

Towards Environmentally Sustainable and Equitable Palm Oil:

promoting sustainable pathways by exploring connections between flows, networks and systems at multiple levels

A proposal of WASS, PE&RC and WIMEK Graduate Schools

**to the Interdisciplinary Research and Education Fund (INREF)
of Wageningen University**

1. Title of the programme

Towards environmentally sustainable and equitable palm oil:

promoting sustainable pathways by exploring connections between flows, networks and systems at multiple levels

2. Applicants

WU Graduate Schools:

1. Wageningen Graduate School of Social Sciences (WASS)
Scientific Director: Prof.dr.ir. A.P.J. Mol
Contact Persons: Dr. Esther Roquas and Drs. Eveline Vaane
2. Wageningen Institute for Environment and Climate Research (WIMEK) Scientific Director:
Scientific Director: Prof.dr. R. Leemans
Contact Person: Mr. J. Feenstra
3. C.T. de Wit Graduate School for Production Ecology and Resource Conservation (PE&RC)
Director: Prof.dr. L. Brussaard
Contact Persons: Dr. Th. Jetten, Dr. C. van de Vijver and Ms. A. Mosselman

3. Programme summary

Palm oil production in Southeast Asia has been increasing rapidly as a result of an increase in the global demand for vegetable oils that can be used as a basis for the production of edible oil and biofuels. The increased production of palm oil has environmental and social effects. Oil palm farming is an important cause of tropical deforestation and soil erosion, and a source of greenhouse gases, air pollution and water pollution. The industrial production of palm oil in mills and transportation of products are another source of pollution. In addition, the expansion of large-scale plantations has reportedly contributed to social-political unrest at community level and sustained low productivity of smallholders as contract farmers. These effects and the many global-local links that connect production, processing and consumption, have increasingly globalized the challenges of the palm oil sector. Addressing these challenges and concerns proves complicated as they become visible at multiple locations and under different conditions. Particularly, the absence of formal global institutions to regulate palm oil production and trade is a severe handicap. An initiative to fill this gap was the Round Table on Sustainable Palm Oil (RSPO), established in 2004 by international private companies and NGOs. However, both the effectiveness and legitimacy of the RSPO in reducing the negative social and environmental effects are increasingly questioned.

The central research question of this programme is therefore: How can a more environmentally sustainable and equitable palm oil sector be promoted through socio-technical and institutional fits at multiple levels? The four main objectives are:

1. To identify sustainable pathways for the production, processing and governing of palm oil.
2. To combine and further develop theories on flows, networks and systems as analytical tools to unravel the complex dynamics (multiple stakeholders, multiple issues, multiple scales) of the palm oil sector.
3. To enable different stakeholders to contribute to a more environmentally sustainable and equitable palm oil sector in a science-based and concerted way.
4. To develop Wageningen UR into a world-wide centre for interdisciplinary and science-for-impact research on pathways towards sustainable and equitable palm oil commodity chains.

Field research activities on the entire production chain will take place in Indonesia (Kalimantan and Sumatra) and in (southern) Thailand, while the scope of the research will range from local to national and global level. Indonesia is the largest producer of palm oil worldwide and strongly export-oriented, combining plantation and smallholder production. Thailand is a contrasting case with more modest production, primarily aimed at the domestic market and mainly produced by smallholders with clear land titles and few links to industry.

Eight PhD students will perform a multi-disciplinary research of the palm oil commodity chain, with senior researchers and a post-doc contributing to integration at program level. They will contribute to the identification of *sustainable pathways* for palm oil production in Indonesia and Thailand. Sustainable pathways consist of a combination of agronomic, environmental, land use planning, organizational and governance practices that together fit and generate more sustainable production and trade. These pathways include and are sustained by actors who manage access to material and immaterial flows, networks and systems and connect these at critical locations. To identify sustainable pathways each PhD student will unravel (part of) the complexity and dynamics of the palm oil sector. For this purpose, each student will use and develop theories and concepts on complex systems, flows and networks. Through action research, organized by senior researchers with support from the Centre for Development Innovation, stakeholders will be engaged in seeking sustainable pathways. The scope of action research will differ per type and subject of PhD research. Stakeholders will primarily include smallholders but also plantation owners, processors, multinationals and investors as well as regulatory authorities, like governments and the RSPO.

Detailed programme description

a. Background/history and research questions

Palm oil is the leading tropical vegetable oil due to the rapidly growing global demand for this oil as an input for food products, cosmetics, animal feed and bio-energy. Nearly 90 percent of the production is concentrated in Southeast Asia (Indonesia and Malaysia), but its use is increasingly spreading worldwide with China and India as the main importing countries, next to the EU (USDA 2010). The sector increasingly provides income and employment to millions of people and foreign currency for many countries. These trends have made palm oil into a highly globalized commodity and encouraged other countries to expand their production capacity, like Thailand (being the third largest producer of the world), Ghana and Brazil.

The rapid growth in palm oil production and trade has led to multiple challenges that have attracted much attention. These include negative environmental and social effects of palm oil production and processing.

Environmental effects are first of all associated with deforestation for the production of oil palm. This leads to loss of biodiversity through habitat loss. Deforestation and the exploitation of peat soils also lead to increased greenhouse gas emissions, such as CO₂, and to soil erosion. In case forests are cleared through burning, air quality problems may result from it. There may also be pollution of waterways due to the use of chemical fertilizers and pesticides. The industrial production of palm oil in mills, and transportation of products are other sources of pollution of air, water and soil (Danielsen et al. 2009, McCarthy and Zen 2010, Reijnders and Huijbregts 2006, Tan et al. 2009).

Negative social effects of expansion and large-scale organization of palm oil production also form major challenges. These include social-political unrest at community level due to land conflicts, food and income insecurity and broken promises (McCarthy and Cramp 2009, McCarthy 2010, Rietberg 2011). Increasingly, concerns are being raised about the low productivity of smallholder production as part of large-scale plantation schemes and the lack of (room for) institutional innovation to benefit smallholders. The negative effects of expansion and large-scale organization of palm oil production are often considered to be the (more or less direct) result of the ways in which international private corporations and funding agencies influence and organize palm oil processing and trade. These effects and the many global-local links that connect production, processing and consumption, have increasingly globalized the challenges of the palm oil sector. (For key publications: see Annex 9).

Addressing these challenges and concerns proves complicated as they become visible at multiple locations and under different conditions. Particularly, the absence of formal global institutions to regulate palm oil production and trade is a severe handicap. An initiative to fill this gap was the Round Table on Sustainable Palm Oil (RSPO), established in 2004 by international private companies and NGOs. The RSPO formulated a set of principles and criteria for sustainable production of palm oil. However, the effectiveness of the RSPO in reducing the negative social and environmental effects is questioned. Smallholders face major difficulties in complying with its standards both as independent producers and as contract farmers included in estate schemes while plantation companies sometimes seem to refrain from strict adherence to them and prefer to expand production rather than increase the productivity of smallholders under contract farming. Moreover, much of the global palm oil trade, like imports to India and China, is not concerned by these standards. In addition, the legitimacy of the RSPO is contested by national governments that deem the organization a threat to their sovereignty. The Indonesian and Malaysian governments have both taken the initiative to develop their own national sustainability standard for palm oil. At the same time, governments of European countries (like the UK and the Netherlands) have convened

meetings with palm oil leadership to commit them to continued rapid growth in the production and use of RSPO-certified palm oil (Hospes 2009).

Alarmed by bad press about one of its major agricultural loans to palm oil business in Indonesia, the World Bank Group (WB), together with the International Finance Corporation (IFC), took the initiative in 2010 to launch a global consultation process with a view to develop a WB framework and IFC strategy for engagement in the palm oil sector. This process involved a wide range of stakeholders: governments, private sector companies, environmental and social NGOs, farmers, indigenous communities and knowledge institutes. Both WB/IFC and national governments now wonder how different global arrangements or standards (WB/IFC, RSPO) can be related to national governance arrangements to impact palm oil production, processing and trading and to promote smallholder development.

Under these circumstances, addressing the environmental sustainability of palm oil production is crucial, both in terms of determining more sustainable production and processing practices and in identifying relevant policies, institutions and governance mechanisms to promote their implementation. At the same time, the controversy on extensification versus intensification of oil palm production has to be addressed as an environmental, social and economic issue. Increased productivity of smallholder production at estate schemes can serve as a disincentive for plantation companies to expand palm oil production and provide economic benefits to smallholders. This again requires addressing issues of governance, institutional arrangements and political inclusion of smallholders. As the RSPO initiative has made clear, if smallholders are not explicitly included, they risk to become marginalized in this process and disengage from (more) sustainable production.

Equitable palm oil is about higher productivity and favorable economic and political inclusion of smallholders at the same time. This will enable and constrain practices and processes towards environmental sustainability of palm oil production, which in their turn, will affect opportunities to make palm oil production more equitable.

These observations lead to the conclusion that promoting environmental sustainability and equity in the palm oil sector is urgent because of the growing importance of the sector, the intensifying environmental and social problems that result from this, and the limitations of the present initiatives and regulatory arrangements at multiple levels. In this program, we focus on the environmental, social and economic dimensions of sustainability in an integrated way. We want to identify what combination of measures, practices and actors at different levels can contribute to more environmentally sustainable and equitable palm oil. Hence, the central question for the research is: **How can a more environmentally sustainable and equitable palm oil sector be promoted through socio-technical and institutional fits at multiple levels?**

The specific questions (that will be used to organize the PhD programme as well as the supervisory and synthesizing roles of senior researchers) are:

1. How can the challenges be addressed that smallholders face under different conditions, in terms of increasing yields, meeting quality and certification standards, strengthening their position in value chains and increasing their participation in policy and rule-making processes?
2. What socio-technical measures can reduce negative environmental and social impacts from palm oil supply chains in production, processing and trading?
3. How are (transboundary) financial and commodity flows of palm oil value chains organized and how can they contribute to making the palm oil sector more environmentally sustainable and equitable? Attention will be given to the roles of governments, investors and trading companies.

4. How can different global governance arrangements (in the field of palm oil, biodiversity, forestry, etc.) be related to national and local (public and/or private) governance arrangements to make the palm oil sector more sustainable and equitable?
5. What scenarios can be identified that portray future trends in the palm oil sector and in the environmental sustainability and equity of the palm oil sector? How will differently scaled socio-technical, environmental and institutional developments affect these trends?

Important dimensions of the research are:

- Multi-level research (global, regional/national and local) and exploration of the linkages and interactions between them.
- Close collaboration between technological and social research is needed to contribute to environmental sustainability and equity in the palm oil sector.
- Research approach is stakeholder-inclusive and change-oriented.

To answer these research questions, a coherent study of the entire palm oil supply chain is required, including all actors, as well as the integration of technical, environmental, social and economic dimensions through a combination of systems, flows and networks perspectives. The study focuses on environmental sustainability and equity issues, but considers other aspects (technical, economic, institutional) when evaluating pathways towards these aims (see section d).

b. Justification, relevance of the programme for international development issues

Globalization processes require new approaches to international development issues and new ways of organizing science. First, these new approaches are characterized by an increased understanding that international development requires re-organizing transboundary flows of commodities to create shared value. There is a growing consensus that changing the ways in which critical global commodities (like palm oil) are produced, processed and traded, will have a much greater impact on international development than transfer of official development aid. For (natural and social) science this implies that research cannot be organized at one level only. Science has to trace flows of goods and money and to study how these flows impact economically and/or politically weak actors (like smallholders in Indonesia and Thailand) as embedded in different agro-ecological and social systems. This is what the programme envisages and what makes it distinctive vis-à-vis earlier research on palm oil that has too much concentrated on one level (often cropping, primary production), technology or discipline.

Second, new approaches to international development in a globalizing world are characterized by the view that international development cannot be limited to the government realm only but should involve companies and civil society organisations to act as change agents and to work together in partnerships. The newly assigned or acquired position of companies and civil society organisations has contributed to new insights and unorthodox approaches but also to controversies, biased information and normative approaches (like in the field of sustainable palm oil). Under these circumstances, (natural and social) science could play a key role in providing reliable data and insights in complex issues and processes, taking information and problem statements of all stakeholders seriously but not taking sides. Stakeholders primarily include smallholders (as part of different production schemes or business models) but also plantation owners, millers, processors, multinationals, investors, local and national governments and multi-stakeholder initiatives like the global RSPO. This proposed INREF program is well-positioned to play the role of an independent, yet interactive, knowledge broker and to organize linkages and exchanges between stakeholders and scientists and among stakeholders in a concerted way. As an emerging hub for interdisciplinary and action research on sustainable palm oil, WUR could redress the limited role and importance that science has played in the development and testing of different policies, principles and impact assessments by governments, companies and NGOs.

Third, new approaches to international development in a globalizing world are characterized by the view that changes in exploitation of natural resources, agricultural productivity, environmental systems and governance arrangements cannot be studied in isolation as they relate to each other. This proposal is based on this view and therefore extremely relevant for international development.

Fourth, new approaches to international development in a globalizing world require a more interactive and concerted approach of organizing science in relation with stakeholders at different levels. This program can indirectly but tremendously contribute to more environmentally sustainable and equitable palm oil by capitalizing on practical knowledge of different stakeholders, testing their policies-in-the-pipeline, sharing insights on sustainable pathways, and increasing the capabilities of different stakeholders to act upon sound information – to contribute to more environmentally sustainable and equitable palm oil. We do not expect to identify silver bullets applicable for all problems and locations but want to develop action research approaches to kick-start innovation processes/systems that enable (the generation of) ‘best fit’ solutions. This program can be an incubator to generate new intelligence and new solutions through well-organized action research.

c. Objectives

The proposed research has four main objectives, which are mutually related and reinforcing:

1. To identify sustainable pathways for the production, processing and governing of palm oil by answering the specific questions (see above: 4a).
2. To combine and develop theories on flows, networks and systems as analytical tools to unravel the complex dynamics (multiple stakeholders, multiple issues, multiple scales) of the palm oil sector.
3. To enable different stakeholders to contribute to a more environmentally sustainable and equitable palm oil sector in a science-based and concerted way.
4. To develop Wageningen UR into a world-wide centre for interdisciplinary and science-for-impact research on pathways towards environmentally sustainable and equitable palm oil chains.

Sustainable pathways

To advance environmental sustainability and equity within palm oil value chains, we want to identify ‘sustainable pathways’. Sustainable pathways can be characterized as:

- a combination of agronomic, environmental, land use planning, organizational and governance practices that together fit and generate higher and more sustainable production,
- including and being sustained by actors who manage access to material and immaterial flows, networks and systems and connect these at critical locations.

An essential contribution from using the notion of sustainable pathways is the acknowledgement that there will not be one single solution found to respond to the challenges of producing, processing and trading more environmental sustainable and equitable palm oil. We will thus develop sets of pathways to enable different stakeholders to more fully appreciate diverse options for the future of palm oil production in Indonesia and Thailand. More specifically, we will develop sustainable pathways at multiple scales, taking into account different relevant actors, and sustainability criteria.

These sustainable pathways combine practices that together generate higher and more sustainable production and trade:

- Agronomic: e.g. closing the yield gap; environmentally sound oil palm production; optimal profits; optimal farm size;
- Environmental: e.g. cleaner production; pollution management in the whole production chain / life cycle; meeting international environmental standards;

- Land use planning: e.g. avoid deforestation;
- Organizational: e.g. optimizing legal issues; optimizing position of smallholders; RSPO issues;
- Governance: e.g. smallholder inclusion; optimal local/regional/national/international policies/governance arrangements; RSPO issues;
- Economic: e.g. fair banking / green finance,

Sustainable practices will be identified and evaluated on the basis of different relevant sustainability criteria and indicators:

- Environmental performance (deforestation, pollution, resource depletion, etc.)
- Social acceptance/equity (e.g. share and say of smallholders)
- Economic efficiency
- Technical feasibility

Sustainable pathways describe future developments at the level of practices that can be employed by different actors in the production chain. These practices will be identified on the basis of criteria through action research with involvement of the most important change agents, including farmers, industries, transportation sector, governments, RSPO, NGOs, etc. We will also explore different futures on the basis of forecasting exercises (what if types of analysis) assessing what will happen with environmental sustainability and equity in the palm oil sector if specific pathways will be implemented. Also for this modelling exercise, we will adopt a participatory approach, involving stakeholders/change agents in the process of exploring the future.

To identify sustainable pathways, we need to understand and unravel the complexity and dynamics of the palm oil sector. For this purpose we propose to use and develop insights from theories on complex systems, flows and networks, with specific attention to critical actors that control access to and between networks.

d. Conceptual framework

Contemporary palm oil production, processing and trade practices are complex because many locations, actors, production systems and final products at different parts of the world are included and connected to each other in different ways. These practices are dynamic as the organisation of the production process, the composition of products and the relations between actors involved are diverse and changing. As a result, palm oil supply chains are characterized by processes of integration and fragmentation at the same time. To study the complexity and dynamics of the widely linked, yet diverse and fragmented palm oil sector, we propose to combine and develop theories and concepts on complex systems, flows and networks, and programmers and switchers as critical actors in and between systems and networks.

Complex systems

The first dimension of our conceptual framework is to conceive the palm oil sector as a complex system and at the same time as consisting of a multitude of complex systems. Complex systems are dynamic networks involving multiple actors, who act in parallel and who are influencing and influenced by natural and material conditions as well as other social actors (Duitz and Galaz 2008, Folke et al. 2005, Gunderson and Holling 2002, Uhl-Bien et al 2008, Woodhill 2010). Each complex system has both material and immaterial properties that explain complexity and dynamics of such a system. Actors involved in complex systems can be located in differently scaled geographical and jurisdictional spaces (Termeer, Dewulf and Lieshout 2010), covering several countries (like 'global integrated networks', see Mol 2007), one country (called 'regions' in Mol 2007), a plantation, or village community.

In complex systems, change does not occur through linear processes (Duit and Galaz, 2008). Through different feedback mechanisms, complex systems are constantly evolving in response to changes in both internal and external dynamics.¹ As a result, different development paths are possible. Although complex systems have a functional dynamic of their own, no single actor can control this, because, next to the intended consequences, interactions also have unintended effects at different levels (Avelino and Rotmans 2009). Simple cause-effect relationships often do not exist. The stability of complex systems is not the result of a purposed design. It is rather the consequence of permanent activities and un-coordinated interactions of different social actors (Giddens 1984).

To analyse the connections between differently scaled complex systems, we want to use and develop the concept of flows.

Flows and networks

The second dimension of our conceptual framework is to conceive the palm oil sector as consisting of material and non-material flows and to study the relations between these flows and the relevant networks of actors at different locations located along the flows. This proposal is based on the theory of 'space of flows' as developed by Castells (1996).

The 'space of flows' theory emphasizes the complex dynamics that exist in the context of globalization (Mol and Spaargaren 2006) characterized by loss of supreme power within a territory. Sovereign states can no longer be considered autonomous actors in regulating production, processing and trade because material and immaterial flows increasingly cross borders. Today, global governance takes place through both territorially and non-territorially-based networks that compete and/or co-operate through the exercise of formal and informal authority (Bulkeley 2005). An example of a non-territorially based network in the palm oil sector is the Round Table on Sustainable Palm Oil (Hospes 2009).

By conceptualizing the palm oil sector as consisting of flows and spaces characterized by competition or cooperation between different types of networks, it becomes possible to explore connections between local, national and/or global dynamics within transboundary palm oil supply chains (Oosterveer 2007 and 2009).² Present day palm oil provision constitutes (global or domestic) socio-material flows structured via primary production, processing, trade and end-use, whereby different arrangements at different levels can be discerned. Local, national and global networks link primary production at the farm/plantation, embedded in the local landscape, with domestic processing and international trade encompassing the material dimensions of palm oil as well as the relevant institutions, policies and arrangements.

In contemporary global network society the space of flows can acquire differently scaled modalities. These include *regions* and *global integrated networks (GINs)* (Mol 2007).³ In the palm oil sector, these two modalities of flows can co-exist, overlap and compete, next to other modalities. Each modality, however, operates within a wider context where global market dynamics, technological innovations, but also the World Trade Organization (WTO), the Convention for Biological Diversity (CBD) and other multilateral institutions and civil

¹ For an overview of conceptualisation of adaptiveness of complex systems, see the report (February 2011) of the IPOP theme Complex Adaptive Systems Working Group (February 2011).

² 'Transboundary' is used here because we do not only include global relationships but also bilateral and regional ones.

³ Regions consist of (im)material flows, material objects, social actors and their mutual relations (networks) that are primarily clustered geographically, often within one country. Such regions have fixed and solid relations, show 'directional' mobility of the flows and are constrained by clear boundaries. GINs consist of less stable, enduring and predictable relations that stretch across different regions. Such networks are relatively stable with predictable patterns of exchange and relations and routes for the material flows involved. Both modalities involve specific relationships between the actors and socio-material flows, i.e. between primary producers, material dynamics, processing facilities, final users and governance institutions.

society organisations play a role (Oosterveer and Mol 2010). The actors and institutions involved in each modality necessarily operate simultaneously across multiple levels and thereby influence the ways in which global issues are addressed. The state and non-state actors involved may intervene at local, national and global levels of governance simultaneously.

To identify the properties and positions of critical players in enabling or constraining sustainable pathways, we want to study access and control of networks, with a focus on key actors.

Key actors: programmers and switchers

The third dimension of our conceptual framework is to use and develop the concepts of 'programmers' and 'switchers' to explore what actors control access to a network or access from one network to another.

Networks are composed of actors and relations between them, so the relevance of a particular actor is primarily determined by its level of inclusion in the network and subsequently by which position it occupies within the network. Furthermore, in networks, power is primarily related to managing access (through mechanisms of inclusion and exclusion) to the networks themselves and to controlling the organisation of the (im)material flows. We will call the actors taking up this powerful role 'programmers', because they define and shape the way in which a network is programmed. A second key role is occupied by those actors who control access from one to the other networks and who connect different networks. We will call these actors 'switchers'. Flows and networks are shaped by these relations of power, so the possibilities for creating change towards more environmentally sustainable and equitable palm oil depend on the roles of programmers and switchers involved.

The combined use of the concepts of complex systems, flows and networks, and programmers and switchers allows us to:

- understand that dynamics in the palm oil supply chain does not only occur one-way from primary production to processing, trade and final use, but also the other way round;
- identify the key actors in the relevant networks, with a focus on the roles of switchers and programmers in organising the operation of particular flows and in controlling or connecting multiple networks and flows;
- analyse the decreasing dominance of states and formal regulation and the increased role of private governance through RSPO and other quality (and sustainability) standards;
- assess the limitations of the existing private arrangements and suggest ways in which not (yet) included stakeholders, such as smallholders, can gain access to them as well.
- acknowledge the mutual interaction between material and non-material dynamics;
- explore how social, economic and environmental values get connected or not;
- identify the main environmental sustainability and equity problems within the value chain;
- develop promising perspectives for increasing the oil palm yield particularly among smallholders;
- determine potential sustainable pathways that fit the organisation and dynamics of the palm oil flows and networks.

e. Research activities, number of PhD students, short description of topics for PhD projects, post-doc research, number of MSc students

The researchers and research projects funded through the INREF program include 8 sandwich PhD students, 1 post-doc (0.5 fte)⁴ and 8 additional MSc research projects. WUR senior researchers will supervise the PhD students individually and team-wise. The programme coordinator, post-doc and coordinators of PhD teams will contribute to exchange, integration and joint publication of results at programme level. The senior researchers, assisted by CDI, will also play a key role in preparing and phasing action research to organize interactions and knowledge exchange among PhD students and between PhD students and stakeholders (see 5c). CDI (together with PAP) will analyse and document learning and innovation processes involving and connecting different stakeholders and researchers at multiple levels.

In the following, we briefly describe the topics for PhD projects (as well as one matching PhD grant), post-doc research, master student research and analysis of learning processes

Short description of topics for PhD research (see Annex 5 for a more detailed description)
PhD 1 (promoter: chair of Plant Production Systems) will identify the factors in the different smallholder-plantation models in Indonesia that are capable of improving smallholder agronomic, economic, social and environmental performance. The aim of this project is to determine what technical and institutional barriers exist that prevent smallholders from achieving higher productivity and how these can be overcome. The study is based on exemplary cases where high yields have already been realized.

PhD 2 (promoter: chair of Plant Production Systems) will assess the possibilities for improving the quantity and quality of palm oil production and for advancing farmers' livelihoods in Thailand through bottom up sustainable intensification. The near absence of land available for expanding the plantation areas forces a strategy of intensification. This study will identify, based on pilot projects, which social, economic, technical and institutional factors positively affect farmers' choice to invest in sustainable intensification of palm oil production and what is needed for the production system to comply to additional sustainability and equity criteria.

PhD 3 (promoter: chair of Public Administration and Policy) will identify ways to contribute to increasing the market share of sustainable palm oil in Indonesia. By analyzing the roles of different chain actors (producers, processors, traders), particularly on how they connect commodity, financial and regulatory flows, it will become clear if and how sustainable palm oil will become more mainstream in Indonesia or not. Next to these empirical findings this PhD will also contribute to further conceptualization on the processes and networks involved in inserting sustainability principles in palm oil commodity chains.

PhD 4 (promoter: chair of Environmental Systems Analysis) will address the sustainability of palm oil production in Thailand. The palm oil production chain will be studied at the landscape and sector level. Environmental models will be developed to evaluate options towards sustainable development of palm oil production. The models will integrate information on the causes of sustainability problems, the underlying processes, and possible solutions. Socio-technical measures will be identified to improve sustainability along the chain, with a focus on the environment and equity. Stakeholder participation in the model development will be aimed at in order to increase the usability of the model.

⁴ The post-doc will be based at the same chair group (PAP) as the one of the program coordinator. This positioning is to facilitate close collaboration with the program coordinator and to explore the need and possibilities to access extra means from or through PAP to add 0.2/0.3 fte to the 0.5 fte postdoc position.

PhD 5 (promoter: chair of Public Administration and Policy) will study the strategies of Indonesian state actors in the governance of sustainable palm oil. Despite the emergence of private sector initiatives, such as RSPO, the role of national governments in governing global palm oil supply chains should not be ignored. This particularly concerns the Indonesian government which prepares a national Indonesia Sustainable Palm Oil (ISPO) standard. This PhD will study this process within the broader perspective of network governance and the changing role of the state when governing sustainability of palm oil.

PhD 6 (promoter: chair of Environmental Policy) will analyze existing and future governance mechanisms and practices that impact the sustainability of palm oil production, processing and trade in Thailand. The existing national mechanisms and practices will be studied in order to determine how they relate to transboundary governance dynamics through different private and governmental initiatives, and with actual practices at the local level. On the basis of this assessment, multiple options to enhance environmental sustainability and equity in the palm oil supply chain will be identified and compared.

PhD 7 (promoter: chair of Environmental Policy) will study the existing relevant transboundary flows and networks (such as financial flows, RSPO, WTO, AFTA, etc.) to determine where they overlap and/or compete and how they can in the future support environmental sustainability and equity. These transboundary dynamics encompass public, private company and civil society dimensions. The assessment will be realized by connecting these global dynamics with the national and local dynamics in Indonesia and Thailand.

PhD 8 (promoter: chair of Environmental Systems Analysis) will explore future scenarios for the palm oil sector at the middle and longer range. The analysis will include an interpretation of existing global scenarios and national trends for (farming and eco-) systems, commodity chains and governance mechanisms in Indonesia and Thailand. Different scenarios will be analyzed with respect to their impact on environmental sustainability and equity at the level of farming and ecosystems. This research will be conducted in a participatory way through collaboration with selected stakeholders in order to ensure that the developed scenarios will be supported by the palm oil sector.

The PhD-project included through a matching grant from Environmental Systems Analysis (ESA), 'Ecosystem Service Modelling in Central Kalimantan Province, Indonesia', aims at modeling ecosystem services at the sub-national level in the face of environmental and climate change. In particular, the project will analyse the (environmental, social and economic) benefits resulting from ecosystems, including palm oil-based agro-ecosystems in central Kalimantan. The matching project (under supervision of ESA) will particularly complement the project for PhD 3, herewith strengthening the basis for comparison with PhD 4 in Thailand.

Post-doc research: the task of the post-doc is to reflect and to stimulate reflection on sustainable pathways during all stages of the program, by linking and synthesizing findings from different PhD research projects and providing feedback to individual research projects - working in close collaboration with the programme coordinator for this purpose.

The 4 annual program workshops and the international closing workshop will provide the post-doc and PhDs with a challenging opportunity to systematically and interactively reflect on their experiences and provisional findings during different stages of the research.

MSc-students: master students will conduct scoping or preparatory studies at program level or specific and guided support (data collection, support with interviews or data processing etc.) for PhD field research.

Analysis and documentation of learning and innovation processes

The Centre for Development Innovation (CDI) is to play a two-fold role: to advise senior researchers on the organization of meaningful communication between PhD researchers and stakeholders in all stages of the research and to analyze learning and innovation processes. CDI will support supervisors and PhD students in designing and implementing action research in the field, design and facilitate multi-stakeholder workshops, and will support interactive and reflective meetings, among researchers and with stakeholders. For analyzing learning and innovation processes, CDI will identify what combination of actors and knowledge hamper or enable the introduction or scaling up of new practices or policies contributing to more environmentally sustainable and equitable palm oil.

f. Results expected

The expected results at PhD project level and program level logically relate to the main objectives of the program (see 4c). The logical flow in Annex 3 presents our own theory of action on how the main objectives are related to each other and on how results at PhD level lead to results at program level. Here follows a narrative presentation of expected results per main objective (see Annex 4 for the logical framework):

The first main objective is to identify sustainable pathways by answering the five specific questions (see 4a). The PhD projects will identify relevant options, measures, governance arrangements or trends. Individual PhDs from Thailand and Indonesia that address systems, flows and networks at comparable nodes or levels are expected to produce similar but not identical results. The expected results per PhD project are:

- PhD1+2: options identified on how challenges of smallholders in terms of increasing yields, meeting quality and certification standards, strengthening their position in value chains and their participation in policy and rule-making processes can be addressed
- PhD3+4: socio-technical measures for environmental sustainability and equity identified
- PhD5+6: options for linking global, national and local governance arrangements identified
- PhD7: options for transboundary investment and commodity flows of value chains for environmentally sustainable and equitable palm oil identified
- PhD8: future trends and their effects clarified.

The answers to the specific questions will be synthesized by the senior researchers (and the post-doc and programme leader in particular) to produce a result at program level: sustainable pathways identified.

Concrete outputs at PhD project level will be (at least 2) presentations per PhD at meetings with stakeholders in which options, measures, governance arrangements and trends are identified and discussed. Upon invitation from stakeholders and if compatible with time-planning, one or two fact sheets, policy notes or science-based recommendations may be written. The options, measures, governance arrangements and trends will also be addressed by every PhD in one or two scientific articles. Concrete outputs at program level will be a presentation on sustainable pathways at the international conference of the RSPO and two paper presentations at international academic conferences. These presentations will culminate in two scientific articles on sustainable pathways by the post-doc, with senior researchers acting as co-authors.

The second main objective is to combine theories on flows, networks and systems as analytical tools to unravel the complex dynamics (multiple issues, scales and stakeholders) in the palm oil sector. Every PhD is expected to produce a conceptual framework, seeking conceptual diversity and clarity in teams of PhDs (see section 5a) at the same time (as also illustrated in Annex 3). The result at program level is an interdisciplinary and multilevel approach for understanding the complex dynamics in the palm oil sector.

Concrete outputs at PhD level will be four articles per PhD (published or accepted for publication in scientific journals), of which one may be theoretical. The three or four articles

describe the dynamics of a system or network of the palm oil sector in Thailand or Indonesia, or (impact of) global governance arrangements and transboundary financial and commodity flows (on palm oil production, processing and governance). Concrete outputs at program level will be one overarching conceptual framework and three synthesis papers of complex dynamics and trends of the multi-level palm oil sector: one for Indonesia, one for Thailand and one for global governance and transboundary flows and how these impact palm oil production, processing and trade in Indonesia and Thailand. These will be written by senior researchers as supervisors of teams of PhDs (see 5a).

The third main objective is to enable different stakeholders to contribute to a more environmentally sustainable and equitable palm oil sector in a science-based and concerted way by sharing insights with them on new practices, technologies, models and scenarios and by developing diagnostic tools for and with different stakeholders. To realize this objective, the identification of sustainable pathways and the unraveling of complex dynamics in the palm oil sector are important pre-conditions. At the same, mere knowledge transfer does not suffice. Reflexive, interactive processes have to be developed and practiced to increase the capabilities of different stakeholders to act upon comprehensive and sound information. At the same time, PhD students should be sensitive to the types of information needed by different stakeholders in order to act. Every PhD is to develop an issue-specific approach of action research.

The Centre for Development Innovation (CDI) will assist senior researchers to adjust and apply analytical tools for situational analysis, for decision-making and reflexive interactive processes as possible and relevant for the various PhD projects. In addition, CDI will help to make scientific results and insights applicable for stakeholders acting as change agents. The expected result at program level is the increased capacity of different stakeholders to act upon sound information. For every PhD research, different stakeholders or end-users are envisaged (see Table 1).

Table 1: Specification of stakeholders per PhD project

PhD project	Stakeholders to be involved
1+2	Smallholders; collectors in Thailand; mills, plantation managers in Indonesia
3+4	Actors in palm oil commodity chains in Indonesia and Thailand
5+6	National public authorities, palm oil companies in Indonesia and Thailand, and RSPO
7	Global and national investors, traders, multinationals, national public authorities and RSPO
8	Actors in palm oil commodity chains, government officials, NGOs and RSPO

The concrete activities on knowledge sharing and capacity building will have to be defined during the implementation of the research programme as they cannot be determined yet without prior consultation with stakeholders. However, a number of interesting options have already been proposed by stakeholders to WUR senior researchers under the INREF program:

- Linking and learning workshops on smallholder inclusion at the RSPO annual conference
- Building of research capacity of institutional members of the network organization Sawit Watch
- Training of plantation managers (INSTIPE) and the launch of a Nuffic Niche project for curriculum development of INSTIPE
- Training of smallholders (with FECU and GIZ) in Thailand
- The development of social and environmental impact assessment together with GIZ (Thailand) and Sime Darby (Malaysia)

Concrete outputs at PhD level will be the design of an action research approach in the early phase of the research to be adjusted and refined during the research. Concrete outputs at

programme level will include two documents of CDI: a synthesis paper of action research approaches from the literature before the field research periods and a synthesis paper of action research experiences of PhD students after their field research. In addition, senior researchers (with assistance from CDI) will develop diagnostic tools for and with different stakeholders. These tools are to enable stakeholders to unravel complex dynamics of the palm oil sector and to identify barriers to sustainable pathways.

The fourth main objective is to develop Wageningen UR into a world-wide center for interdisciplinary and science-for-impact research on pathways towards sustainable and equitable palm oil commodity chains. More specific results and indicators are: the establishment of new partnerships for research and development (agreements to collaborate in Thailand or Indonesia and new research in another country). Third parties seek to establish such partnerships and want to learn from and engage WUR in the development of interdisciplinary and action research in their country or network. We also wish to organize a new interdisciplinary PhD course or new module of an existing course as a joint activity of WASS, PE&RC and WIMEK), provided such a module or course offers an added value. Finally, we wish to explore possibilities for a CDI-led training module for professionals on multi-scale sustainability governance in commodity chains.

g. Methodologies

An interdisciplinary approach to scientific research is essential in this program as promoting a more environmentally sustainable and equitable palm oil chain clearly contains dimensions, that need contributions from different scientific disciplines in order to being adequately addressed. Knowledge and concepts from the natural and social sciences need to be integrated because there is a close interaction between the institutions and technologies involved in the production and processing of palm oil and the direct and indirect impacts related to natural resources. This integration asks for combinations and confrontations of methods and concepts and ultimately may lead to the development of new concepts and methodologies applicable to the study and promotion of sustainability in commodity supply chains in general.

As the palm oil sector is to a large extent globalized through production and trade comparative research can provide more in-depth understanding on how global dynamics become embedded in different local contexts and on how local and regional dynamics relate to global dynamics.

Action research emphasizes the importance of interdisciplinary and multi-level research for understanding complexity and is characterized by reflexive process orientation, that is, the planning of a process of interactions with stakeholders to generate new knowledge, to adapt research to upcoming or unexpected outcomes, and to contribute to change. These two dimensions of action research form a perfect match with this program. To study the complexity and connections of systems, networks and flows, knowledge from natural and social sciences will be combined and collaboration with different stakeholders will be organized. 'End users' will be approached as 'co-producers of knowledge' (Regeer and Bunders 2009) and 'change agents'. Instead of simply informing different stakeholders (companies, smallholders, NGOs, governments) at the end of the research program, we want to engage them in a learning process in which theories of action and policies-in-the-pipeline are tested.

We do not want to kick-start a process of knowledge generation that is driven by one interest group or normative view but contribute to a shared understanding of what combination of technical and institutional mechanisms at what levels can make palm oil more environmentally sustainable and equitable. This not only requires learning from different disciplines through interdisciplinary research but also (an openness) to explore with end-users how different systems connect, in what way different actors manage access to material

and immaterial flows and how they operate in networks. Herewith diagnostic tools and out-of-the-box thinking are developed for and together with different 'end users' to enable them to contribute as change agents to a more environmentally sustainable and equitable palm oil sector.

In section 5, we will further explain how we want to realize these intentions in practice through the chosen approaches to research and the way in which results will be integrated.

h. Inputs (personnel, finances)

This project involves 8 PhD students from Thailand (4) and Indonesia (4). Together with a post-doc and the project coordinator they will form the principal personnel input for this project involving INREF-funding. This input will be complemented by the senior researchers from the local partner institutions, CDI and the (4) WUR chair groups that will be involved in implementing and supervising PhD-research, MSc-thesis, additional research and collaboration with stakeholders.

The financial inputs will be €1,301,286, of which €999,936 is requested from INREF. This excludes an additional amount of €300,000 of co-funding (see section 11 for an explanation).

i. Location of program activities

Field research activities on the entire production chain will take place in Indonesia (Kalimantan and Sumatra) and in (southern) Thailand, while the scope of the research will range from local to national and global level. Analysis of entire value chains of palm oil requires an assessment of systems and flows, both within and between these two and other countries and will require visits to other types of 'localities': local, national and global offices of multinational companies, NGOs and state authorities.

Indonesia is the largest producer of palm oil worldwide and strongly export-oriented. Palm oil is produced by workers in plantation systems and by smallholders strongly linked to processing industries in nucleus-plasma (NIR) and other out-grower (e.g. KKPA) schemes. Due to deforestation and use of pesticides oil palm production is perceived as a threat to biodiversity, whereas land conflicts point at social-economic and legal problems. Indonesian plantations, processors and traders are well represented in the RSPO. Indonesia is part of a global network due to export of palm oil to e.g. China and EU, and investments from Malaysia and China in palm oil plantations in Indonesia. Indonesia can be seen as included in a 'Global Integrated Network' (GIN) and an arena in which different global, national and local authorities try to impose their sustainability agenda and standards.

Thailand is a contrasting case, although the third largest producer worldwide, its production is primarily aimed at the domestic market. Occasionally Thailand even imports palm oil. Domestic production is mainly organized via smallholders with clear land titles and little formal links to the industry. Thailand aims to expand its production area to realize domestic biofuel supply and to become a competitive player in the global food and cosmetics industry. The only area suitable for expansion is currently however occupied by rubber and fruit trees, not by forest. In some locations degraded land can be used but the main area for expansion is expectedly found in the east of the country. Processors, not producers, have become members of the RSPO. Thailand can be seen as a national network that is gradually evolving into a GIN and whose major challenge is to embark on a sustainability pathway addressing agro-energy, environmental and equity concerns simultaneously. Areas included in this study are Krabi province and the newly expanding plantation areas in the east of the country.

j. Logical framework

See Annex 3 and see 4f for the narrative.

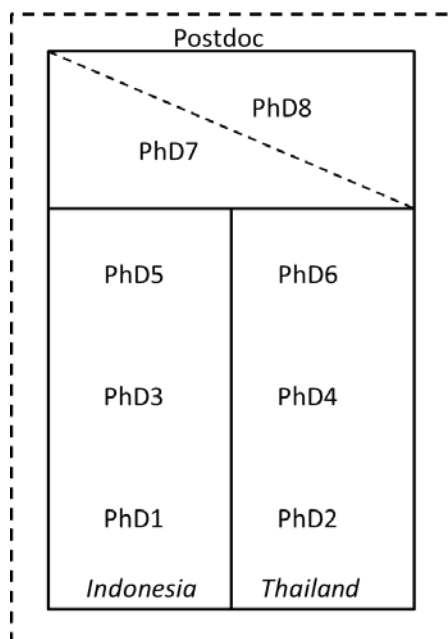
5. Interdisciplinary, comparative and action research

a. Interdisciplinary research

It is the ambition of the project that PhD candidates coming from each disciplinary background learn to appreciate each other's point of view and to learn to see how technological issues influence social science perspectives and vice versa. The cohort approach will facilitate this aim by bringing all PhD-students together during the first 6 months of their project. During regular meetings, each discipline will be introduced by one of the supervisors and its potential contribution to the research program as a whole discussed. These meetings will be included in the Training and Supervision Plans of the respective PhD-students.

In addition, the organization of the PhD-research itself will be such that interdisciplinary research is encouraged. Thereby, teams will be formed, as illustrated in Figure 1, in which several PhD-students collaborate closely and adjust their activities to each other and to the other team. Team A focuses on Indonesia, and consists of PhD1, 3 and 5. Team B (PhD2, 4 and 6) focuses on Thailand, and team C includes PhD7 and PhD8.

Figure 1: Overview of the three teams: Team A (PhD 1, 3 and 5 focusing on Indonesia), Team B (PhD 2, 4 and 6 focusing on Thailand) and Team C (PhD 7 and 8).



Teams A and B will specifically address research questions 1, 2 and 4 (see section 4a):

- PhD 1 and PhD 2 will study (question 1) practices, conditions and options of smallholders in Indonesia and Thailand to increase yields, meet quality and certification standards, strengthening their position in value chains and their participation in policy and rule-making processes. They will seek technical-institutional fits that are relevant for smallholders and for this purpose study smallholders as connected to different (networks of) actors (plantation owners, processors, communities, state authorities), flows (material and immaterial) and systems (production, farming systems, ecosystems).
- PhD 3 and PhD 4 will study (question 2) the palm oil production chains as developed in Indonesia and Thailand, with a focus on the connections between input provision, production and processing. They will identify social-technical measures to reduce negative social, economic and environmental impacts along the chain, incorporating governance mechanisms both internal and external to the chains.

- PhD 5 and PhD 6 will address question 4 by exploring how national policy and law making processes in Indonesia and Thailand (regarding palm oil, de-forestation, zoning, etc.) relate to different global governance arrangements and bodies (RSPO, WTO, WB, CBD, International Labour Organisation, human rights bodies, etc.). For this purpose the PhDs will analyze how state authorities in Indonesia and Thailand organize themselves and how they manage relationships with various global governing initiatives that each try to promote different dimensions or pre-conditions of sustainable palm oil. The PhDs will also explore how state authorities organize participation or representation of smallholders, plantation owners and other chain actors in national policy and law making processes.

Team C will specifically address research questions 3 and 5 (see section 4a):

- PhD 7 will analyze (question 3) global transboundary investment and commodity flows, with particular attention to the analysis of flows that are integrated in formalized global governance arrangements and those that (also) operate outside of these arrangements. This PhD will identify trends at global and national levels and interactions/interrelationships between them. Indonesia and Thailand will be studied as different but complex spaces and nodes of these investment and commodity flows.
- PhD 8 will (question 5) explore scenarios for the environmental sustainability and equity implications of potential increases in palm oil demand in the coming 2-4 decades in Thailand and Indonesia. These scenarios will be used to identify ways to increase palm oil production with minimal environmental and social disruption. This will be done by interpretations of existing global scenarios with the involvement of stakeholders. The PhD will focus on impacts of global and national trends on systems (farming system, ecosystems), commodity chains and governance mechanisms (as studied by teams A and B) in Indonesia and Thailand.

Taken together, PhDs 1-4 will all study producers, processors and traders as nodes of three different flows: flows of palm oil through the value chain, flows of regulations up and down multilevel governance, and material flows in production, farming and ecosystems. PhDs 5 and 6 will offer a comparative analysis of how state authorities connect with global governors and seek to voice interests and views of smallholders and other chain actors. By studying Indonesia and Thailand as case studies of nodes of investment and commodity flows, PhD 7 analyzes transboundary flows of commodities, money and regulation of use for PhD 5 and 6. PhDs 7 and 8 will draw different scenarios of future developments at global and national levels and how these may impact environmental sustainability and equity at the level of farming and ecosystems.

Sustainable pathways will be developed at the programme level. The postdoc will take a leading role in this, supported by the senior researchers. Each of the PhD students will provide building blocks for these pathways, taking a different focus. The role of the postdoc will be (1) to design a long list of potentially promising pathways at the beginning of the program on the basis of consultation of experts, stakeholders and decision makers, (2) to share these insights with individual PhD projects, (3) to stimulate interaction among PhD students throughout the programme, (4) to stimulate discussions between PhD students and stakeholders on sustainability, (5) to interpret, integrate and synthesize the results of the individual PhD studies and information from stakeholders and other sources into sustainable pathways. The results will be compared with RSPO developments to discuss sustainability beyond RSPO.

The sustainability pathways will focus in particular on environmental sustainability and equity. Environmental sustainability will be addressed on the basis of results from, for instance:

- PhD3: deforestation
- PhD4: pollution and agrarian land use change
- PhD8: future trends and global context

Equity will be addressed on the basis of results from, for instance:

- PhD1+2: higher income and benefit sharing; equity voicing
- PhD5+6: equity voicing
- PhD7: equity voicing of smallholders in international arenas and green financing
- PhD8: future trends and global context

Sustainable pathways will be formulated at different spatial and temporal scales (Table 2)

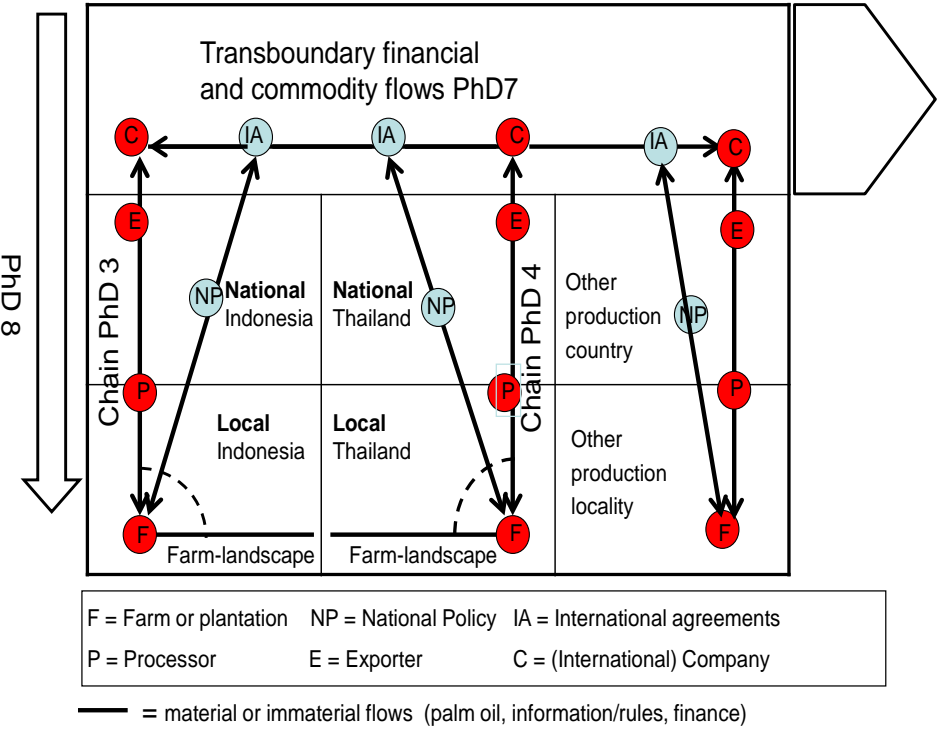
- Spatial: ranging from individual farms to multinational chains, and from the local to the (inter)national level
- Temporal: pathways for the coming years to decades

Table 2: Contributions of individual PhD students to sustainable pathway development at multiple scales. Bold indicates major focus.

	Plot	Farm	Collectors/ mills	Trade & industry	National	Inter- national
Contemporary	PhD1&2	PhD1&2	PhD1&2			
Coming 10 years		PhD3&4	PhD3&4	PhD3&4	PhD3&4	PhD5&6 PhD7&8
Coming 20-40 years			PhD5&6	PhD5&6	PhD5&6 PhD7&8	PhD5&6 PhD7&8

Figure 2 provides a schematic presentation of the proposed PhD research activities and at the same time reflects the conceptual framework of the research (see section 4d). The figure shows a network of flows, actors and systems at different levels and indicates for every PhD researcher on what actors, flows, networks and systems the research will focus. Other stakeholders, such as consumers, NGOs, knowledge institutions, are not being represented in this figure but will be included in the different PhD research projects. For PhD 1 till 4 critical nodes and units of analysis of flows, networks and systems will be producers, processors and traders. For PhD 5 till 8 it will be not so much actors but flows, organizations and systems that will form units of analysis for studying trends and impacts. In both teams, natural and social scientists will collaborate and contribute in a concerted manner.

Figure 2: Schematic presentation of PhD research projects



Each PhD student will be supervised by a professor (promoter) from one of the WU chair groups, one associate professor as daily supervisor, and a local supervisor from the main partner institute. If functional and providing added value to the PhD student, other experts (from WUR, CDI or other partner institutes in Indonesia or Thailand) may be added to the supervision teams. They could bring in specific knowledge and expertise on the palm oil sector in Indonesia or Thailand, and/or a complementary discipline. Co-supervisors will act as co-authors of one or more thesis articles or chapters of the dissertation (provided they meet ethical guidelines for co-authorship). The postdoc will be supervised by the program coordinator.

Every year all researchers (PhDs and supervisors from WUR and partner universities) will meet to discuss progress and where needed decide on re-orienting the approach. These annual meetings provide an excellent opportunity to enhance communication across disciplinary borders and to exchange views between the different PhDs. The annual meetings aim at the integration at program level by progressively finding an answer to the main research question.

Another aim of the annual meetings will be to integrate the results from the different PhD and MSc research projects. The preliminary findings from the research will be presented and shared with the other team-members. In addition, there are three particular strategies to strengthen this process of integration. First, to realize the proposal training for stakeholders an integration of the contributions from the different disciplines involved is required. Second, the project will generate several cross-disciplinary publications through journals, edited volumes and policy briefs. Third, the team will collaborate with global financial and research institutes and this collaboration cannot be organized along disciplinary lines, and therefore provides a driver for an interdisciplinary integration of results/findings.

The annual meetings will also be used as an occasion to share and discuss findings with relevant stakeholders and to plan joint presentations at scientific or stakeholder workshops

for the following year, aiming to present an interdisciplinary perspective that might contribute to developing sustainable pathways of and in the global-local palm oil sector.

b. Comparative research

This research will also be comparative because palm oil production is taking place at many different locations and because its trade has become global. Hence the palm oil sector is globally connected but still displays much local variations. Comparative research will offer the evident advantage of singling out the more general and the more unique characteristics of particular practices and offers a more secure basis for formulating conclusions that can be generalized. An externally funded Indonesian PhD from the International Plant Nutrition Institute, South-East Asia office, Penang, Malaysia, will add to this comparative approach, by focusing at one type and level of systems (the plantation cropping system). The subject of study will be Best Practices and Environmental Indicators in oil palm plantations across different soil types. This approach adds value to our comparative studies in Kalimantan, Sumatra and southern Thailand by adding data and insights on yet another locality or context. This will increase the possibilities to come to more general and at the same time context-specific conclusions.

Additionally, PPS has been asked by WWF and Ecofys to participate in a comparative study on indirect land use change (ILUC). The possibility to develop ILUC into a sustainability indicator is currently discussed in many platforms, and the study will be funded by Agency Netherlands (Agentschap NL). In this study PPS takes responsibility for a pilot study on small holder oil palm production in Indonesia, whereas others will be responsible for other pilots. Such a study perfectly fits into our program and allows us to directly contribute to the larger picture aiming at developing sustainability standards.

There is an additional reason for incorporating comparative research in this project, which is based on the need for comparison between the various levels (global, regional, national, district, local). Both technological issues (e.g. environmental impacts) as social/governance issues play a role at the local and at the global level. Comparative research at the different nodes in the networks will facilitate more in-depth understanding of the vertical interactions along the supply chain.

An analysis of not just the production but the entire value chain of palm oil requires an assessment of systems and flows, both within and across countries. As locations for comparative research, Indonesia and Thailand are interesting and insightful because of their similarities and differences at the level of palm oil production, in terms of relationships between production and processing, at the level of ecosystems and land use change, and in terms of their different links with foreign countries and investors. We will explore the global and international dimensions and dynamics of the sector, as well as the more local and landscape aspects from the perspectives of these two countries in a comparative analysis. Comparative research between the different levels will be realized by studies on global governance arrangements and on the linkages between global and national/local arrangements in the two countries.

In studying the global dimensions, explicit attention will be given to current ways of 'escaping' sustainability criteria through selling to China, or shifting production to countries in Africa (Liberia, Congo) or Asia (Laos and Cambodia) that do not (yet) have any sustainability regulations concerning oil palm production or import. In our scenario analysis, we also will consider the role of (other) upcoming producing countries, like Brazil, which may drastically alter the palm oil sector and sustainability dynamics.

c. Action research

The two principles of action research of 'understanding complexity' and 'reflexive process orientation' to research and learning will guide both the organization of research at project

level and integration at program level. The terms and intensity of engagement of PhD researchers with other researchers and with change agents will differ per PhD project and evolve over time. The engagement depends on the specifics and complexity of the subject matter, the competences and the (presumably increasing) understanding of PhD students, the characteristics of change agents, and the process of interaction.

Senior researchers, with support of staff of the Centre for Development Innovation (CDI), will enable PhD students to develop their own and specific action research approach. For this purpose, they will organize exposure of PhD students to different approaches and methods of action research as well as 'previews' or field exposure (meetings with change agents) at an early stage of the program.

The specific role of CDI is to help senior researchers to organize meaningful communication between PhD researchers and change agents in all stages of the research. For this purpose they will share earlier experiences, pros and pitfalls of action research as part of PhD programs, like documented by Almekinders et al (2009) and Huntjens and Termeer (2011). For organizing research and learning processes, different elements or steps of 'action science' can be used. Key critical elements of this action research approach are the reconstruction, testing and confrontation of 'theories of action' between researchers, policymakers and other change agents. Theories of action are causal propositions that actors use to guide their behaviour (Freidman and Rogers 2008, Reason 2003).

The responsibilities of PhD students and senior researchers for action research will depend on the role and level of participation of change agents in the research. These may vary from providing data to formulating problem statements, co-production of knowledge and use of new data, models and insights to design new interventions. Senior researchers are to supervise PhD students in accessing and analysing data from change agents and in translating problem statements of change agents into research questions. Senior researchers, with support from CDI staff, are to supervise PhD students in exploring opportunities and designing ways to co-produce knowledge with change agents. The use of new data, models and insights to design new interventions remains the ultimate responsibility of change agents, though researchers (senior ones and possibly PhD students) and CDI staff can act as resource persons and facilitators respectively. Senior researchers can organize linking-and-learning workshops with change agents, in which PhD students share their problem statements, findings and new questions.

At the PhD project level, the principle of 'understanding complexity' implies that every PhD may start from one knowledge base or major discipline but gradually seeks to learn, gain and process knowledge from other sciences as well as from practical knowledge, strategic insights and 'institutional memory' of chain actors, NGOs and civil servants. The role and responsibility of each interdisciplinary supervisory team is to support this learning process. By organizing meetings and workshops between PhDs from one country and by organizing interactions between PhDs from Indonesia and Thailand at similar levels of research or similar subjects, WUR researchers and main partners can further contribute to this process.

Another major implication of the principle of 'understanding complexity' is that every PhD may start with using and developing one dimension of the conceptual framework (systems, flows, networks) but gradually will combine this with the use and development of concepts that relate to other dimensions. At the same time, new insights gained from field research and interactions with change agents and other researchers will be used to reshape the conceptual framework, allowing every PhD student to contribute to theory development in his or her own specific way.

At the programme level, the principle of 'understanding complexity' implies that senior staff will regularly discuss and reflect on what insights generated by different PhD research

projects imply for understanding complexity and nodes of systems, flows and networks. Such reflection may result in sharpening or other adjustments of individual PhD projects and express our commitment to 'reflexive process orientation'. The special role of the post-doc is to reflect and stimulate reflection on sustainable pathways during all stages of the program, by linking and synthesizing findings from different PhD research projects and providing feedback to individual research projects.

The principle of 'reflexive process orientation' underlies the planning of interactions among researchers and between researchers and change agents, such with a view of enabling adaptation or adjustment of research efforts and interventions. During the first phases of the research PhD students will concentrate on studying change agents, their knowledge and theories of action. Gradually, and having gained insights in the complexity of systems, flows and/or networks, PhD students will engage on research with change agents. Senior researchers will enable specific change agents to learn from wider findings. Bringing together different change agents and combining insights from PhD projects, senior researchers will generate multiple sustainable pathways. The specific role of CDI throughout the research is to facilitate joint learning between researchers and change agents, using appreciative inquiry and critical analysis as action research approaches (Van Mierlo 2010).

d. Approaches and activities to integrate results of the individual PhD and MSc research projects

The programme coordinator, the post-doc and the coordinators (WUR senior researchers) of PhD-teams A, B and C will play key roles in the integration of the results of the individual projects along commodity chains, across countries and at programme level.

The germs for such integration are to be built in during the joint discussion by all PhDs of the conceptual framework of the program, their joint exposure to action approaches, and brief field visit and interaction with stakeholders in the first (half) year of the programme.

Integration of individual PhD projects at different levels or parts of commodity chains will be furthered by every coordinator of a PhD team (see Figure 1) at team meetings and in-between such meetings. The coordinator of team A is responsible for exchange and integration of results for the palm oil commodity chain in Indonesia. The coordinator of team B is responsible for such exchange and integration for Thailand. The coordinator of team C has to see to it that the PhD students use data and insights from the other teams and discuss different scenarios and consequences of international trends for production, processing and trade of palm oil in Indonesia and Thailand. In every team, but in particular team C, integration of results across scales is important.

Integration of results across countries will be furthered by the coordinators of all PhD teams and the programme coordinator, who together form and regularly meet as the daily management team (see section 12). This allows for comparing and integrating results of PhDs addressing a similar level or area of research in a different country or context. Such comparison and exchange will be organized for PhD1 and PhD2, for PhD3 and PhD4, and for PhD5 and PhD6 by their respective promoters/supervisors. These comparisons will reveal contrasting cases, different trends and options and/or similar processes and mechanisms from Thailand and Indonesia.

The integration of results from individual PhD projects cross-country and at different parts or levels of commodity chains can be considered forms of integration at a sub-programme level. Senior researchers will play a key role in this. The search for sustainable pathways will drive integration of results at programme level. The post-doc is to play a key role in this. A major task of the post-doc will be to lead the identification of sustainable pathways, with support from the senior researchers. The individual PhD projects and the integration of results in teams and between teams will provide building blocks or stepping stones for the identification

of sustainable pathways. The postdoc will stimulate discussions on sustainable pathways from the beginning of the project at meetings with researchers and meetings with stakeholders. At the end of the project, this will increase the potential to synthesize information from the individual PhD studies and from stakeholders.

Integration will take place through periodic discussions at team meetings and annual programme meetings, organized by the programme coordinator and other senior researchers, and during informal discussions. A key question for these formal and informal meetings will be how to organize the research in such a way that all individual projects contribute at maximum to synthesis and identification of sustainable pathways. These meetings will lead to joint products, such as presentations for a wider audience (within the program or external) or joint publications.

The research activities of MSc students will be linked to program level (scoping or preparatory studies) or PhD level (specific and guided support through data collection, support with interviews or data processing). The programme coordinator and post-doc take the lead in organizing MSc research at programme level whereas the coordinators of the PhD teams initiate MSc research at PhD level – such in consultation with the PhD researchers.

One of the main objectives is to enable different stakeholders to contribute to a more environmentally sustainable and equitable palm oil sector in a science-based and concerted way. To achieve this objective stakeholders will be involved from the start of the program to share (wider) problem statements, tacit and contextual knowledge, and provide an overall perspective. The PhD projects will all involve stakeholders, but not the same (see Table 1 in 4f, for a specification per PhD). Though contributions of stakeholders will be different and specific, they all help to better situate and link individual PhD research activities, herewith enabling integration of results at programme level at a later stage. At the programme level, we also aim to involve stakeholders in the identification of sustainable pathways. By communicating and discussing these with stakeholders, we hope to increase their capacity to act, while ensuring that the pathways reflect stakeholder knowledge and intelligence.

e. Contribution to international profile of W-UR in interdisciplinary and comparative research, development and education

The international profile of WUR in interdisciplinary and comparative research as well as development and education can be both demonstrated and strengthened through the INREF programme. The independent position of W-UR through INREF-funding, in combination with its interdisciplinary and action research approach, is much needed and can strengthen the international profile of W-UR as an honest broker and contributor to quality of life:

The global debates on sustainable palm oil are characterized by many controversies, easy generalizations and black-and-white views on environmental and social impacts from palm oil production. This has brought much of the debates in a dead-lock with different stakeholders accusing each other of green-washing, window-dressing or unfounded naming-and-shaming. Concerted, interactive and science-based efforts by different stakeholders to contribute to higher productivity of smallholders, new business models and technical-institutional arrangements to minimize negative environmental effects are lacking. The contribution of science has so far been disciplinary, limited and/or not appreciated by stakeholders. WUR is very well positioned to turn dead-locked debates into a search for innovation and solutions in both specific and comprehensive ways. As an independent and worldwide acknowledged institute, WUR can involve different stakeholders in an exploratory process to reflect on the complexities of and connections between systems, flows and networks. Here WUR can also capitalize on its 'corporate' approach of studying how different natural and social systems are horizontally and vertically linked. By identifying how complexities and connections between systems, flows and networks enable and constrain possibilities for both technical and

institutional innovation in different places, WUR can contribute to new practices and processes. With the concept of sustainable pathways, WUR can intrigue and invite stakeholders and researchers to reflect on options, scenarios and perspectives and on what knowledge and action is needed to promote them.

The proposed INREF-research program aims to serve as an incubator for a new generation of research & development & education by combining practical knowledge, business intelligence and scientific rigor. Different kinds of intelligence from different spheres (business, NGOs, government, universities) will be connected in PhD workshops and meetings to discuss and develop different sustainable pathways. This implies connecting research & development to new education and out-of-the-box thinking. In this reflexive, process of knowledge generation, PhDs will be exposed to practical knowledge and business intelligence and stakeholders will be challenged to reflect on how systems, flows and networks relate to each other and what connections and social-technical measures can contribute to more environmentally sustainable and equitable palm oil.

6. Time Frame

We aim to work with one cohort of INREF students. Recruiting will take time, including waiting for administrative hurdles such as TOEFFL tests and visa hence we will need at least 6 months before the first INREF students can start. Students supported by additional funding will not be part of the cohort because of different timings but they will participate in the annual meetings. In the end the INREF program will need another 6 months to make the overarching joint output in terms of an end-of-the-program international workshop and a book or special issue of a scientific journal. This means that the program will need 5 years in total, from January 2012 till December 2017. The period between September 2011 and January 2012 will be used to finalize the agreements on the additional funding and to start organizing the recruiting procedure for PhD candidates. This will be pre-program activities.

A time table providing the planning of the activities and duration of the program can be found in Annex 7.

7. Partnership

Our main partners are highly reputed universities. In line with the conceptual framework and action research, we are following a network approach and have mobilized or started partnerships with (other) researchers as well as stakeholders. Therefore, our partners are from different backgrounds, each with relevant expertise and competencies for a number of the specific research questions. Most of them are scientists but others are stakeholders who can make a difference as change agents..

The main partners will play a key role in short-listing PhDs, connecting to local universities, co-supervision of PhD students during field research, preparing informal exchanges and workshops between PhD students and stakeholders, and co-organizing meetings of teams of PhDs and WUR senior researchers. Other research partners will be invited to complement and collaborate with the main partner where needed and possible.

Next to partners at country level, we have approached global partners with long experience in the field of palm oil and particularly in Indonesia and Thailand. All of these global partners are change agents that want to contribute to more environmentally sustainable and equitable palm oil production in different ways, for instance, through policy analysis, promoting learning processes, helping chain actors or establishing new sustainability standards. These global partners have a keen interest in the proposed INREF program and want to discuss major issues like: how to contribute to social, economic and political inclusion of smallholders; how to overcome barriers and identify possibilities for shared value creation; how to identify and

organize new business models. Through the INREF program these issues can be discussed and explored by mobilizing, combining and developing social, economic and political knowledge of WUR researchers and of the global stakeholders.

In this section we will present the profile and qualities of the main partner and other partners at country level as well as those of global change agents involved. An overview of names and addresses can be found in Annex 2.

a) Main partner and other partners in Indonesia

Main partner: University of Indonesia, Department of Social and Political Studies

The University of Indonesia is highly reputed, an excellent partner for social science research, action research, and with networks involving both natural science and regional universities. The Department of Social and Political Studies has a unique experience with community-based, collaborative and participatory research involving village communities and companies. The director has been invited by oil palm companies in Indonesia to conduct participatory research. For this research participatory training tools have been used and developed. One of the other senior staff members of the department is coordinating the KNAW Agriculture Beyond Food program, a partnership between WUR and Indonesia. The Department also has a junior staff member who is capable and interested to start a PhD in our program.

Coordinator: Dr Iwan Tjitradjaja, University of Indonesia, Department of Social and Political Studies (FISYP), TO Ihromi building, UI Depok 16424, West Java, Indonesia.

Other partners in Indonesia:

Research partners:

1. Southeast Asia Regional Programme of ICRAF (World Agro-Forestry Research)
ICRAF is a CGIAR institute, with the Southeast Asia Regional Programme based in Bogor. The institute is conducting research on people-dominated landscapes and cultivation of trees on cropland. ICRAF takes a small-scale farmer and household perspective.

ICRAF is relevant as a partner for at least three reasons: first, their research (projects) can very well be connected to and feed in our PhD projects at the level of smallholders and farming systems in relation to cultivation of oil palm and other tree crops such as rubber, under the heading and issue of agricultural diversification; second, ICRAF has developed a useful methodology of Rapid Land Tenure Assessment; third, ICRAF has conducted research at the local level in Kalimantan, conducting community mapping and spatial planning. This way they could play a role in contextualizing social and environmental problems in palm oil plantation and assessing local implications of applying RSPO criteria and indicators.

Contact person: Dr. Martua T Sirait. Jalan CIFOR, Situ Gede, Sindang Barang, Bogor 16115, PO Box 161, Bogor 16001, Indonesia.

2. CIFOR (Centre for International Forestry Research)
CIFOR is a CGIAR institute, based in Bogor (CGIAR: Consultative Group on International Agricultural Research). The institute explores tensions between nature/biodiversity versus agriculture conducts in research on forest dominated landscapes. CIFOR takes a landscape perspective and addresses competing claims between different land use or forest use activities, such as logging, harvesting of Non-Timber Forest products (NTFP), bio energy, oil

palm, rubber, carbon sequestration. The institute has conducted case studies on oil palm development in Central, East Kalimantan (degraded land) and Riau and expansion into frontier regions (Papua). CIFOR is particularly interested in international leakages (bypassing of regulations) and the need for transparency in international financial streams.

The institute is very relevant as a partner for at least three reasons: first, for matching with our studies on ecosystem services and deforestation in relation to oil palm with a focus on indigenous people, biodiversity, forest use; second, for testing new policies (decentralization), standards (RSPO) and instruments (Renewable Energy Directive EU: RED); and last but not least: to explore possibilities to match their multi-year and multi-PhD programme-in-the-pipeline on sustainable biofuels in Thailand and Indonesia with the proposed INREF program.

Contact persons: Dr. Krystoff Obidzinski (Scientist, Forests and Governance Programme) and Dr. Andrew Wardell (CIFOR Governance Program Director). IFOR Headquarters Jalan CIFOR, Situ Gede, Bogor 16115, Indonesia.

3. IBRIEC (Indonesian Biotechnology Research Institute for Estate Crops)

The research of IBRIEC on biotechnology is used to improve propagation techniques for plant material; to fight *Ganoderma* by breeding for resistance and Integrated Pest Management (IPM); to increase production of ethanol from fruit bunches; to reduce carbon emission and for sequestration in oil palm plantation; to reduce soil degradation and stimulate regeneration (biodiversity, microbes, soil health) and bio fertilizer development; to exploit the potential of biogas and from palm oil effluent, under the Clean Development Mechanism. The research of IBRIEC is relevant to contribute to research on environmental sustainability of palm oil production and the identification of new bio-technologies.

Contact person: Dr. Darmono Taniwiryo, Jl. Taman Kencana No. 1, Bogor 16151, Indonesia.

4. LIPI (national biotechnology institute)

The research of LIPI on biotechnology and bio-refinery is directed at: production of high quality planting materials; lignocelulosic bioethanol (including oil palm trunk); production of valuable products of the side product of biodiesel production from oil palm; production of functional foods from waste; production of fiber and bio energy from fruit bunch; production of bio fertilizer suitable for oil palm (mycorrhizae and Rhizobium mix); study on *Ganoderma sp*; focus on how to include small farmers into adding value to waste or byproducts. The research of IBRIEC is relevant to contribute to research on environmental sustainability of palm oil production and particularly the creation of added value to smallholders by waste management.

Contact person: Prof.dr. Eny Sudarmonowati. Jalan Raya Bogor km 46, Cibinong, Indonesia.

Both CIFOR and ICRAF are relevant for the relation between oil palm-forest and deforestation, combining research on small holders with research on ecology, biodiversity and policy, but also aiming at policy influence. In both institutes several very capable scientists are willing to participate. Decision of collaboration will depend on choice of location and especially which institution is best suited to provide and/or supervise PhD student(s), with CIFORs expertise more on ecosystem services (link to ESA) and ICRAF's expertise more on farm household level (PPS). PPS has good experience with joint PhDs with both CIFOR and ICRAF.

Both LIPI and IBRIEC are (bio) technological institutes with comparable expertise: one is private and one is governmental. They will be partners for best practices in oil palm

cultivation (with PPS) and for decreasing environmental problems by adding value to waste (ESA). Given their different institutional status, using the sandwich formula seems easier with IBRIEC. Yet LIPI is much more widespread and could contribute more to the spread of research findings such as new methodologies in the scientific community. IBRIEC already works with PRI. Exact involvement will need further discussions and finally depends on their capacity to find a qualified PhD candidate.

Stakeholders:

Stakeholders may provide input to problem statements and research questions and act as change agents using knowledge and insights generated through the INREF program to promote more environmentally sustainable and equitable palm oil. They may also provide PhD candidates, participate or join multi-stakeholder consultations and seek to twin their projects or funding with those of the INREF.

5. Netherlands Embassy of Indonesia

This Embassy has a strong interest in revitalizing the palm oil dossier and more generally in supporting multi-stakeholder consultations with regard to different commodities (palm oil, tropical wood, etc.). The Embassy is well connected to different initiatives and players like the Norway-Indonesia agreement on de-forestation and the RSPO. The Council for Agricultural Affairs of the Embassy supports the application for a BOCI project in 2011.

6. Indonesian Palm Oil Committee (IPOC)

This public agency of the Ministry of Agriculture represents palm oil business and smallholder interests. IPOC has an observer status at the RSPO and is member of different RSPO working groups. IPOC is coordinating the launch of the Indonesian standard for sustainable palm oil that should be WTO-proof and can be brought under multilateral trade agreements. IPOC is conducting comparative studies on greenhouse gas emissions from palm oil and use of fossil fuels.

7. Sawit Watch

This Indonesian NGO and network of 135 'watchers' (working with local or national NGOs all over the country and particularly in palm oil producing areas) is focusing on social issues of palm oil. Sawit Watch has collaborated with Forest People Program on several occasions in research and provides case studies of palm-oil related conflicts. Sawit Watch is a member of the RSPO board. It has a keen interest in collaborating with INREF for research capacity building and to collaborate with technical institutes. Sawit Watch has hosted quite a number of master students and is eager to develop a partnership directed at capacity building of Sawit Watch, staff and members. It is willing to exploit possibilities for exchange and synergy in relation to the research project as part of the Oxfam Novib-Sawit Watch program.

All three stakeholders want to participate in the program as they see WUR as a neutral research institute without biased views or hidden interests to promote or favor any party involved in the policy process. All stakeholders seek answers to technical, environmental and social questions on sustainable palm oil and favor an interdisciplinary approach.

b. Main partner and others partners for Thailand

Main partner: The Faculty of Engineering of Chulalongkorn University, Bangkok.

The faculty offers 45 degree programs for BSc, MSc and PhD and is capable of providing quality PhD candidates for our research program. The faculty has expertise in industrial ecology and applies this on crude palm oil industry and waste utilization incl. on waste to energy, and environmental management. The faculty has successfully collaborated on a joint PhD with ENT/ENP in the AGITS-INREF project. During this trajectory the faculty has

acquired expertise in several scientific tools such as integrated assessment and scenario studies including policy alternatives, which can be put to (further) value in this new program.

Coordinator: Dr. Orathai Chavalparit; Faculty of Engineering, Chulalongkorn University, Phayathai Road, Patumwan, Bangkok, Thailand 10330.

Other partners in Thailand:

The other partners provide added value not only by offering complementary environmental expertise but also expertise in economic and business analysis.

Research partners:

1. Specialized Research and Development Units of Prince of Songkhla University (PSU)
PSU is based in southern Thailand. Three centers within this university offer to cooperate with our programme: (1) Oil Palm Research and Development Center, conducting research on plantation practices and development of oil palm varieties, economics and marketing of oil palm. They continuously train farmers in best practices; (2) Specialized Research and Development for Alternative Energy from Palm Oil and Oil Crops, conducting research on biodiesel. Development of equipment for small scale biodiesel production for local communities and providing advice and consultancy services to biodiesel industry; (3) Specialized Research and Development for Product and Palm Oil Technology conducting research on palm oil related products aiming to create added value from palm oil and from waste and eco-efficiency of crude palm oil production. The three centers are of interest to our program because of their focus on local needs and different aspects of the value chain, both aiming to reduce environmental impacts and aiming at economic profitability including marketing and added value creation.

Next to these three centers, also the Faculty of Economics is interested in cooperating, building on their experience in studying palm oil through a GTZ-project.

Contact person: Associate Prof. Dr. Aran Hanpongkittikul, Had Yai, Songkhla, 90112 Thailand.

2. Walailak University (WU)

WU is located in Nakhon si Thammarat province in the south of Thailand, a newly expanding area for oil palm plantation. WU offers degree program at undergraduate and postgraduate levels as well as postgraduate courses in a wide range of academic disciplines. WU has academic collaborations with a growing number of overseas higher education institutions. Several projects with a focus on palm oil are carried out by WU staff from different departments. For instance, on oil palm breeding development, oil palm plantation practices and utilization of oil palm waste. But also on the effect of rubber and palm oil expansion on natural resources and biodiversity, and on the improvement of environmental performance, and human health issues related with the palm oil production process.

A distinctive and added value of Walailak University is its expertise in business management including institutional aspects and in the economics of palm oil production, next to its expertise in the field of (technical) environmental science.

Contact person: Dr. Warit Jawjit, Thungsong, Nakhon Si Thammarat 80000, Thailand;

Stakeholder

The following agency has been contacted as non-academic partner to collaborate with in recruiting PhD candidates from stakeholder organizations and in connecting to stakeholders during formulation of research questions and organization of multi-stakeholder meetings. The agency is also extremely interesting for development of joint or matching research projects in Thailand, Indonesia and other palm oil producing countries:

3. German International Cooperation (GIZ)

GIZ plays a leading, coordinating and pioneer role by organizing research and bringing together different stakeholders in the field of sustainable palm oil. In 2009 GIZ organized two workshops on “Roundtable for Sustainable Palm Oil (RSPO)” in Thailand in 2009. The workshops were intended to promote understanding on RSPO’s aim to support sustainable palm oil production among oil palm farmers and stakeholders of the oil palm industry. Approximately 400 public and private sector representatives and oil palm farmers participated in the workshop. March 2010 GIZ and 3 major oil palm mills signed an implementation agreement of the project “Sustainable Palm Oil Production for Bio-Energy” which aims to develop certified and sustainable palm oil for export, particularly to European Union countries. This is an activity under the “Sustainable Palm Oil Production for Bio-Energy” project, implemented by GIZ in cooperation with the Office of Agricultural Economics (OAE) of Thailand. The project duration is 3 years (2009-2011). GIZ has shown to be capable and willing to organize stakeholder platforms in Thailand which is a comparative advantage for our research program.

In Sumatra Indonesia, GIZ has a track record of supporting small farmers in a nucleus-plasma system and PPS recently conducted research on smallholder’s performance in such a nucleus plasma model. We propose to take this as a test site building on the former research and development investments. Thomas Fairhurst acted as intermediate for contacts.

We have been discussing with GIZ to join their activities and to jointly conduct follow up research on sustainability of oil palm and palm oil production and processing chain from 2011 onwards. GIZ is preparing a project which will be implemented under Sime Darby supply chain in Indonesia and Liberia, aiming to reach 20-30,000 smallholders. WUR has been invited to support this project as a neutral and international academic institution. Parallel to this, the CEO of Sime Darby has invited WUR to discuss possibilities for collaboration in the field of sustainable palm oil.

Contact person: Dr. Yotsawin Kukeawkasem, Manager Sustainable Palm Oil Production Deputy Project Director & Project Manager, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bureau of Agricultural Economic Research, OAE, Bangkok, Thailand.

c) Global change agents

The following organizations all have a high profile in the field of sustainable palm oil and have been contacted to act as global change agents to discuss how on-going or planned projects can be matched with the INREF programme, and to explore opportunities for joint projects.

Generally speaking, we have noticed that the Initiative for Sustainable Trade (IDH) and World Bank/IFC are well equipped to provide business intelligence and economic data whereas Oxfam-Novib and the World Resource Institute (WRI) are excellent organizations to exchange and to produce knowledge on social and political inclusion/exclusion of smallholders. Finally, we expect a complementary role and contribution as a global change

agent from Tropical Crop Consultants, based on its extensive, agronomic and technical knowledge on palm oil production all over the world.

1. IDH (Dutch Sustainable Trade Initiative or *Initiatief Duurzame Handel*)

IDH is a Dutch organisation aiming at improving the sustainability of international commodity chains by tackling social, ecological and economical bottlenecks of chain actors in developing countries. IDH is a multi-stakeholder process in which government, private sector, labour unions and non-governmental organisations from both Northern and Southern (production) countries jointly implement commodity-specific development programmes and jointly organize (inter)sectoral learning processes. The ambition of IDH is to act as a catalyser and knowledge broker. The commodities or sectors for which IDH is already implementing development and learning programmes: tropical timber and other forest products, soy, nature stone, cocoa, tea, tourism, aquaculture and cotton. Exactly in May 2011 the board of IDH happened to select palm oil for the development of a new international programme and learning process, seeking alliance with key players and knowledge brokers, like WUR, for this purpose.

Contact person: Mr. Jan Gilhuis en Dr. Lucian Peppelenbos, Nieuwekade 9, 3511 RV Utrecht.

2. Oxfam-Novib

This NGO is a member of the RSPO board and has been involved for many years in the promotion of sustainable palm oil to benefit smallholders and communities. On behalf of WUR/SSG, Michiel Köhne (Rural Development Sociology) and Otto Hospes (PAP) have together been contributing to the development of a research project as part of a larger programme of Oxfam-Novib and Sawit Watch on 'Scaling Up Sustainable Palm Oil'. March 2011 Oxfam-Novib has submitted a concept note to the EC for a grant application under 'SWITCH Asia: Promoting Sustainable Consumption and Production'. This concept note (see Annex 8) has been accepted and includes WUR as one of the main partners to organize and implement a 4-years research on sustainable palm oil and smallholder inclusion in Indonesia.

June 20, 2011 Oxfam-Novib submitted a grant application of €2.1 million for 'Scaling Up Sustainable Palm Oil' (SUSPO) to the European Commission, under 'SWITCH Asia: Promoting Sustainable Consumption and Production'. This includes a budget of € 300,000 for research by RDS and PAP of Wageningen University on the importance and impact of RSPO principles and criteria in political processes and decision-making at community and country level in Indonesia.

Contact person: Mr. Johan Verburg and Mrs. Madeleine Brassier. Mauritskade 9, 2500 GX Den Haag.

RDS will act as one of the associate partners of the INREF program. One of the research clusters of this chairgroup is 'governance of natural resources in development', including the regulation of palm oil production. Researchers from both INREF and Oxfam- Novib projects can profit from scientific exchange to allow and promote comparison of research findings of INREF and SUSPO, especially with regard to Indonesia (Kalimantan, Sumatra); participation in research seminars and conferences; and the production of scientific publications.

Contact person: Dr. Michiel Köhne, Rural Development Sociology Group, Wageningen University, Hollandseweg 1, 6706 KN Wageningen.

3. World Resource Institute

WRI is a reputed global environmental think tank that goes beyond research to find practical ways to protect the earth and improve people's lives. The goal of WRI is to empower people and support institutions to foster environmentally sound and socially equitable decision-making. The institute particularly wants to contribute to 'better governance for more sustainable decisions'. For this purpose, WRI explores how citizen and community access to government decision-making can be improved and how 'sustainable finance' can be organized, that is, public and private flows of capital to contribute to sustainability and equity. In this light, WRI participated in the recent series of WB/IFC consultations on sustainable palm oil, exchanging views with WUR/CDI on the occasion and expressing strong interest in collaboration with WUR through INREF.

Contact person: Dr. Fred Stolle, Program Manager Forest Team. World Resources Institute, 10 G Street, NE (Suite 800) Washington, DC 20002 USA.

4. World Bank Group/International Finance Cooperation (IFC)

WB/IFC organized a global consultation process on sustainability issues in the palm oil sector (May-August 2010). Stakeholders involved included small farmers organizations and community representatives, private sector (from plantations and mills to processing industries), the public sector, financing companies, environmental and social NGOs, RSPO representatives. IFC is interested in further discussions and developments in smallholder inclusion and sustainability in the palm oil sector a good partner for mobilizing an international network of stakeholders.

Contact person: Dr. Hartwig Schafer, World Bank, Director Strategy and Operations. 1818 H Street, NW Washington, DC 20433 USA.

5. Tropical Crop Consultants

The director, Dr. Thomas Fairhurst, wrote THE standard work on oil palm production and has worked in oil palm plantations for more than 20 years. He has extensive knowledge and many data bases on cultivation of oil palm, the causes of yield gaps and the potential solutions to these. His current research interest is in improving smallholder oil palm production, being aware that technology may be scale-dependent and smallholders might need different technological-institutional combinations for successful improvement of their life. With PPS he conducted research on smallholders' performance in nucleus plasma schemes in Sumatra, Indonesia. He also recently investigated the potential of oil palm production in degraded lands in Kalimantan with WWF. He worked as a consultant for GIZ. For the proposed INREF program he could be a great asset because of his knowledge of oil palm production, production systems in Indonesia, Thailand and elsewhere and his network amongst those working on oil palm sustainability issues. We have proposed to develop joint projects and have invited Dr. Fairhurst to join the international advisory board.

Contact person: Dr. Thomas Fairhurst, Tropical Crop Consultants Ltd, 26 Oxenturn Road, Wye, Kent TN25 5BE, UK.

We are matching the INREF program with research plans of these partners, or are discussing possibilities to do so. We are also exploring with these partners the development of new joint projects, preferably in Indonesia and Thailand and if possible in other countries. We expect to start joint proposal writing for additional research funding as an on-going activity after the envisaged start of the INREF core programme.

8. Related Programme(s) of the Graduate School(s) involved

a) The C.T. de Wit Graduate School for Production Ecology and Resource Conservation (PE&RC)

PE&RC aims at understanding the functioning of (agro-) ecosystems enabling the development of sustainable and multifunctional production- and land use systems. Research topics are (1) effects of scale, (2) biodiversity, (3) quality and (4) sustainability. The systems approach is adopted as the unifying approach for the PE&RC research agenda. Modeling and experimentation/observation are two approaches that are inextricably connected and of mutual importance to investigate and exploit the occurring and emerging phenomena in systems. The systems approach is applied at different temporal and spatial scales and is especially useful for studying their interrelationships. The main research efforts focus on the plant, the crop, the field, vegetation or ecological zones, often taking one particular scale-time frame as the bounding conditions for research. The interaction with social sciences, especially at the higher integration levels is of utmost importance.

Our program fits in the graduate school research topics taking levels as explicit units of study and also aiming at sustainability at different spatial and temporal scales, with a strong focus on sustainable use of land. Sustainability is translated in efficiency of input use, soil organic matter status, nutrient balances and biodiversity related to oil palm but also comprises social-economic components such as economic viability of the oil palm farming system and social inclusion and equity in terms of access to land and respect for land tenure regimes. In our program ample attention is given to competing claims on land and forest use for different goals such as timber, biodiversity, rubber, food production and oil palm. Our program applies the methods used in PE&RC as it uses the systems approach and focuses explicitly on different spatial and temporal scales, from oil palm crop to plantation or farm, but also the forested landscape. Biophysical processes are studied from field to global scale and spatial scale is explicit from seconds in plant simulation models to decades in climate change scenario studies and carbon sequestration processes. Our program aims to train and deliver students with T-shaped skills which is another objective of the graduate school.

b) Wageningen School of Social Sciences (WASS)

WASS essentially studies the dynamics of human behavior and the complex interaction between (and among) humans and their natural and bio-physical environment. Hereby the study of institutions, defined as the (in)formal rules and arrangements that orient human behavior and (inter)action at a given moment in time and space, gets particular attention. WASS distinguishes three categories of institutions: allocative, interpretative and normative institutions. WASS strives to make high-quality academic contributions and also to critically engage in societal debates and contribute to societal problem solving and innovation, paying ample attention to interdisciplinary and transdisciplinary research including action research.

This research program fits in the WASS' aim to study normative institutions that orient the governance of the oil palm production-consumption chain and the institutions allocating natural resources (land, forest) to oil palm or other uses. Our research studies allocative institutions by analyzing the various governance arrangements at multiple levels of scale (including the global level) that enhance or hinder the movement towards more sustainable ways through which people deal with the scarce natural resources within the palm oil supply chain. Hereby we pay particular attention to processes of inclusion and exclusion regarding local people, farmers, plantation workers in relation to voicing their concerns and wishes regarding the sustainability standards and access to resources. Our research also investigates interpretative institutions by the study of legal pluralism playing out at farm scale level. Our research intends to have impact along the different phases of the palm oil production-consumption chain and this fits with the aim for interdisciplinary,

transdisciplinary and action research approaches that WASS sees as essential to contribute to solving societal problems. With regard to the specific research themes identified by WASS, this research fits directly in 2 (Networks and chains for food production and distribution) and 5 (environmental degradation and climate change), but also in 1 (conflict and competition over natural resources) and 7 (entrepreneurship, markets and sustainability).

c) The Wageningen Institute for Environment and Climate Change (WIMEK)

WIMEK combines a range of natural and socio-economic sciences in studying the flow of substances through the environment and society. Its research program is focused on the analysis of the causes and the ecological and societal effects of environmental problems, the development of solutions for sustainable environmental management and nature conservation and the ecological transformation of production and consumption. Research themes are (1) Micropollutants, (2) Environmental change and ecosystem dynamics, (3) Global change: climate, land use and biogeochemical cycles, (4) Industrial transformation – towards sustainable use of energy and materials.

Our research program fits to themes 2, 3 and 4 as we investigate change in ecosystem services due to palm oil plantations in forest zones, we investigate environmental effects of the entire palm oil production and consumption chain affecting climate change processes and other ecosystem services through pollution and waste production and we focus on industrial transformation of palm oil production including adding value to waste and more efficient and less polluting material flows. Relevant method and theory that binds WIMEK to our program is the use of the systems approach, integrated assessment and scenario studies, whereas in more social science aspects WIMEK comprises environmental policy which is also of high importance in our program as we are aiming for global governance systems for environmental and social sustainability.

Our proposal not only fits the themes of the individual graduate schools but also their joint initiatives such as the WU strategic programme “Scaling and Governance” which also tries to bridge between biophysical scales and governance levels. Our additional strength is that we do not only look at governance as a multilevel ‘process and organization’, using a scale perspective in the domain of governance, but rather as networks and flows connecting nodes in different scales, thereby fitting in the considerations to develop a strategic program on ‘Complex Adaptive Systems’.

9. Relation with education programmes

The proposed research program will benefit to education programmes in five different ways:

1. *A new interdisciplinary PhD course or module on mixing theories and methodologies on systems, flows and networks to unravel complex dynamics of global commodity chains*
Based on the research, a new PhD course or new module of an existing PHD course ((as a collaborative effort of the three graduate schools, with senior staff involved in the INREF programme acting as designers and lecturers) could be developed. The course or module should be distinctive and provide an added value to existing PhD courses offered by one or more Wageningen graduate schools, like ‘Innovation for sustainability: bringing theory into practice’ and ‘Sustainable enterprise: emerging theory and practice’. A distinctive asset could relate to new methodologies for multi-level research on sustainable global commodity chains. A leading question could be how to use and mix theories and methodologies on systems, networks and flows to unravel complex dynamics of global commodity chains and to identify sustainable pathways.

2. *The program will lead to new modules for capacity development*

CDI is specialized in capacity development for professionals and facilitation of multi-stakeholder processes. Among others, CDI covers the topics transition and innovation processes and governance, which are highly relevant to the processes in the palm oil sector. On the basis of its expertise, CDI will develop capacity development modules in the field of governance at multiple scale levels, facilitating multi-stakeholder processes, transition and innovation processes, etc. for professionals in palm oil and other commodity sectors. During the project we will incorporate CDI-developed modules for instance on 'managing multi-stakeholder processes for sustainability' in the PhD training. We will explore the options to develop a regular training CDI-led module for professionals and PhD students from WASS, PE&RC and WIMEK graduate school on multi-scale sustainability governance in commodity chains, using the analytical and decision making tools that were developed during the research program. During such a course science meets practice.

3. *Development of curriculum of partner universities*

During the implementation of the program, we will jointly discuss and identify the opportunities for curriculum development of research partners in the South, with such development remaining final responsibility of the partners themselves.

4. *The program will benefit regular teaching*

Chair groups ENP and PAP will both include the outcomes related to global governance, legal pluralism and governing for sustainability for instance in their courses on Globalization and Governance (LAW 30306) and Globalization and Sustainability of Food Production and Consumption (ENP 31806). The chair groups ESA and PPS will include both technical aspects and integrated assessment methods in their MSc teaching. The courses Global Food Security (YSD 50806) and Sustainable Development: worldview, theory, practice (YSD 50306) in particular will include outcomes and methods that will be especially developed through the proposed research program.

5. *The program will benefit to new teaching*

For BSc students new minors can or will be proposed for which new courses are being developed. A minor on the right to food has been approved early this year and a minor on sustainable development will be submitted for approval. As staff engaged in the proposed research program is also responsible for coordination of the mentioned minors, they can assure that the results of the program will be integrated as soon as they become available.

10. WU – Senior Staff/Researchers involved in the program

Co-ordinator: Dr. Otto Hospes (associate professor Public Administration and Policy).
Task/input: co-promoter of PhD 3 and 5; member of supervisory team of PhD 1 and 7; economic sociologist with wide experience in trade finance/micro-finance; has coordinated 4 major, international research programs by order of FAO and the Netherlands Ministry of Foreign Affairs; specialist in institutional change, governance and social inclusion in value chains; analytical watcher of RSPO and other commodity-based multi-stakeholder initiatives
Address: Hollandseweg 1, 6706 KN Wageningen, the Netherlands, Public Administration and Policy Group, Wageningen University
E-mail: otto.hospes@wur.nl

Other staff involved:

- a. Prof.dr. Carolien Kroeze (professor of Environmental Systems Analysis)
Task/input: promoter of PhD 4 and 8, co-ordinator of PhD-team C (transboundary flows and scenario analysis)

Dr. Lars Hein (associate professor of Environmental Systems Analysis)
Task/input: co-promoter of matching project of PhD 3 and of PhD 4 and 8; economic ecologist and specialist in ecosystems research

- b. Prof.dr. Ken Giller (professor of Plant Production Systems)
Task/input: promoter of PhD 1 and 2

Dr. Maja Slingerland (assistant professor of Plant Production Systems)
Task/input: co-promoter of PhD 1 and 2; coordinator of PhD-team A (Indonesia);

- c. Prof.dr. Arthur Mol (professor of Environmental Policy)
Task/input: promoter of PhD 6 and 7; internationally reputed sociologist in environmental policy

Dr. Peter Oosterveer (associate professor of Environmental Policy,
Task/input: co-promoter of PhD 6 and 7, coordinator of PhD-team B (Thailand); specialist in globalization, sustainability and food

- d. Prof.dr. Katrien Termeer (professor of Public Administration and Policy)
Task/input: promoter of PhD 3 and 5; wide experience in action research, multi-actor governance and analysis of complex decision-making processes

Dr. Otto Hospes (associate professor of Public Administration and Policy)
Task/input: co-promoter of PhD 3 and 5; member of supervisory team of PhD 1 and 7; economic sociologist with wide experience in trade finance/micro-finance and policy evaluation; specialist in institutional change, governance and social inclusion in value chains; analytical watcher of RSPO and other commodity-based multistakeholder initiatives

Phone: +31 317 483399

Email: otto.hospes@wur.nl

- e. Dr. Jim Woodhill (director of Centre for Development Innovation)
Task/input: co-supervisor of PhD 5 and 7; contributing to learning for innovation by understanding complex adaptive systems

Ir. Marianne van Dorp (senior staff member of Centre for Development Innovation)
Task/input: advisory role in exposure of PhDs to action research; organizing and analyzing learning processes with researchers and/or stakeholders in Indonesia

Ir. Dieuwke Klaver (senior staff member of Centre for Development Innovation)
Task/input: advisory role in exposure of PhDs to action research; organizing and analyzing learning processes with researchers and/or stakeholders in Thailand

11. Budget

For the budget of the full program, with specifications per year, see enclosed Annex 6.

The budget includes an amount of confirmed co-funding of €301,350.

In addition, we are expecting extra co-funding this year of €300,000: June 20, 2011 Oxfam-Novib has submitted a grant application of €2.1 million to the European Commission, under the program of SWITCH-Asia: Promoting Sustainable Consumption and Production. This includes a research project of €300,000 to be implemented by Rural Development Sociology and Public Administration and Policy Group of Wageningen University (see above: Global

Partners under section 7: Partnership). This research project is to twin with the INREF program and the Indonesia-based PhDs in particular.

Given our strategy for co-funding as an on-going activity, we have identified or contacted the following other organizations and funds, with a view to explore possibilities and interests in co-funding of our program:

1. GIZ has worked in Indonesia on smallholder oil palm production and is still working on small holder oil palm production in Thailand. They will prepare a next phase project in Thailand (in 2011/12). We are discussing a joint proposal for Thailand and Indonesia.
2. The multinational company Sime Darby has approached GIZ as well as WUR to discuss partnerships. Sime Darby wants to test and use its tool of social and environmental impact assessment.
3. Oxfam Novib is committed to investigate and support different commodity-based multi-stakeholder initiatives in Indonesia (in partnership with of funded by Netherlands Embassy) and to conduct analysis of shifting powers in the palm oil sector.
4. The Netherlands Embassy in Jakarta has proposed to launch a BOCI project on sustainable palm oil.
5. CDI is discussing possibilities for follow-up action to its role as knowledge broker and facilitator in a worldwide series of country-based multi-stakeholder consultations under auspices of the World Bank Group/IFC.
6. The CGIAR Fund, which is a new multi-donor, multi-year funding mechanism that provides strategic financing to support agricultural research, geared towards food for people, environment for people and policies for people.
7. KB programs: next to KB I, also KBVI, could be a window of funding on the issue of global governance of sustainability.
8. Nuffic for additional PhDs
9. Subcontracting (against remuneration) by/through expert Thomas Fairhurst when relevant, which is especially interesting for additional shorter research investments by staff or other chair group members.

12. Organisation and management of the programme

The program will be coordinated by Otto Hospes (**programme coordinator**) of the Public Administration and Policy chair group. The INREF budget will be allocated to the administrative staff of the Social Science Department, who will be responsible for budget management. Together with the programme coordinator, the administrative staff will be responsible for annual reporting to INREF. A **Daily Management Team (6)** will consist of the program coordinator, the post-doc, one representative of each of the participating WU chair groups (including the programme coordinator) and the director of CDI. This team will meet when needed to support the program coordinator, but at least two times a year, to discuss issues related to programme management and execution.

Wageningen University **PhD supervisors** are responsible for following budget expenditure of their PhD students and will be accountable for adequate reporting to the program coordinator when annual reporting to INREF is required. Wageningen PhD supervisors are also responsible for scientific progress of the PhD student and to report on this progress for the annual reporting to the INREF programme coordinator. They need to discuss any change of program with the program coordinator especially when it has budget implications. To share the time investments in coordination activities, we propose that the organization of each of the annual meetings will be led by one of the four Wageningen chair groups or CDI. The annual meeting will be coordinated together with one the main partners (from either Indonesia or Thailand, depending on the location) under final responsibility of the programme coordinator.

The representatives of the two main partners (in respectively Indonesia and Thailand) will act as **counterpart coordinator** at country level. As discussed and agreed with them, they will conduct the following roles and network activities:

- to provide support with short-listing and selection of sandwich PhDs;
- to connect the PhD work to local universities and (other) research institutes in Sumatra, Kalimantan and the south of Thailand;
- to co-supervise PhD students during field research, in close contact with the PhD-specific WUR promoter;
- to co-organize meetings of PhD students conducting research in Indonesia or Thailand, together with the coordinator of PhD team A (Indonesia) or team B (Thailand);
- to co-organize the annual meeting taking place in his/her country, together with one of the members of the daily management team;
- to help prepare informal exchanges and learning and linking workshop between PhD students and stakeholders.

Through their networks and networking, they can ensure participation of project members (PhD and/or staff) in relevant stakeholder meetings that take place in his/her country. If logistics allow, we aim for at least one in-country meeting in between two annual meetings, with a view to discuss progress and potential connections between PhD research activities. The counterpart coordinators are in direct contact with the team coordinators and the programme coordinator to ensure cohesion and integration at programme level.

In the six months preceding the official start of the programme, the recruitment of PhDs will be organized under administrative responsibility of the Department of Social Sciences of Wageningen University, and capitalizing on working relationships with main partners, other partners and their networks.

As explained in section 5 (interdisciplinary, comparative and action research) we want to start working during the first 6 months of the project with all students together in a **cohort** facilitating common understanding of concepts, approaches and methods that are important at program level. After that, the cohort will be split into three teams of PhD students (see section 5a) that each will focus on a set of related issues, and that will be guided by a **team coordinator** who has special responsibilities in facilitating interdisciplinary teamwork and integration at (sub)program level (see 5d). The team coordinator has to stimulate collaboration within the network of partners to achieve the teamwork. He/she has a special task to identify issues of team relevance and to identify and facilitate supportive or exploratory MSc studies within the scope of the team or the larger program. Together with the programme coordinator, he/she has a responsibility to take initiatives for joint outputs at team level. To achieve this, input in the preparation of the annual meetings, with a focus on the teams is expected. During the year they will report in the two meetings of the daily management team. Given the composition of the staff expertise, their envisaged involvement in PhD research projects, the focus of the PhD teams and the time availability of the program staff, we propose Maja Slingerland (PPS) as coordinator of team A, Peter Oosterveer (ENP) as coordinator of team B, and Carolien Kroeze (ESA) as coordinator of team C.

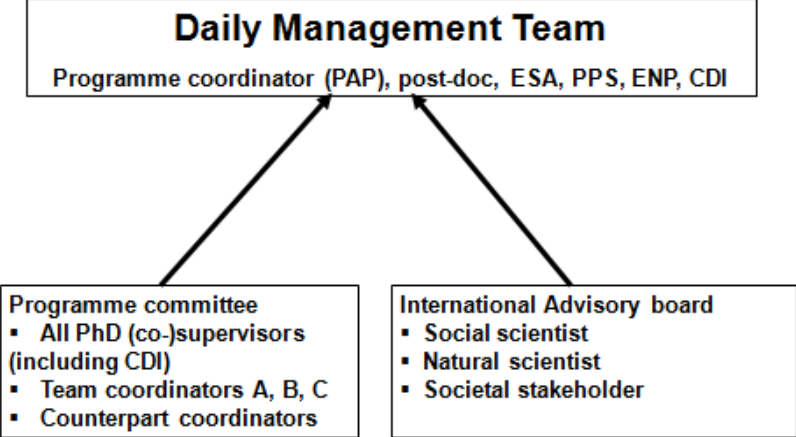
We propose a more comprehensive **Programme Committee** consisting of all PhD (co-) supervisors from Thailand, Indonesia and the Netherlands, which automatically includes the programme coordinator and post-doc (2), the team coordinators (3), the representatives of main partners (2) and the director and two staff members of CDI (3). This programme committee is responsible for monitoring the progress of the program, apart from their role in supervision of individual PhD students. They will meet once a year immediately before or after the annual meetings.

We intend to have the annual meetings in Thailand (one time), Indonesia (two times at two different locations) and the Netherlands (in the last year when PhD students are writing their thesis at Wageningen University). For the annual meetings in Thailand and Indonesia we will

choose a location that allows for a joint field visit to a PhD research site to enhance common understanding among project participants for each other’s work. Each annual meeting will focus on scientific progress and relevance for stakeholders/end-users, inviting local and national stakeholders for the latter. During these meetings we will also monitor the progress of the teamwork and the integration at programme level.

We propose to have a small **International Advisory Board** to which we have invited (with positive reply) Dr. Thomas Fairhurst (oil palm plantation expert from UK), Dr. John McCarthy (social scientist from Australia National University; Indonesia and palm oil expert) and Mr. Johan Verburg (Oxfam Novib and member of RSPO board) for reflecting on scientific progress of the programme but also on its relevance to stakeholders. They will be invited to analyze and synthesize intermediate findings and to provide inputs on how to promote sustainable pathways. During the programme implementation the members of the advisory board may be consulted individually by the daily management team, the team coordinators and country coordinators when needed.

Figure 3: Organigram of the programme management



Annexes

1. Agreement, MoU or otherwise stating clearly commitments of all partners involved, including funding commitments.

Letters of Intent or Support from:

- University of Indonesia (main partner Indonesia)
- Chulalongkorn University (main partner Thailand)
- Research partners Indonesia: LIPI, IBRIEC, ICRAF (and forthcoming from CIFOR)
- Research partners Thailand: RMUTSV, PSU and WU
- Stakeholders and change agents: GIZ, IDH.

Commitments to co-funding from:

- World Wildlife Fund/PPS
- European Research Council/ESA
- Centre for Development Innovation

2. Overview of partner organizations, contact persons and addresses.
3. Logical Flow of results at PhD and program level (illustrating the Theory of Action of the proposed INREF programme)
4. Logical Framework
5. Description of PhD research projects per PhD student
6. Budget
7. Time table (providing the planning of the activities and duration of the program)
8. Project proposal(s) submitted for external additional funding (if available).

Grant application Form submitted by Oxfam Novib to the European Commission under SWITCH Asia: Promoting Sustainable Consumption and Production (including WUR as research partner). March 14, 2011 the concept note (enclosed) was submitted and accepted. June 20, 2011 the full grant application has been submitted.

9. List of key publications
10. List of relevant publications from researchers involved