:0	27,7	42	13	11
Stearic	C18:0	2,8	5,4	3	4
Oleic	C18:1	55,0	40	71	24
Linoleic	C18:2	11,4	11	10	54
Linolenic	C18:3	0,4	0,2	1	7
Saturated		31	49	16	15
Unsaturated		69	51	82	85

Results from E. guineensis X E. oleifera hybrids in Hacienda la Cabaña, Colombia

Having an impact (4)

An environmentally and economically efficient composting

Composting reduces needs for mineral fertilizers of 15%
It improves both soil fertility and texture.



**ENVIRONMENTAL
SERVICES**

DIRECT

FERTILISERS BILL

ORGANIC MATTER

C SEQUESTRATION

INDIRECT

N LEACHING

N₂O EMISSIONS

CO₂ EMISSIONS





12 m³ methane
per ton FFB

15 m³ methane
per m³ POME

Mitigating GHG emissions

Global project - 3 palm plants	2012	2020
Palm plants		
Milling (T FFB/year)	295,000	438,000
POME flow (m ³ /year)	231,500	344,700
COD load (T/year)	15,400	22,900
Methanization systems		
Biodigester capacity (m ³)	37,500	37,500
Methan captured and used (m ³ /year)	3,645,900	5,382,600
Diesel/Kerosene savings (l/year)	2,946,600	4,059,800
GHG reduction		
CH ₄ and N ₂ O avoided (T CO ₂ eq./year)	40,500	59,800
Diesel/Kerosene savings (T CO ₂ eq./year)	9,400	13,900
Economics		
Investment costs(5%, 9years) k€	5,453	8,460
Savings k€		17,564
O&M costs k€		5,258
Net profit k€		3,847

Farinet et al (2011) Palminet Workshop, Bali, Indonesia.

Getting into the public debate ...



People do not know what they should know ...



Huile de palme et environnement

Alain Rival

Alain Rival est biologiste, Correspondant pour la Filière Palmier au CIRAD (Centre de coopération internationale en recherche agronomique pour le développement).



La forêt primaire et la biodiversité sont-elles menacées ?

La relation entre plantations de palmier et déforestation est complexe : ni directe ni automatique. Les concessions sont accordées par les pouvoirs publics, souvent au niveau local, aux compagnies forestières qui exploitent le bois. Les forêts dégradées peuvent ensuite évoluer en friches, en savanes ou en terres cultivées sous l'action de l'homme. Les espaces déforestés ne sont que partiellement reconvertis en plantations de palmier. Ainsi, sur les 21 millions d'hectares de forêt primaire qui ont dis-

paru en Indonésie entre 1990 et 2005, 3 millions seulement correspondent à la création de palmeraies [1]. Toutefois, cette relation directe a tendance à s'aggraver dans de nouveaux fronts pionniers, comme à Bornéo, où près de 30% des forêts primaires abattues ont été converties en palmier à huile [2], alors que les nouvelles plantations sont responsables en moyenne des 10% de la déforestation enregistrée en Indonésie et Malaisie [3].

Take home messages

- ✓ Improving sustainability requires **multidisciplinary and collaborative research**
- ✓ Public awareness has pushed **new approaches and new actors** into the sector
- ✓ **Large scale projects** based on Public/Private partnership are emerging
- ✓ Results are getting more **published and recognized**
- ✓ Research provides a shared basis to **certification processes**
- ✓ There is a need for education and **capacity building on sustainability**
- ✓ Scientists must jump into the arena of the **public debate**



Thank you four your kind attention

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