The Thai water sector's awareness of and preparedness to improve sustainability in the rice-water nexus

a sound basis for successful implementation of a Book & Claim incentive mechanism?

Master Thesis by Liselotte de Vries

13-08-2013

Utrecht University, The Netherlands
International Development Studies
University Coordinator: Guus van Westen

UTZ Certified and Sustainable Rice Platform
Host organizations
UTZ Certified Coordinator: Gieljan Beijen

Abstract

This research applied qualitative research methods to investigate water sector stakeholder's awareness of worsening water quality, due to agricultural practices in rice cultivation. When pollution of water is perceived as a problem this could be reduced by investing in sustainability initiatives at the source, e.g. rice farmers. This research therefore also studies the preparedness to contribute to initiatives towards sustainability. This awareness and preparedness is studies by interviewing stakeholders to the Thai water sector and validated by interviews with a control group existing out of international organizations, universities and independent researchers who are professionals in the field of agro-commodity supply chains, sustainability or Thai development.

The extent of awareness among the Thai water sector and the extent of preparedness to contribute to sustainability lead up to the likability of successful implementation of an incentive mechanism. The incentive mechanism discussed in this study is one based on the concept of Payments for Ecosystem Services (PES). PES is a market-based approach to increase sustainability in (Thai) waters, by improving agricultural practices in (rice) cultivation. Thai farmers, through such scheme, are incentivized for the implementation of better agricultural practices, such as reduced agro-chemicals application. The success of the suggested incentive mechanism, the Book & Claim model, one with low-cost and high flexibility, will be studied through analyzing the characteristics of the model (low traceability and transparency) in combination with the research results about the water sector's awareness and preparedness and the political and social circumstances affecting the rice supply chain. It will conclude the government to be a valuable partner for further collaboration while other political objectives are resolved and general awareness and preparedness to contribute grows. The Book & Claim incentive mechanism will hold potential, while other factors such as lack of knowledge about the magnitude and causality between rice and water have to be overcome first.

Further research is needed in the extent of water pollution through rice cultivation and the potential of other (external) stakeholder to the rice supply chain to invest in the Book & Claim incentive mechanism to improve sustainability in the Thai rice-water nexus.

Acknowledgement

UTZ Certified funded this research in preparations of its joined efforts with the Sustainable Rice Platform. I would like to thank everybody at UTZ Certified for enthusiastic assistance prior, during and after my field study in Thailand. This has been and is a great source of knowledge. I specifically would like to thank Mr Gieljan Beijen, my coordinator at UTZ and Mr Han de Groot, Executive Director for giving my this opportunity and bringing me in touch with so many interesting issues and individuals. This opportunity has provided me with a chance to develop my professional expertise and gain experience in the interesting new topic of rice, in combination with water.

I sincerely would like to express my gratitude to the host organisations in Thailand, GIZ and the Thai Rice Department. Thanks to Khun Ladda Viriyangkura Senior Agricultural Specialist on Food Safety at Thai Rice Department of the Ministry of Agriculture and Cooperatives I have met many interesting stakeholders belonging to the research group. She has, with her warm and personal approach, made my research time in Thailand a pleasant and fruitful experience.
The same counts for Mr Matthias Bickel Project Director ASEAN Sustainable Agrifood Systems at GIZ Bangkok, who has not only provided me with a warm welcome at his office, providing me with a working place, but has with this created a pleasant working environment for me where I was looking forward to go back to on a daily basis. All staff members working for GIZ are motivated, warm, helpful and patient individuals who are an example to every multicultural workforce.

As an individual, Mr Damien Jourdain, Visiting Assistant Professor Agricultural and Natural Resource Economics at the Asian Institute of technology who has provided me with valuable insights on the Thai rice supply chain and the effects of the rice-pledging scheme. He has also forwarded me to multiple professionals who were able to provide me with their expertise.

I greatly acknowledge the guidance and feedback provided by Mr Guus van Westen, Assistant Professor Human geography and Planning International Development Studies at Utrecht University for which this research was conducted as part of my Master study International Development Studies. His feedback and advice have been good guidance during the field research and writing period of this thesis.

In addition to all the professionals thanked above, I would like to thank all who enabled the data collection of this research, the research population and control group. Without all the Thai water sector stakeholders and professionals working for the international organizations, universities and as individual researchers this research would not have been possible. Thank you for your collaboration and honest answers.

Furthermore, but not any less important I would like to thank my friends and family, who have supported me during every day and have always believed in me. They have proven the best support and listening ears.
With friends I, not any less, also mean those new ones in Bangkok. Bangkok has provided me with a collection of interesting, smart, life-loving fun group of friends. Thai friends and families have been one of the most worthy encounters in Bangkok. They have welcomed me to their home and hearts and I hope to be able to return the favor one day. I miss you, but will be forever thinking of the great times and I have loved every minute of your hospitability.

Thank You

Table of Content

List of abbreviations

AIT	Asian Institute of Technology
ASEAN	Association of Southeast Asian Nations
B&C	Book & Claim
CSR	Corporate Social Responsibility
DOA	Department of Agricultural
DOAE	Department of Agricultural Extension
DWR	Department of Water Resources
E.G.	Exempli Gratia (for example)
ES	Ecosystem Services
Etc.	Et cetera
FAO	Food and Agriculture Organization of the United Nations
FAS	Foreign Agricultural Service of the United Nations
FDA	Food and Drug Administration
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GI	Geographical Indicators
GIZ	Gesellschaft für Internationale Zusammenarbeit Germany
GWP	Global Water Partnership
IRRI	International Rice Research Institute
MOAC	Ministry of Agriculture and Cooperatives
MSP	Minimum Support Price
MWA	Metropolitan Waterworks Authority
NDP	National Development Plan
NGO	Non-Governmental Organization
OECD	Organization for Economic Co-operation and Development
PAD	People's Alliance for Democracy
PCD	Pollution Control Department
PES	Payment for Environmental Services
PWA	Provincial waterworks Authority
PwC	PricewaterhouseCoopers
Q	Quarter
RID	Royal Irrigation Department
SRP	Sustainable Rice Platform
THB	Thai Baht
TRT	Thai Love Thai political party
UDD	United Front for Democracy Against Dictatorship
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFVSS	United Nations Forum on Voluntary Sustainability Standards
US	United Stated
USD	United Stated Dollar
UTZ	UTZ Certified (started as “Utz Kapeh", which means "good coffee" in the Mayan language Quiché)
WWF	World Wildlife Fund

1. Introduction

Approximately 20% of the people in this world, over one billion, are fully dependent on rice cultivation. In the past 15 years however, rice yields have stagnated or even declined, which is alarmingly in the context of food security. With a growing world population and an increasing rice demand, the world's poorest consumers and rice producers will continue to suffer from food scarcity and toughening livelihoods.

The international rice trade market is dominated by a few major players, of which Thailand, India and Vietnam currently are the biggest. In 2012, the first year in three decades, Thailand lost the throne of leading rice exporter to both India as well as Vietnam. The main cause of this is the Thai government's rice pledging scheme, which aimed at supporting rice farmers to win their political votes. Through this scheme, the Thai government has bought rice against a guaranteed price set 30%-40% higher than the international market price. In order to sell the bought rice further to the international market, without financial loss, the Thai government offers the rice against incredibly high prices. Uncertainty in the international market due to the monopolized release of Thai rice to the market and its high price arose. Despite no longer being the main exporter, Thailand remains amongst the leading rice producing and consuming countries and aims at repossessing the throne.

The pledging scheme promotes production as it stimulates farmers to achieve high yields and receive high income in return. Unfortunately it does not encourage sustainable use of water resources and limited application of agro-chemicals. The pledging scheme currently stimulates Thai farmers to use more agrochemicals to boost yields and therefore earn more. These agrochemicals pollute surface- and ground water, which are used by public- and private sector organizations domestic- or agricultural purposes. Already scarce resources are affected by unsustainable practices during rice cultivation and hypothetically create problems for stakeholders in the water sector.

'Rice cultivation' is the biggest user of water resources, called 'water footprint' in the world. On top of that, Thailand's use of internal water resources for rice production is among the top 10 highest in the world. This combined has led to at least 37% of surface water in Thailand to be polluted, mostly located in Central Thailand, according to research executed by the World Bank in 2013.

Thailand has implemented some efforts to manage and reduce pollution, due to agriculture, of its waters. The Thai government's Good Agricultural Practices training increases the knowledge of farmers about better balanced agrochemical use and aims at decreasing the level of chemicals in soils, commodities and water. The second one is the strict control of imported toxic agrochemicals and reduced water allocation to irrigation areas to reduce yearly crops. However, in light of the high demand of water for agriculture, intense agro-chemical application during rice cultivation and the health of humans and the environment, much more needs to be done to increase sustainability and food safety.

This background justifies and introduces this research. Within the framework of the Sustainable Rice Platform and UTZ Certified, the causality awareness of 'rice cultivation and water' in Central Thailand, where rice cultivation is most intense, is studied. The hypothesis is that pollution in water from agriculture creates extra purification costs. This could be avoided if pollution was avoided in the first place, which could be done by giving incentives to farmers to use fewer chemicals. This proposed 'Payment for Environmental Services' is studied by interviewing main water stakeholders and related organizations. Since rice and water are resources of such political-, social, economic and environmental sensitivity a flexible and low-cost incentive scheme is researched. Before jumping into hasty conclusions about such incentive scheme, this research (1) maps the gap between the theoretical 'need for sustainable rice production and better water quality' and the actual "extent to which downstream water stakeholders, external to the rice supply chain are aware and prepared to contribute to the sustainability via the (2) Book & Claim incentive mechanism.

2. Research objectives

The objective of this research is to study if water sector stakeholders, external to the rice supply chain, are actually experiencing and suffering from a decrease in water quality and to what extent they are aware of the causality between rice cultivation and the quality of water. This research studies if those aware are also prepared to contribute to the improving sustainability in the rice cultivation and related water management practices. This can be achieved by investing in the Book & Claim incentive mechanism. This model most suitable for rice as is is flexible and low-cost and does not require major adjustments within the supply chain. It also allows for stakeholders, external to the rice supply chain to invest, which will be explained further in chapter 4. However, the fact that an incentive mechanism is needed to improve sustainability does not mean everyone is willing to contribute to this. This research aims at contributing to the knowledge about the gap between the need for sustainability and the awareness of those affected of the issues such as water quality and quantity reduction. Eventually 'awareness' should lead to 'preparedness' to contribute to this sustainability if improvement is demanded.

This research in the first place aims at conceptualizing the Thai water sector's awareness and preparedness in order to map the 'gap' or causality with sustainability initiatives.
The second objective of this research is to, based on the extent of above conceptualized awareness and preparedness, judge the basis as such for an incentive mechanism as governance initiative towards improvement of rice cultivation and water use.

With regards to the transnational consideration, this study contributes to a rethink on the 'classical' model of certification as incentive mechanism. This as rice, with its incredible social and political value being a staple crop feeding 50% of the world's poor, cannot benefit from the pulling (Western) demand for sustainability which in the case of cocoa, coffee tea demands the value chain for sustainability. This calls for another model, not driven by increasing commodity prices and western sustainability demand, but dealing with primarily South-South trade. The suggested Book & Claim incentive mechanism is suggested for its ability to include water stakeholders as these hypothetically speaking experience water pollution from agriculture. When they do, what affects awareness and determines their preparedness to contribute to an enabling environment for improvement? Current literature studies have not addressed this water stakeholder inclusion and have mainly focused on other commodities with regards to incentive schemes. In addition, little attention has been paid to the B&C model as certification and traceability option. This gap in knowledge is hopefully reduced through the findings of this research, which also aims at increasing the knowledge about the gap between need to act and actual preparedness to act towards sustainability.

A more practical objectives of this research is framed within those of the Sustainable Rice Platform, co-chaired by UTZ certified, towards the creation of sustainable rice supply chains. UTZ' specific objective, along co-chairing SRP, is to conduct a pilot, which will teach how the Book & Claim model could work in practice.

To conclude; this study aims at indicating the size of the gap between international demand for sustainability efforts related to natural resources and food security and Thailand's water sector stakeholders' awareness of these issues and their preparedness to act. It conceptualized awareness and preparedness to create a better understanding of this gap and to create a foundation upon which the Thai water sector is judged for its likability to be a good combination with the Book & Claim incentive mechanism in a joined strive towards improving sustainability in rice cultivation and water use.

3. Theoretical Framework of the Rice-Water Nexus

A theoretical framework clarifies what interrelated concepts are framing the environment and background of a research. It guides the research, defines what things will be researched, and what the relationships between concepts are. In this chapter the background of agricultural development will be discussed in the part about the Green Revolution and the intensification of agriculture, which occurred during this period of time all over the world. The developments in agriculture brought up in this part lead the way to the introduction of the concept of sustainable development and the reasons why this is important in light of the environmental health and water footprint, discussed subsequently. Not only the environment and natural water resources will benefit from sustainable practices, its lack of can also negatively affect human health. This background shows the development through time and paves the way to the introduction of conservation approaches aiming at restoring natural resources and reducing the use of e.g. agrochemicals during the cultivation of rice. An example is a Payment for Ecosystem Services, of which a specific model will be introduced, suitable for rice and Thailand in chapter 5.

Nowadays, Thailand is a country with a wealth of agricultural biodiversity, a vast number and kind of spices, vegetables and fruits. Unlike many other Asian countries with similar climate characteristics, most Thais are able to live a subsistent livelihood and 95% of the population has access to water (World Bank 2013). Thailand has long been the world's number one exporter of rice, indicating food security not to be a national problem.

The enabling social policies behind this producer and exporter status have had different shapes and outcomes throughout time of which the most relevant are discussed in this chapter 3. The first one is the 'Green revolution', which clarifies how countries, such as Thailand, has come to the point of agricultural intensification and what the issues are that sprouted from this cultivation intensity. This historical shift in agriculture introduces the justification of sustainable development, upon which ultimately this research is based. A need for more careful actions of all actors involved with natural resource and food production is introduced through this notion of sustainable development. It if followed up with a more specific natural resource; water. As this research looks at rice cultivation and its effects on water, more specifically if pollution from rice cultivation is felt by stakeholders dealing with water, the actual Water Footprint of Thai rice is embedded in literature.

These notions lead to the instruction of conservation approaches, more specifically Payments for Environmental Services as a tool to ensure sustainable practices of natural resource users through incentives provided by stakeholders. Who or what this stakeholder is, depends on its reasons to contribute to the conservation of an ecosystem's natural resources and will be elaborated upon. The model eventually research upon its ability to include of water stakeholders, towards enhancing sustainable rice cultivation, is a form of Payment for Environmental Services introduced through the Sustainable Rice Platform and the host organization of this research; UTZ Certified.

3.1 The Green Revolution's Agricultural Intensification

The Green Revolution is discussed in this research, because it explains the history of Thai agriculture and clarifies why the negative side effects of rice cultivation still are problematic.

The 'Green Revolution' of the 70s and the 80s was a response to the increasing demand for rice to battle the frequently occurring famines in the developing world during previous decades. The Green Revolution has kept rice supply well ahead of the population growth and accompanying rice demand, in many developing countries for the next two decades (Tran 1997). The increase in production was enabled via a set of yield-improving measures and production technologies, rather than land expansion (Nguyen & Ferrero 2006). Effective irrigation and the introduction of Higher Yielding Varieties were accompanied with increasing application of agrochemicals, such as fertilizers and pesticides. This intensification of rice production and investments in irrigation systems facilitated shorter cropping periods while increasing total yield (Potter et al 2008).

The implementation of irrigation in developing countries too was a result of the Green Revolution's ideology to modernise agriculture. Large-scale water network systems with dams were designed and implemented along riversides to create vast numbers of irrigation constructions. All the modern and improved production technologies of the Green Revolution were enabled through favourable government policies, development of irrigated areas, accessibility to agricultural finances, intensive support services and the importation of vast amounts of agrochemicals, such as fertilizers and pesticides.

The Green Revolution has indeed contributed to the alleviation of food security in some countries of the world. However its positive contribution to development has been overcome by the constant population growth worldwide. Currently there are over 840 million people living a livelihood of persistent hunger. More than 50% of these people live in countries that are dependent on rice production for food, employment and income. These people are the last to be able to cope with the on-going increase of international rice prices (Nguyen & Ferrero 2006).

Even though the Green Revolution has improved the food security in some parts of the world, an on-going demand for rice production needs the sector to further develop and increase its effectiveness. 70 % of rice today, but also reduced soil fertility and polluted natural resources are the direct outcomes of the policies and practices implemented during the Green Revolution (UNDP 2010). At the start of the 21st century the awareness of this ecological cost led to a changing paradigm of how agriculture should be practiced in a more sustainable way (Vidal 2013). Alarming reports about soil depletion for plant nutrients, increase in rice pests outbreaks and the destructive impact on the environment and internal water resources call for new development techniques in agriculture, which introduced the next paragraph (Tran 1997).

3.2 Sustainable Development

This paragraph introduces the concept of 'Sustainable Development', which is one of the pillars of this research and a fundamental phenomenon in the world today where development has to cope with a balanced attention to the 3 P's; People, Planet and Profit. With the increased production of food during the Green Revolution, yet its negative affects on the environment and disability to be profitable to the entire world population, continued development of the agricultural sector is needed. Public- and private sector and international organisations should aim at alleviating hunger, without harming the environment, with a fair price for food producers and an affordable one for all consumers.

The concept of sustainable development was published in a report written by the Brundtland Commission in 1987, at the end of the Green Revolution. The prominent definition of sustainable development is; *"Development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (IISD 2010).*
This approach proved successful as it helped to shape international agenda and the worldwide attitude towards economic, social and environmentally friendly development. It promotes resilient economic and social development, especially for people in the 'bottom of the pyramid'; the world's poorest. It does so while protecting natural resources towards intergenerational solidarity (Potter, et al 2008).

With around 15 years of working with the notion of sustainable development some successes and challenges have surfaced. The widespread adoption at local level can be ranked among its successes as over thousands of institutes have promoted sustainable development through local initiatives and herewith increased the awareness and impact. However, actually meeting this objective of sustainable development seems complicated in a political environment promoting agricultural intensification at first. The actual implementation of sustainable initiatives suffers from administrative burdens, scarce political support, limited financial and technical resources at multiple levels, scarce involvement and empowerment of civil society, lack of awareness due to little educational attention, etc. (UNECE 2005).

Sustainable production implies economically viable, environmentally sound, and socially beneficial management and operation; its site-specific implementation characteristics vary by region and production system.

Sustainable development is a process only successful when participation and frequent unpretentious dialogues among all stakeholders are fundamentals, where objectivity should overrule personal agendas. Democratic thinking and consensus-based public- and private sector participation are pillars of the SRP in its aim to contribute to what principles and standards help to create sustainability in the (rice) supply chain. This will be further elaborated in chapter 4.

3.3 Health Effects of Agrochemical Exposure

Not only the environment suffers from deteriorating natural resources through the increasing level of agrochemicals, they can also endanger human health. These chemicals also affect its diffuser, end up in agro-commodities cultivated and eventually at the end-consumer. It depends on the level of exposure and intake if this is harmful for human health.

A study executed among Pilipino rice farmers, who had been farming for 20 years and had applied several pesticide 3 times a year, showed that these farmers suffered from health issues. The most occurring direct health issues were the following: fatigue (52%), light-headedness (50%), and body pain (32%). Farmers also reported to suffer from around 43 different chronic health issues. These varied from neurological (98%), respiratory (88%), to cardiovascular (56%) health complaints. This research proved that the chronic complaints were significantly lower for those who sold emptied pesticide containers, with higher income and for those who had benefitted from some sort of agricultural training (Kedia & Palis 2008).

Unfortunately, another research conducted among Thai rice farmers presented that they had a moderate perception of their vulnerability to, the magnitude of, the benefits of, and barriers to the use of agrochemicals during rice cultivation. The biggest danger related to agrochemical exposure comes from the wrong application of pesticides and fertilizers. The incorrect belief of the interviewed Thai rice farmers regarding agrochemical poisonousness and its over application, the misuse of and lack of maintenance of spraying equipment and the lack of protective clothing makes these farmers more vulnerable then necessary (Raksanam et al. 2012).

One should not forget that the rice itself also is exposed to agrochemicals, meaning it is polluted or at least suspicious. In the past couple of months several international newspapers published disturbing articles on rice, which was claimed to contain chemicals and therefor endangering the health of the end-consumer. Examples of publications are the following:

BBC News: "US rice imports 'contain harmful levels of lead" (Palmer 2013).

The Nation: "Farmers fret over excessive chemicals, low yields" (Raksaseri 2013).

The first publication indicates that rice (imported from Thailand) by the U.S. exceeds the accepted level of lead. Rice meant for export, to western countries, is subject to strict quality standards should contain less chemicals than rice not subject to these quality standards. These standards are set to safeguard consumer health. Most rice producing countries do not have any of such standards for their domestic markets, meaning this could even hold higher levels of e.g. lead. In the second article, rice farmers themselves acknowledge that they use excessive amounts of chemicals to boost yields. They fear for their own health due to exposure to chemicals and buy rice from other farmers who use fewer chemicals for that reason.

Although the researches and publications mentioned above are just examples and do not cover all countries or all affects of agrochemical exposure existing, it gives an understanding of the need to further research the risk and solution. This requires close monitoring, transparency and traceability throughout the rice value chain.

3.4 Water Footprint of Rice

So far this chapter has described the theoretical framework of this research as to how agricultural intensification during the Green revolution increased the need for sustainable development in order to sustain natural resources and reduce human health implications. This paragraph highlights one element of the natural resources significantly affected by agrochemical use during rice production; Water.

While rice feeds around half of the world's population, its cultivation provides employment and food security to millions of people worldwide, its environmental footprint is among the largest of any human activity. Its cultivation requires vast amounts of fresh water, the emission of green house gases is substantial and millions of hectares of the world's most imperative agricultural land is used for its cultivation(IRRI 2012).

"To be more specific, the production of one kilogram of paddy rice is responsible for the:

1. *Evaporation of 1200 litres of water*
2. *Pollution of 110 litres of internal fresh water.*
3. *910 litres water loss in the field".*

The total water used is 2220 litres when rain fed and not further processed. Around 55 % of cultivated rice areas worldwide are irrigated. Rice grown in irrigated fields needs more 4.000-5.000 litres of water to produce 1 kilogram of paddy rice (Chapagain & Hoekstra 2010). The production of milled white rice costs even more water. Currently the water efficiency is about 50%, whereas it can reach 80 % when drained water would be recycled (Tran 1997).

As is envisaged above, the biggest demand for the world's freshwater resources derives from agriculture. Around 75% thirds of the water from freshwater sources is used for field irrigation and crops treatment. In addition agriculture also significantly pollutes water resources through over-fertilization. Fertilizers and pesticides hold nitrogen and phosphorus, which can cause severe health issues for human beings, damage wildlife and the environments and contribute the greenhouse gas emission. Wastewater from agricultural fields, containing these chemicals, is released into waterways without prior purifying treatment. This particularly affects rural livelihoods as 95% of these rely on this locally available water as their only source of drinking water. Please not that these are international statistics and not Thai statistics. Nevertheless the effects of chemical use during cultivation are comparable and as significant (FAO n.d.)

These numbers of water amounts linked to the value chain of rice are made possible through the initiation of the 'Water Footprint'. Before the introduction of Water Footprint, there was little attention paid the actual total consumption and pollution of water in terms of what was actually consumed by communities in combination with the global economic structures of international trade. All goods and services produced and provided use water throughout the entire value chain from production to transport and eventually consumption. In the light of water management and sustainability, one needs to know the actual water consumption, pollution and its spatial distribution along the entire supply chain to draw an accurate conclusion about the water needed for consumer product; the 'Water Footprint'. The improved understanding of these 'hidden waters' and what commodities top the ranks are at the basis for reducing the pollution and use of water resources (Chapagain & Hoekstra 2011).

3.5 Rice-Water Nexus

The interconnectedness of rice and water is actually part of the larger triangular of energy, water and food resources; 'the energy-water-food nexus'. Water is used to extract energy and produce power, whereas energy is needed to purify and transport water, water and energy are used to cultivate and process food. In the coming decades these fundamental resources will continue to encounter threats. The world's continued population growth and increased wealth will increase global demand for energy, food and water exponentially.

The 'energy-water-food nexus' is, or should be, present on most agendas of the public- and private, international organizations and NGOs. By 2050, 70% more food is needed to feed the world's population of around nine billion people. Today, agriculture accounts for 70% of freshwater consumption and it is predicted that by 2030 water demand will surpass its supply by 40% (2030 Water Resources Group 2009).
People, animals and vegetation cannot live without water, yet it is not perceived as most valuable resource of the world. This place is taken by another complex and scarce resource; oil. However, it is waiter supporting the global economy as no product or service can be provided without water. Water is therefore strongly correlated to food security, which is the second basic need in life. It is because of globalization and the liberalization of international food trade that resource scarcity and security is of transnational scale and scope (Supesuntorn 2011). Figure 1 envisages the 'energy-water-food nexus', but then as a water-food nexus in times of climate change. It shows the relations between water management in agriculture and the need to do so to feed the world, but with an increasing climate change.

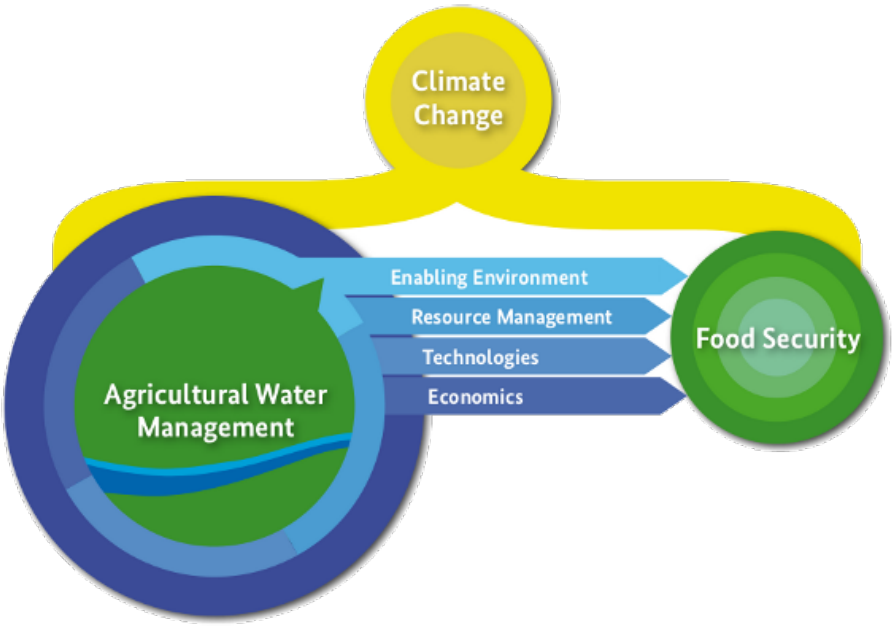

Figure 1: Nexus: Agricultural Water Management under Climate Change for Food Security (Agriwaterpedia.info 2013)

In this research the energy-water-food nexus is stripped down to the rice-water nexus. As rice is the staple crop feeding half of the world population, this is considered the most important food variety. Due to its intensive use and footprint of water, this resource is the closest link; the rice-water nexus.
All water related stakeholders are discussed further in this research as they are mostly affected by polluted water from rice. The rice-water nexus holds the biggest potential in terms of stakeholders and future investments in sustainability efforts towards conserving internal waters.

3.6 Incentive Mechanism; Payments for Ecosystem Services

After introducing the need for sustainability in the rice supply chain towards reduced agrochemical use in farming and conservation of international waters, this paragraph discusses a phenomenon holding a potential to conserve the rice-water nexus and increase health within. An incentive mechanism

The differences between geographic locations and the livelihoods of its inhabitants toughen the process towards sustainability in areas, which are considered environmentally fragile. It can be said that people living in these fragile geographical areas, where agro-commodities often come from, are generally poorer than the people consuming the commodities. The consumers create a demand for these agricultural 'services'; yet do not pay for these. 'Services' refers to the facility the ecosystem provides to cultivate food, e.g. water, land and biodiversity. The people cultivating the land and producing the agro-commodities are generally too poor to invest in more sustainable practices or are simply not aware of the consequences to the environment or their

own health. These service providers, the farmers, have no tangible or intangible incentive to change their farming practices (Kolinjivadi & Sunderland 2012).

Following up upon the Brundtland Report, the conservation of ecosystems became more people-oriented as alleviating poverty seemed the way to conserve and protect the environment. It after all are the poorer people living here and cultivating these endangered and polluted areas (Wunder 2005). The phenomenon 'Payment for Environmental Services' (PES) is a practical and actor-oriented sustainable development paradigm and acknowledges the need to link the interests of proprietors and those of stakeholders affected by practices on this land. The official definition of PES is:

> *"A voluntary transaction whereby a well-defined ecosystem service (such as clean or plentiful water and healthy soils) is 'bought' by a minimum of one ecosystem service buyer from a minimum of one ecosystem service provider if, and only if, the ecosystem service provider continually secures the ecosystem service provision (i.e. with an element of conditionality)" Wunder (2005).*

PES focuses on the improvements of agricultural practices in developing or transition countries. It is a sustainable development approach that can benefit ecosystem service buyers, sellers and improve the natural resources used along the way.

Some government invest in incentive mechanism such as PES, on behalf of the society, to protect a country's resources. Governments can be considered as the more powerful enablers as they hold centralized power. Although governments hold major power and can enable significant impact, disadvantages of a centralized top-down implementation of a PES-system are likely to occur. Governments might not objectively represent the needs of ecosystem service sellers or buyers (e.g. farmers, rice supply chain actors or, more relevant to this research, water stakeholders), but instead focus on commercial targets or political missions. The need for a more actor oriented participatory approach, by including and empowering farmers and private sector stakeholders, succeeds or fails as a result of the abilities to adapt to local circumstances and needs. Institutional interplay refers to the effectiveness of the output of collaborations between institutions. Most water resource management programs today are based on institutional interplay and participatory approach dialogues (Bumbudsanpharoke 2010). PES is a tool to encourage also the private sector stakeholders, operating in all aspects of water resources management, to invest in the preservation of natural water resources. Important is that this approached as a market-based incentive for water conservation in order to really implement a solid and sustainable tool for all stakeholders involved.

The key is to find a win-win situation for both the service seller as well as the service buyer. The seller can benefit from an increase and diversification of income and improve its livelihood, whereas the service buyer can contribute to cleaner water or 'better' agricultural commodities and safeguard the future of its business. The right balance between incentives in exchange for the implementation of improved farming practices is a social negotiation and the foundation upon which PES is built. It is a voluntary actor-based approach, which might find easier adoption at farmer level than rules and regulation enforced upon them by governments; but only if the benefits are mutual and trusted (Kolinjivadi & Sunderland 2012).

This research studies if a PES-based incentive mechanism would work in the rice-water nexus in Thailand. It researched the likability of water stakeholders willing to pay rice farmers to improve their agricultural practices and thus improve water quality. The exact incentive mechanism this can be achieved with and the accompanying level of traceability and transparency will be discussed in chapter 4.

3.7 Asean Sustainability Awareness and Preparedness

This research aims at clarifying the awareness of the rice-water nexus of the Tai water sector, its preparedness to contribute to sustainability within and finally discusses the likability of success of an incentive mechanism, given the current awareness and preparedness. Before the regional frame(PwC 2013)(PwC 2013) work of Thailand is discussed in the next chapter it is interesting to frame it with the awareness and preparedness of other ASEAN (Association of Southeast Asian Nations) countries.

Although around 80% of private sector companies in have indicated to know there is a need to manage and operate a business sustainably, less than 50% have actually implemented resources and strategies to do so.
The concept of sustainability and what it means for businesses is already well known in developed countries and it is finding its way in Asean countries, such as Thailand. More companies are becoming familiar with the need for sustainability and assign their business focus accordingly. However, research has shown only 3% of Asean companies researched to have proper management structures in place and only 20% mentioning this subject of sustainability during management meetings. Many companies do promote their 'efforts' through media, which shows characteristics of 'green washing',
Global rankings of 'the extent to which stakeholders are prepared to participle in sustainability', such as the annual Global 100 showed the only Asean stakeholders to be from Singapore. The reason behind the poor ranking of other Asean countries was the lack of development and knowledge about sustainability issues. As said, 80% finds sustainability important, but less than 50% actually knows what this strategically means.

When looking at the individual countries, the Philippines scored highest on awareness with 97% and Thailand scored lowest with 63%. Too often Thai companies still see sustainability as a public relations stunt, but the leading ones start to integrate sustainability considerations into the business strategies. Since the floods in Thailand during 2011, the country has made a giant leap forward with regards to the awareness of consequences to neglecting the environment (PwC 2013).

4 Regional Framework of the Rice-Water Nexus in Thailand.

This chapter introduced the reader to the historic and political background against which significant issues surfacing from this research will have to be held. It starts with the agricultural sector of Thailand and the developments, which have taken place over time and at geographical locations. When touching upon the general term of agriculture, rice is highlighted where possible. After the history of Thai agriculture is discussed the political background starting from the age of Taksin is reviewed. This, as current and past politics have played significant roles in the current issues related to rice cultivation and export in Thailand. These politics even affect the global rice markets and toughen promoting sustainability. At last this chapter touches upon the governmental initiative promoting good agricultural practices and what this means for third party international platforms such as the Sustainable Rice Platform.

4.1 Agriculture and Intensive Rice Cultivation

The original agro-commodities Thailand exported are rice, sugar and pineapple. Thai export has grown to the point of Thailand being the single Asian country producing far more than it needs for domestic consumption. The decades of the Green Revolution have changed Thailand from a nation of subsistence agriculture, to an industrialized economy and one of the main exporters of rice. Since the Green Revolution Thailand has managed to successfully adopt the modernizations in technology and the outcomes of agricultural research towards developing an export-oriented agro-economy. In its goal to develop and towards becoming the main exporter of rice, Thailand invested in the intensification of agriculture. Agriculture was on of the bigger likelihoods towards bettering the livelihoods of the Thai. Europe had developed similarly during the industrial revolution, one that did not reach Thailand. Due to Thailand's suitable agricultural land, temperature and experience it was their its chance and time to boost production, export and eventually GDP (Ananvoranich 2012).

Even though Thailand became wealthier, benefitted from rural development, urbanization and industrializations, not all farmers benefitted. Many still depended on the highest yield possible to survive and had to diversify their income. In responds to this, the Ministry of Agriculture and Cooperatives (MOAC) established a National Development Plan (NDP), which promoted the application of agro-chemicals to boost yield. An increase in overall rice yields is in line with the Thai government's agenda of remaining the leading rice exporter of the world. The government does not restrict agro-chemical advertising, by private sector companies. Up until today, Thai farmers are persuaded to buy agro-chemicals due to aggressive promotion of the private sector. Some agro-chemical importers promote their goods by offering motorbikes upon purchase (Ananvoranich, 2012).

The aggressive marketing strategies from the private sector and enabling policies implemented by the government, led Thailand to be the world's number one rice, canned pineapple and pineapple juice exporter. Additionally Thailand is among the top ten exporters trading seafood, frozen shrimps and chicken, which all accounts for 15% of total exports. The worldwide economic crisis in 1997 made Thai export increase for rice, rubber, poultry etc. that proved Thai agriculture to be flexible and responsive to otherwise risky circumstances (Childs et al. 2013).

Thailand's agriculture has enabled the reduction of poverty in rural areas from 30% to around 10% at this moment of time (Murray 2007). This can merely be accounted to exports and the Thai government's active stimulation of poverty alleviation with policies such as the pledging scheme explained further in the next paragraph on political populism. Today, Thailand is responsible for 30% of international rice trade, which is around 9-11 million tonnes. Only 10 million tonnes is the yearly domestic demand. Over 25 million Thai people have a livelihood revolving around the production of rice yet only 12 % of Gross Domestic Product (GDP) can be traced to agricultural production (Facon & Ti, 2001).

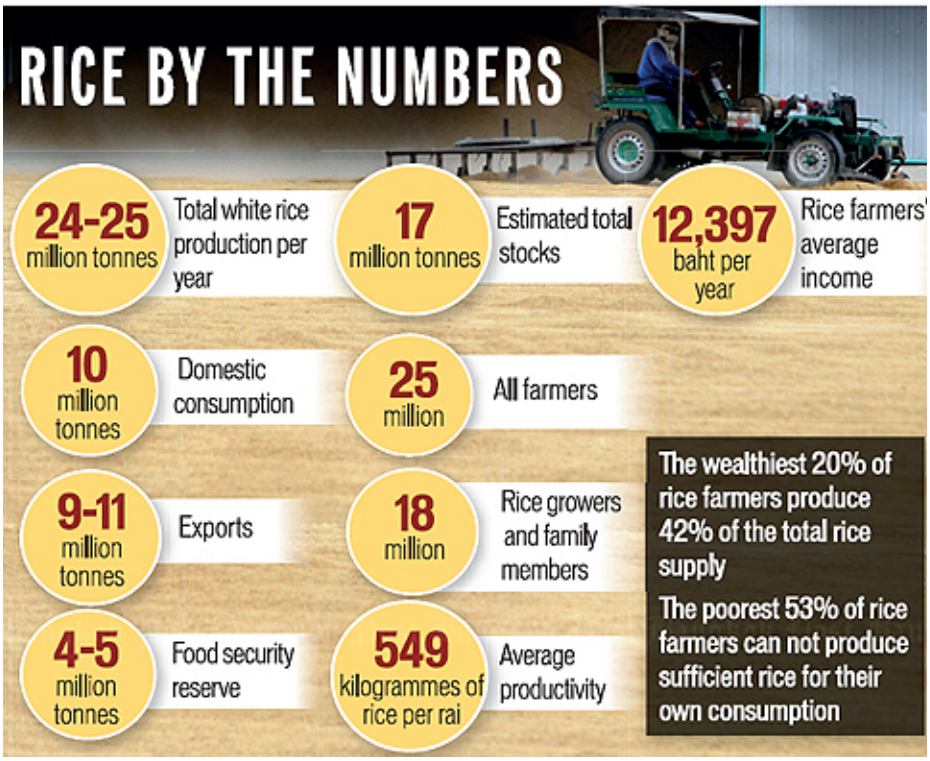

Figure 2: Rice Numbers of Thailand (Office of Agricultural Economics, Thailand Development Research Institute, Commerce Ministry 2013)

Figure 2 shows the most relevant rice numbers of Thailand. The black box on the right states; most production of rice is in hands of the richest 20%. Most of these farms are based in Central Thailand as this river basin has the most developed irrigation systems. The Chao Phraya River basin in Central Thailand is the "rice bowl" of Thailand, with the 'best of both geographical worlds'; highly developed rural areas for agriculture and urban areas suitable for living as well as attractive to industries, such as Bangkok. Central Thailand is accountable for 50% of the production of rice (meant for export) yet covers only 20% of land, which is explained by the most developed irrigation systems and the intensive rice cultivation with a high level of mechanization and a significant use of chemicals. Pesticides and fertilizer are a must if this level of cultivation and high yields is to be maintained (Perret, Babel, Rahatwal, & Yarnsiri, 2009).

Thailand has clearly focused on improving the livelihoods of its inhabitants by promoting the production of agricultural commodities intensively. This was Thailand's priority as developing country leaving little attention to sustainable practices at the time. Where poverty decreased, environmental changes and other stresses have not. As the external environment puts a burden on the livelihoods of farmers, with pests and irregular water supply, farmers are relying more on the acquired inputs of fertilizers, outsourced labour and farming services, calling for financial support from e.g. farmer banks (Jitsuchon, 2006).

However the level of intensity Thailand cultivates in has its effects on natural resources such as water. The World Bank has indicated 37% of Thailand's surface water to be polluted and that this is responsible for a cost between 1.6%-2.6% of Thai GDP (Bumbudsanpharoke 2010). As discussed in the previous chapter on water footprint, rice has a water footprint, which is one of the most substantial of any human activity. When looking at individual countries Thailand appears to be topping the net-exporters and net-importers ranks of water use. When the latter two facts are combines; Thailand is among the top 10 per-capita water footprint of rice, due to the daily rice-based diet of the Thai people. When summarizing all the numbers stated above, one can conclude that Thai waters suffer from rice production and consumption for domestic as well as exported rice, creating a complex and important liaison between rice and water (Chapagain & Hoekstra 2010).

4.2 Politics and the Effect on Export

The paragraph above introduces the need for sustainable development if Thailand wishes to maintain the current level of intensive rice cultivation and at the same time protect the natural resources it depends on. However, the political regime in charge might not always enable this in every aspect. It is important to frame the development of Thai agricultural in the bigger political game played in Thailand between the so-called "red- and yellow shirts'. Which 'shirt' is in charge and what policies are implemented influences the agricultural environment and the willingness of Thai society to be part of the discussion on sensitive national issues such as rice and water.

4.2.1 Political Populism throughout History

As mentioned before, the Green Revolution has brought Thailand a fast developing economy and social changes. Many children of farmers, who were now wealthier, moved to urban areas to study and work. An increased number of students with high ambitions sprouted during the following decades, getting ready to become part of the business elite. This business elite aimed at cutting down taxes over their business profits and aimed at having a say in scheme decisions. Although this group of fresh business people had little experience in politics, it believed to represent modern Thailand. This student-business-bourgeois slowly took over the military control, which held power at the time, and became a new parliament. This parliament should be baptized 'a business club', as deals were made based on and between representatives of interests and social groups. This type of politics was called 'money politics', existing out of businessmen, their own agendas and little national interests.

Taksin Shinawatra belongs to one of the major business-families who survived the 1997 financial crisis relatively well. Restoring economic growth in Thailand became Taksin's acclaimed political goal when he was first elected as Prime Minister in 2001 and represented the so-called red-shirts. The supporters of the Red-shirts, officially known as the United Front for Democracy Against Dictatorship (UDD) mainly are rural workers living outside of Bangkok and account for the biggest population group of Thailand. However, also businessmen can relate to him, as he was a former telecommunications tycoon, born in an unprivileged livelihood himself.
Taksin, who 'created' populism on demand, implemented beneficial policies highly desired, e.g. health-care- and educational funds, among rural farmers and the urban working class during his five years of governance. The states' policies were a welcome hope for these people as the 1997 crisis had hit them hardest and the urbanizations as response to worsening circumstances for the youth in agriculture triggered major socio-economical changes. The government helped those in need with e.g. pledging schemes, to win votes (Baker & Phongpaichit 2005).

This political phenomenon is called 'neo-populism', as such policies appeal to the 'not-organized' population of society, e.g. small peasant farmers or informal-sector workers in urban areas, who together promote the larger part of Thailand's inhabitants. Taksin's Thai Love Thai (TRT) government party was formed out of Thailand's major business representatives. Their control over- and interest in policies enabled a local capitalistic protection against external global forces and enabled some Thai multinationals to dominate production and export, the main drivers of Thai GDP. Legal and cultural restrictions have protected the service sector of e.g. the media, real estate, construction and telecommunication against foreign competition. Thaksin promoted foreign investment yet protected domestic capital, making his populist politics highly successful. Taksin was dethroned during a military coup in 2006, but the support from rural areas never vanished (Phongpaichit & Baker 2010).

The yellow-shirt party consisted out of royalists, ultra-nationalists and the urban middle class and is officially called the People's Alliance for Democracy (PAD). Thaksin was accused by the yellow-shirts of corruption, human-right- and power abuse as well as insufficient loyalty to the Thai king.

It was quiet after the overthrow of Thaksin until Thaksin's allies won new elections in 2007, after which the yellow-shirts protested again in 2008. These protests also caused violence, cancellations of flights and diminished the tourism to Thailand. The new Democrat Party government under Abhisit Vejjajiva as prime minister was elected in 2008. The red-shirt governing party was banned and the yellow-shirts stopped protesting. After a comeback of red-shirt protests in 2009 it was quiet until April 2010 when protesters aimed at the overthrow of the yellow-shirt government. This time more people died, the commercial heart of Bangkok was closed for several weeks, satellite transmission bases were stormed and flights had to be cancelled, which all led to the Member of Parliament to flee. It was only in May, after protesters and soldiers were killed, that armed government troops were able to take over the two red-shirt camps.

Figure 3 Thaksin's sister Yingluck as Prime Minister

As can be seen in Figure 3 in July 2011 the Pheu Thai Party won the election, with Thaksin's sister Yingluck as Prime Minister. She now represents the red-shirts while Taksin resides in Dubai. The current red-shirt government has implemented several political policies to promote rice production and ensure Thailand's position as one of the major exporters of agricultural commodities, similar to the times of the Green Revolution.

4.2.2 Rice Pledging Scheme and Export

One of the main policies the political party of Yingluck has implemented is the 'rice pledging scheme. This is a:

"Minimum guaranteed price for farmers from the government, set higher than the international market price".

This scheme somewhat refers to 'political populism'; an instrument to attract votes from farmers who, as mentioned above, suffered from the outcomes of the 1997 crisis or the changing socio-environmental externalities. The current Prime Minister Yingluck won the elections through the success of this scheme, with farmers' votes accounting for 40 % of total Thai labour (Phongpaichit and Baker 2005).

Thailand is not the only country to have such a system for farmers, as e.g. Vietnam and India also have provided their farmers with similar price support schemes. India's combination of a lower pledging price and weaker currency has empowered Indian traders to price rice a lot cheaper than similar types produced in Thailand. The problem with the Thai pledging scheme is not the issue of a pledging scheme itself, but the fact that the Thai guarantee price is set 30–40% higher than the international market price. The prices were set at THB15.000- 20.000 per ton upon implementation, but academics actively promote a price of THB10.000-THB12.000 (USD325- 390) per ton to be more sustainable in light of the shrinking national budget available (Ananvoranich, 2012).

The consequences of the pledging scheme are mainly twofold; tumbling export quantities as result of

increasing Thai rice prices and national rice stockpiling. The stockpiles also hold two consequences; a national lack of free warehouses for storage and rice stored too long.
2012 was the year during which, for the first time in over 30 years, Thailand has not managed to be the biggest rice exporter of the world as it was overtaken by India and Vietnam. The pledging scheme not only affected exporters, trying to compete against the high prices offered to farmers by the government, but also producers of specialty rice, such as organic or Jasmin rice as the sales of these varieties decreased. Where these usually enjoyed a premium, this rice is now sold to the government as conventional rice. Moreover, in the context of international food security and increasing demand for rice imports, the international market hopes the Thai government to introduce information about the release of rice stocks as the monopolized Thai rice business creates insecurity (Mohanty, 2013).

During the first half of 2013 several newspaper headlines have caused a stir in Thai rice business and Thai rice importing countries. The latest headline, published in The Nation is the following:

> *"A foreign news agency recently reported that the US Food and Drug Administration (FDA) has ordered stringent inspection of Thai rice imports in every container after a report that Thai rice had been put through fumigation that might harm consumers' health"* (Pratruangkrai 2013).

The Thai Commerce Ministry, together with the Royal Thai Police, has set up taskforces for the inspection of rice warehouses in multiple provinces after government's rice stocks have gone missing. In appendix 1, the Economist covers the rice-pledging scheme and discusses the competence of the current government. Political populism to win farmers' votes and national money problems have still not been solved and export suffers.

Figure 4: A worker amidst bags of government rice in a warehouse in Thailand. (The Guardian 2013)

The rice-pledging scheme, according to many, suffers from corruption and millers secretly inflating the quantity of rice meant for pledging or selling the rice without government's notice (Viriyangkura 2013). Alarms as such have a significant impact on rice trading as it reduces Thai export and confidence of the international markets. Rice, which has been bought and stored under the pledging scheme, now also is subject of concerns from e.g. the U.S. The newspaper headline mentioned above indicates that the United Stated (US) Food and Drug Administration (FDA) will impose severe inspection of Thai rice imports after a report stated Thai rice had been subject to decontamination processes that might harm human health. This article states that rice, which is bought and stored by the government, is subject to corrupt millers as these secretly sell the stored rice further. Figure 4 shows that warehouses are full and becoming scarce in the country. Thailand has a problem and needs to invest in clearing its name by researching and investing in sustainable solutions to reduce stockpiles, corruption in the supply chain and the pollution from cultivation or molds (Pratruangkrai 2013).

The current red-shirt rice pledging scheme looks at productivity rate, meaning the income loss when yield is low is a farmers' own problem. The rice-pledging scheme of the previous yellow-shirt government measured farming area to determine the price paid to farmers, so at least investment costs were covered. However, this scheme was prone to corruption from farmers, as many reported to cultivate bigger areas than true. As similar occurrence as millers are accused of under the current rice-pledging scheme(Raksaseri 2013) . The history of populist schemes implemented in Thailand to support rice farmers and the lack of any kind of sustainable production promotion, showcases the complicated environment of the rice-water nexus in Thailand.

4.3 Defining the Stakeholders of the Rice-Water Nexus in Thailand.

To clarify, in this research the term 'actor' is used for players within the supply rice supply chain, e.g. millers. The term 'stakeholders' is used when referring to bodies with a stake in promoting sustainability in agricultural practices. This could be a stakeholder working with water, currently not represent a role in the rice supply chain: e.g. water bottling- or purification plants. Global Water Partnership (GWP) described a stakeholder as a body involved in discussions on water and land related resource management in one of the Thai basins and who will also be affected by decisions related to water (Uraiwong & Watanabe 2008).

As mentioned in the paragraph above the Rice-Water Nexus is a complicated phenomenon. Practices in rice affect water and visa versa. The agricultural sector is responsible for 71% of water use in Thailand, where industries only account for 2%, domestic use for 5% and the 22% for e.g. watering forests. Thailand is trying to reduce this share of water used by agriculture and add it to industrial- and domestic usage (Facon & Ti 2001).
Rice is a politically sensitive issue and combined with water quality as well as quantity high on the Thai agenda. A throughout stakeholder analysis, to identify and prioritize stakeholders, is needed. Some stakeholders discussed in this chapter were unfortunately not reached and will therefore be less discussed, yet do represent the role of a stakeholder to the Thai rice-water nexus.

One can assume that rice supply chain actors are naturally more aware and prepared to contribute to ensuring and enhancing the health of their own supply chain, as the outcomes are affecting their practices and future. The bigger question is whether external stakeholders of the rice supply chain, who hypothetically are affected by unsustainable practices, feel the same need to promote sustainability in agriculture.

In the study conducted by PricewaterhouseCoopers (PwC) in 2013 showed that only 3% of the interviewed companies in five Asian countries had proper leadership structures to push sustainability forward and only 20% discussed the issue during board meetings. Many Asian companies promote to the public, via the media, their "sustainability" initiatives, yet only 18% of the companies actually have an independent third-party verification and assurance of their initiatives (PwC 2013).

However, one must bear in mind that all these stakeholders hold different agendas, power and have different institutional backgrounds. This is why the interests of the stakeholders are discussed in the following part as a preparation for framing their awareness and preparedness to contribute to preserving ecosystems affected by rice cultivation. .

Thai Government

The Thai government is only actually responsible for food safety as the rice market itself is liberalized. The role of the government is supportive and simulative in government-to-government rice trading to promote export and not to monopolize the rice export market. Its role is more significant at farm level, where it manages research and promotes development. It is the Ministry of Agriculture and Cooperatives which trains farmers on seed improvement, organic fertilizer use and better farming technologies(ADB 2012).

Thailand is currently changing its water resource management from an ineffective government dominated management to a multi-stakeholder approach. There are two government agencies involved with water; the state enterprise Royal Irrigation Department (RID) under MOAC and the Ministry of Natural Resources and Environment.

The Ministry of Agriculture and Cooperatives (MOAC) and the Rice Department

This ministry's agenda is to better farmers' health and welfare, improve food safety and boost the Thai economy. It does so by development initiatives to boost production, by setting up farmer organizations and by implementing basic structures and support (Bouman 2011).

The government's rice pledging scheme stimulates intensive rice cultivation without paying attention to sustainable cultivation. Farmers are stimulated to use more chemical fertilizers and pesticides in an attempt to increase yield to make up for their increased costs of land rent, as mentioned under the chapter of political populism. Whilst farmers use excessive amounts and varieties of fertilizers for high yields, water is exploited and polluted (RID, 2011). The pledging scheme has costs the Thai government so much money that combined with the increased national resources development budget, national budget cannot cope. The pledging scheme leaves little money or intention to invest in environmental protection.

However, MOAC has set up ThaiGap standard in 2008, which is based on the bigger GlobalGap and supports sustainable, qualitative and safe rice cultivation with a set of basic voluntary Good Agricultural Practices (GAP). This is done to be more compatible in the international trade markets as well as the domestic market. The problem with this standard is similar to that of many other standards. Farmers find it hard to believe it benefits them on the long run and are held back by the implementation costs and administration that comes with it. Upon implementation a farmer should invest in organic fertilizers and pesticides, which could at first slightly lower the yield. However after a couple of crops, land becomes more fertile again and yields rise. The fact that this is neither incentivized nor mandatory results in minor adoption of the practices at farm level. In addition markets do not pay for the GAP credit, yet this is advisable to be able to continue this initiative. The ministry has indicated to have new development plans for GAP; it wishes to increase technologies, included indicators to measure the improvement of rice production systems and develop linkages to certification and labelling initiatives (IRRI 2010). It is therefore that MOAC's interest is that of the entire Rice-Water Nexus and not solely one of the resources. It is one of the departments with currently an active role in sustainability initiatives with its ThaiGap and its collaboration with the Sustainable Rice Platform, explained in the next chapter.

Royal Irrigation Department under MOAC

The Royal Irrigation Department (RID) is a government agency under MOAC, allocating water to irrigation systems, ecosystems (forests during the dry season), industries and domestic use. RID supports water policies, which decide how much water is meant for ecosystems, domestic use, sector and agriculture. Thailand is divided in 25 river basins, which are governed by only two government agencies with regards to water management; the Royal Irrigation Department under MOAC and the Department of Water Resources (DWR) under the Ministry of Natural Resources and Environment. The Ministry of Natural Resources and Environment will be discussed below. RID builds reservoirs and maintains these according to the policies designed at governmental level. Purification of the water in these reservoirs is not needed, as it is water meant for irrigation. The water is collected during the monsoon and mainly in Central Thailand, as this area features most irrigation systems.

RID sometimes fails to deliver water properly to meet the needs of farmers and their intensive cultivation of rice in the Chao Phraya river basin (Facon & Ti 2001). Other major fundamental problems in the water management of Thailand; the lack of an official water allocation physical- and managerial network, a severe lack of policies about water rights and an inefficient allocation of funding among organizations. The government has initiated the adoption of Integrated Water Resource Management (IWRM) in an effort to raise participation and decentralize power. It has done so by dividing Thailand in 25 major river basins and more sub basins. The main basin is that of the Chao Phraya in Central Thailand around Bangkok (Uraiwong & Watanabe 2008).

The Ministry of Natural Resources and Environment and the Pollution Control Department (PCD)

The decades of economic development, Thailand has gone trough, since the Green Revolution have brought Thailand from being the resource-abundant country to one that is now resource-constrained. The pollution is caused by several environmental stresses and natural resource scarcity. In response to this change the Pollution Control Department (PCD) was founded in 1992 under the Ministry of Natural Resources and Environment. The mission of this department is to promote the health of Thailand's inhabitant, yet with respect and sustaining environmental resources.

This government department has already presented some concerns regarding the deterioration of water quality in Thailand. It has indicated that the main cause of water quality deterioration is wastewater from societies. This wastewater is a combination of industries, agriculture and domestic wastewater release, which is discharged without prior treatment. It has presented working papers focusing on campaigns to encourage the public to reduce its use of water and to treat the water before release. Most companies and buildings for housing now have installed some sort of water treatment system before it enters the sewage systems or is released in the ground. Natural runoff during agricultural practices remains a problem, as this is hard to tackle at its origin and exceeds the gravity of pollution by the other two sources by far. The interest of this department is therefore mainly promoting sustainable use of water and researching for solutions (Juisiri 2013).

State-enterprises

Thailand its water supply is under the management of several agencies; according to one of the 25 areas and population it serves. The services the urban areas and the surrounding provinces are serviced by Provincial Waterworks Authorities (PWAs). These are state enterprise under the Ministry of Interior and control and support the water supply. The interests of MWA and the PWAs are based on supplying clean and enough water after they purified the incoming water themselves(Poupong & Punlum 2013).

Private Sector

When discussing the private sector related to water in Thailand one quickly realized, most water bodies are actually government owned or financially supported. The one sector with a significant stake in water not controlled by the government is water-bottling plants. One must think of water, beer, soda, etc. Defining the major brands it comes down to a hand full; Singha brewery, Chang, Nestle, Coca Cola followed by smaller brands. Most of these bottling plants produce multiple alcoholic as well as non-alcoholic beverages and cover the biggest market share of Thai bottled drinks. Their interests vary from consistent inflow of water to purification standards meeting or exceeding the national drinking standards. Thailand drinks mainly bottled water as tab water still contains too much lead.

Farmers

Although private sector, for this research farmers are considered in a separate group as they hold a stake in both rice and water. It depends on their awareness of the consequences of bad agricultural practices for human- and environmental health, but when aware and able, farmers will contribute to preserving natural resources. Some farmers have received training through the ThaiGap mentioned in the chapter about MOAC and have indicated to now apply partially organic fertilizers. However, many farmers are not trained or simply do not have access to the resources bettering their practices and therefore the health of themselves and the environment. Most farmers rely on water for their agriculture and the quantity of it seems their main priority and not water quality (Ananvoranich 2012).

4.4 Sustainable Development Initiative: Sustainable Rice Platform

This paragraph follows upon the knowledge gained from previous chapters, which described the theoretical and regional frameworks of the rice-water nexus in Thailand. The rice-water nexus calls for more rice cultivation to feed the world and remain a top exporter while improving the management of Thai waters as these suffer from pollution through agro-chemicals.

This background is needed to come op with initiatives that pay attention to all agendas of stakeholders involved without compromising on the needs of future generations. Water has to be protected and used wisely, during the cultivation of rice, to better its quality. This difficult task requires different sustainability models and probably a lot of readjustment in the future to fine-tune the objectives and outcomes. The following paragraphs introduced one such possible initiative, which is specifically catering the complexity and variety of interests of the rice-water nexus in Thailand.

The initiative of Sustainable Rice Platform (SRP) originates from the United Nations Environment Program (UNEP), International Rice Research Institute (IRRI) and private sector representatives; such as Louis Dreyfus Commodities and Kellogg's Company. SRP was launched in November 2011 to promote resource efficiency, sustainable trade flows, and production and consumption alignment throughout the rice supply chain. SRP now holds members of the public sector, research institutions, civil society and the private sector and primarily focuses on rice production in Asia. In the first year of its program, SRP's objectives are to:

1. Develop a set of globally relevant principles and best practices (or a global standard) of sustainable rice production (both production and post-harvest practices);
2. Identify outreach models and incentive mechanisms promoting the adoption of the developed global standard and the sustainability targets (to be defined in year 2-3 of the program) by rice producers and participants in the whole rice value chain (UTZ Certified 2012).

4.4.1 Host Organization: UTZ Certified

UTZ Certified joined SRP in February 2012 and was founded ten years ago as a program and label wanting sustainable farming to become the norm rather than the exemption. It is an independent non-profit foundation with a program for coffee, cocoa and tea for which it designs and enables sustainable supply chains. It has internalized costs of production, low system costs and it is a scalable approach. As it focuses on the farmer as an entrepreneur it balances the standards of people, planet and profit with attention to productivity, quality, as well as efficiency of the farmer towards better farming. Core to UTZ' philosophy is that companies must make sustainability mainstream. UTZ built its programs around and in partnership with market leaders in the sector. These market leaders are part of the board, which creates a market driven approach. It features four different traceability models for depending on domestic or export markets. These four traceability models can be seen in Figure 5.

Market	Domestic			Export	
Traceability model	Subsistence	Small scale	High end	South-south bulk	OECD
Identity Preserved					✓
Segregation			✓		✓
Mass Balance			✓		✓
Book & Claim	✓*	✓	✓	✓	✓

Time

* Not a real market; different approach may be required, but potential benefit from B&C system

Figure 5: Applicability of different markets per traceability model (UTZ Certified 2012)

However physical traceability has the added value of pressing food safety and increased consumer marketing potential, it is challenging and expensive. A market incentive can also be achieved with more administrative solutions. The Book & Claim (B&C) model is the one easiest to achieve as it has low administration costs and does not require physical separation of the certified product from the conventional (similar to Mass Balance), and is therefore cheapest and least demanding. Physical traceability of the product cannot be ensured due to this mixing with conventional products. It must be said Segregation and Identity Preserved models have a much higher assurance if the origin and sustainable production of its content leading to the most desired goal of food safety and increased consumer marketing potential (UTZ Certified 2012). Figure 6 shows the forms of traceability and assurance for all four models.

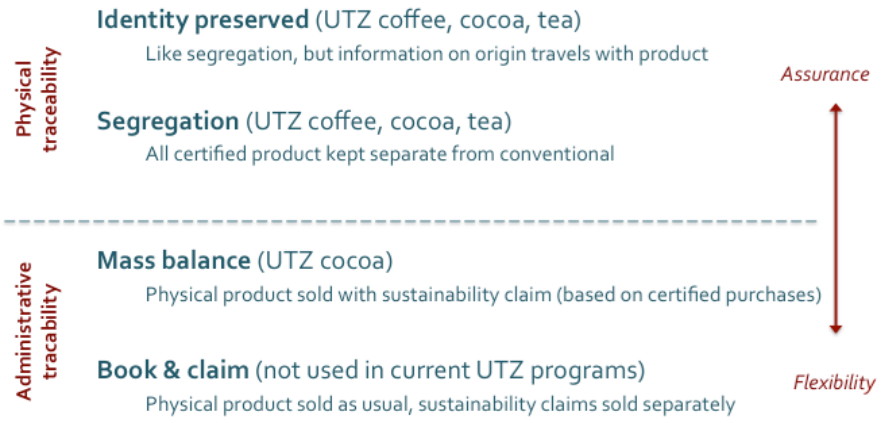

Figure 6: Traceability should support the scale up of better farming (UTZ Certified 2012)

4.4.2 The Different Characteristics of the Rice Market

In Figure 7 one can see the difference between premium markets and mainstream markets is shown.

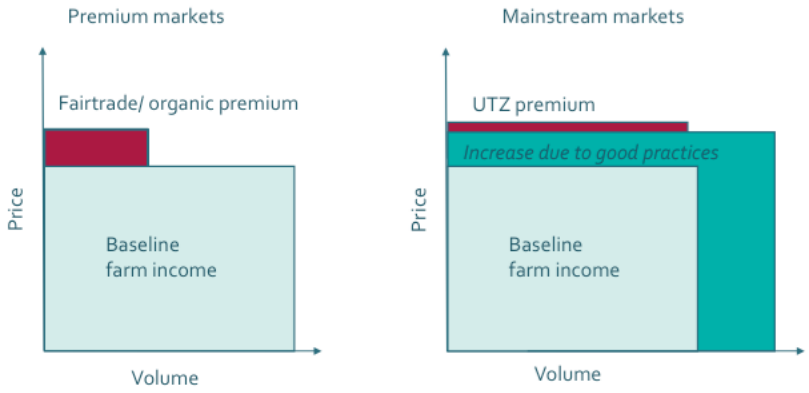

Figure 7: Producer income benefit

In premium market models, the incentive paid is the main driver for improvement of income. Whereas in the example of the mainstream markets; productivity, quality and efficiency are the main drivers of income improvement. In addition UTZ's experience stresses the need for market incentive mechanisms for farmers to actually adopt good agricultural practices (Beijen 2012). These incentives can be results of better farming, e.g. increased productivity, efficiency and higher prices for better quality or a market incentives, such as sustainability premiums (UTZ Certified 2012).

SRP has indicated that current Good Agricultural Practices (GAP), the government's voluntary sustainability program (discussed under 'defining the stakeholders in the previous paragraph), is not successfully implemented and therefore does not generate the desired increase of yield, quality and income for the farmers. The problem with GAP is, as with many other existing (voluntary) standards, that it lacks compatibility and leaves too much room for interpretation. 80% of existing standards are identical, leading to unnecessary administrative burdens for farmers causing them to drop out (Ananvoranich 2012). Farmers do not believe that a reduction of their current e.g. fertilizer use will benefit the yield and land in the long run. Farmers only see the reduction/gap of income in the years leading to the increase as no incentive to cover implementation or administration costs is offered instead. UTZ' experience is that a farmer needs a reward for good practice. A sustainability program (like UTZ) facilitates this (SRP 2012).

However, the current (UTZ) certification model needs to be tailored to the specific rice sector situation as now it caters to north-south commodity trade. But in the case of rice the northern 'Organization for Economic Cooperation and Development '(OECD) countries consume only 1.3% of global rice production:

1. The main rice markets are complex domestic and South-South trade markets with a low demand for sustainable products, whereas the current UTZ model operated with a western demand for sustainability and South-North trade. These factors challenge the potential to create momentum for improvement and the reach of minimum economies of scale in traceability to (northern) brands and retailers.
2. Also there has to be a consensus on e.g. a standard as rice is a strategic staple crop of extreme social and political importance. As rice is a lower value crop it needs higher volumes for a business case to cover assurance costs and government buy-in from the start. The western demand for sustainable production in agriculture cannot drive sustainability in the rice supply chain as the main market is domestic e.g. Asian and lacks the demand for sustainable products.

4.4.3 Payment for Ecosystem Services: The Book & Claim Model

Opportunities within the rice supply chain

A Book & Claim traceability - or credit trade - model is an administrative form of traceability. What can be assured to credit buyers is that a certain volume of the product is produced at a certified farm, but not necessarily the specific volume that they bought. Certification schemes as such can be seen as a form of Payments for Ecosystem Services as introduced in the 'literature review chapter'. Also through a B&C model Ecosystem Services (ES) providers are compensation by ES users. It focuses on restoring upstream ecosystems through the improvement of agricultural practices (WWF & CARE, 2011). In this research proposal the focus will be on 'watershed services', as the Book & Claim model will enable those in the same watershed, stakeholders outside the rice supply chain, to intervene/contribute to sustainable use of valuable resources in upstream (IUCN, 2006).

The physical certified product can be mixed with conventional products in the supply chain and cannot be traced as sustainably produced by the buyer of the product back to origin. The Book & Claim model is the model easiest to achieve as it has low administration costs and does not require physical separation of the certified product from the conventional and therefore is cheapest and least supply chain altering. As rice is a staple crop and politically sensitive, the characteristics of the traceability model mentioned above are key to success of any type of traceability or certification (UTZ Certified, 2012). The credit is also referred to as Guarantee of Origin. The point where credits are issued would normally be the unit of certification (or verification), for instance rice cooperative or mill, this is shown in Figure 8. It is also conceivable to issue credits to individual smallholder farmers, but this would be more challenging and experimental. After the credits are given, when sustainability requirements have been met, they can be traded to other market actor, who can transfer the 'claim' forward in the supply chain. The physical certified product can be mixed with conventional products in the supply chain and cannot be traced as sustainably produced by the buyer of the product back to origin.

Even though this creates less assurance than e.g. Segregation or Identity Preserved, it increases flexibility and supply chain actors are not required to invest in administration or keeping the conventional products separate from certified products in the supply chain. This makes this model a low cost and not labour intensive solution yet still supports sustainable production (UTZ Certified 2012).

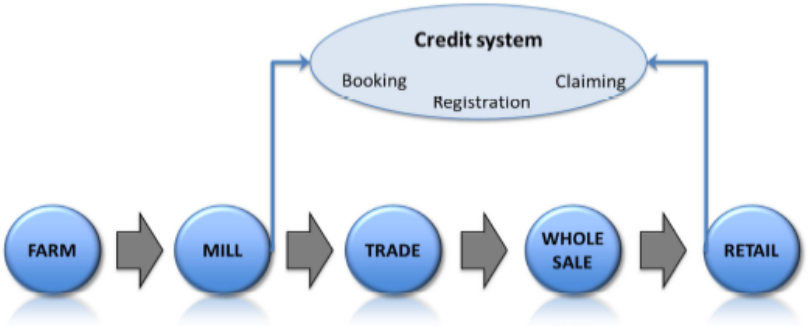

Figure 8: Book & Claim model (UTZ Certified 2012)

Opportunities outside the rice supply chain

What is important in the case of rice, which will also be explained in this paragraph, is that a buyer of the credit can be a stakeholder outside the supply chain of sustainable rice production. This creates an opportunity to intervene/contribute at watershed level as stakeholders outside the rice supply chain can also invest in the sustainable use of valuable resources, e.g. rice, land, forest and water within the watershed of this stakeholder. E.g. water purification plants can reduce the costs of purifying water, polluted by chemicals used for rice production, by investing in good agricultural practices that cause less pollution in the first place. This will reduce costs of cleaning and ensure sustainable use of the world's scarce resources; sources of income for all stakeholders.

Advantages of the B&C model:

- ✓ Reward sustainable production by (foreign) buyers.
- ✓ Make start investing and improving focused where most needed (rice/Asia).
- ✓ (Western) companies can support these apart from own sourcing.
- ✓ Short Return on Investment for farmers by selling 100% yield as sustainable (credits).
- ✓ All stakeholders can buy credits (supply chain actors, government, etc.)
- ✓ Watershed level investment as credits could contain origin data.
- ✓ Flexibility to grow into physical traceability with more assurance.

Disadvantages of the B&C model:

- Not an established basis for consumer labelling of food products.
- Food safety issues are not solved (Beijen 2012).

The fact that this model increases the potential pool of investors is due to the involvement of the entire watershed and the decoupling of the credit from the physical product. This is why stakeholders external to the rice value chain can buy credits. The situation of rice enables only this B&C traceability model, as it is less expensive and easiest achieved. Nonetheless, the B&C model must be based on a dependable independent third-party assurance body.

The implementation of the B&C model generally will be constituted around the following steps:

1. The farmer (group) receives training and technical assistance from local partner organizations e.g. IRRI, NGOs, to meet the pre-set requirements of the SRP.
2. An accredited third Certification Body audits the farm (group) and issues a certificate when all requirements are met e.g. UTZ Certified.
3. The audit results can be centrally registered to enable monitoring of audit quality and producer progress (UTZ Certified 2012).

Pilot

During the SRP meeting in Hanoi in September 2012 UTZ was invited to propose and lead a pilot to test the B&C model in Thailand, in strong collaboration with SRP. The goal of the pilot is to learn how the B&C model in rice could practically work and is planned to have its design and pilot phase start during 2013 and continues to operate up until 2015 (SRP 2012). UTZ has planned to start the pilot in Quarter (Q)1 and Q2 of 2013 with the organizational set up, the design of the project, conceptual models, research into the stakeholders, which standard to use (Phase 1). Phase 2 comprises the actual operational field test of the conceptual model (through implementation, training, trade and administration) and will be executed during Q3 and 4 of 2013 (SRP 2012).

It is in Phase 1 that this research is conducted in order to provide SRP and UTZ with advice and contribute to the scientific knowledge on awareness and preparedness of stakeholders to the rice -water nexus.

5. Research Questions and Methodology

This chapter will present the central question and hypotheses that have led to the central question. The sub-questions and conceptual model will break the central question down in order to show the storyline of interviews. The sub-questions are briefly explained on their importance to this research.

The second part of this chapter will elaborate upon the design and methodology that are used to research relevant issues of the rice water nexus in Thailand. The conceptual model and conceptualization paragraphs show how the extent of 'awareness and preparedness' of the research population in the research area is measured. This is followed by a description of the research methods, Validity and Reliability of Research, Justification of Research and how Limitations and Risk of Research is overcome.

5.1 Research Question, Hypotheses and Sub-questions

This chapter introduced the Research Question, hypothesizes and the sub-questions. The sub-questions will provide the answer to the main research question.

Thai water sector stakeholders are interviewed for this research to assess the perception of how clean water in Central Thailand is. The notion being that polluted water by agriculture is creating extra costs for these water sector stakeholders, who e.g. purify water for households, industries or agriculture. The cost of e.g. purification could be avoided or reduced if pollution (through agriculture) is avoided in the first place.
Avoiding pollution caused by agriculture could be achieved by giving incentives to farmers to use less pesticides/fertilizers supported by either public of private stakeholders. This brief line of thoughts introduced the research questions:

Research Question:

"Is the Thai water sector's awareness of and preparedness to improve sustainability in the rice-water nexus; and is this a sound basis for successful implementation of a Book & Claim incentive mechanism?

This research question leads to the following 3 hypotheses:

1. Hypothesis 1: Water sector stakeholders are suffering from reduced water quality due to agricultural practices used in rice cultivation.
2. Hypothesis 2: These water sector stakeholders, exterior to the rice supply chain, are interested in investing in the upstream sustainable production of rice and use of water.
3. Hypothesis 3: The Book & Claim model is the correct fit if the Thai water sector is to be involved in incentive mechanism towards sustainability in the rice-water nexus.

Sub-Questions

The sub-questions in Figure 9 are designed to touch upon all facets possibly giving an indication, and therefore determining the awareness and preparedness of the stakeholders interviewed as part of the water sector in Thailand. Below Figure 9 the sub-questions are briefly discusses to indicate why this is important to the research and what factors influence the answer the question. This leads up to the conceptual model in paragraph 5.2.

Figure 9: Sub-Questions to the Research Question

1. *Who are the Rice-Water Nexus Stakeholders in Thailand?*

The answer to this question will map how the power relations in the rice-water nexus are and who is in charge of what part of the water management in Thailand. This will also indicate which organisation is important to study for this research.

2. *Are there real problems of incoming water quality?*

This questions aims at finding out the actual perceived water quality problems at the end of the Thai water sector. It checks if they suffer from water pollution or not at all and what type of pollution they suffer from.

3. *What is the main source/type of pollution according to them?*

This question is answered by the perceived cause of pollution, which is can be e.g. livestock, industries, agriculture, etc. This will determine, when agriculture is the (perceived) cause whether or not the stakeholder will eventually be prepared to invest in sustainability practices at the source of pollution.

4. What are their current initiatives to improve this?

*The answer tot his question depends on e*xisting initiatives (e.g. certification schemes) improving rice agriculture and a stakeholders own initiatives. Faith in fruitful collaboration with external bodies, towards sustainability also influences this, as most initiatives are implemented by multiple stakeholders.

5. Are their costs influenced by pollution form agriculture, compared to 10 years ago?

The answer to this is influenced by at first the acknowledgement of the cause of increased pollution costs, which for example could be due to rice cultivation. Then the answer will be influenced by the cost of adaptive measures vs. current water purification costs.

6. What could be done (by others) to change this?

The general feeling of responsibility towards securing/improving natural water quality affected by rice cultivation decides on whether or not a stakeholder will try to change ecosystem services. Faith in fruitful collaboration with external bodies, towards sustainability also influences this. If this stakeholder feels it is e.g. the government's responsibility, preparedness to contribute will be low.

7. What is their motivation for change?

The motivation of a stakeholder to invest can be due to lower cost of adaptive measures in comparison to current water purification. Another motivation could be CSR or an attempt to ensure future resources.

8. Who should implement this change and under what conditions is collaboration an option?

If a stakeholder has a 'feeling of responsibility towards securing/improving natural water quality' he will show ownership and initiative. Faith in fruitful collaboration with external bodies, towards sustainability also influences this. Perceived magnitude of control over water quality will be the final deciding factor for one to start initiatives.

5.2 Conceptual Model and Conceptualization of 'Awareness' and 'Preparedness'

The conceptual model aims at indicating what influences ones awareness and/preparedness in order to conceptualize these two notions. This conceptualization, on the next page, is needed in order to be able to make these two notions operational, to measure based on research outcomes 'what the extent of ones awareness and/or preparedness is'.

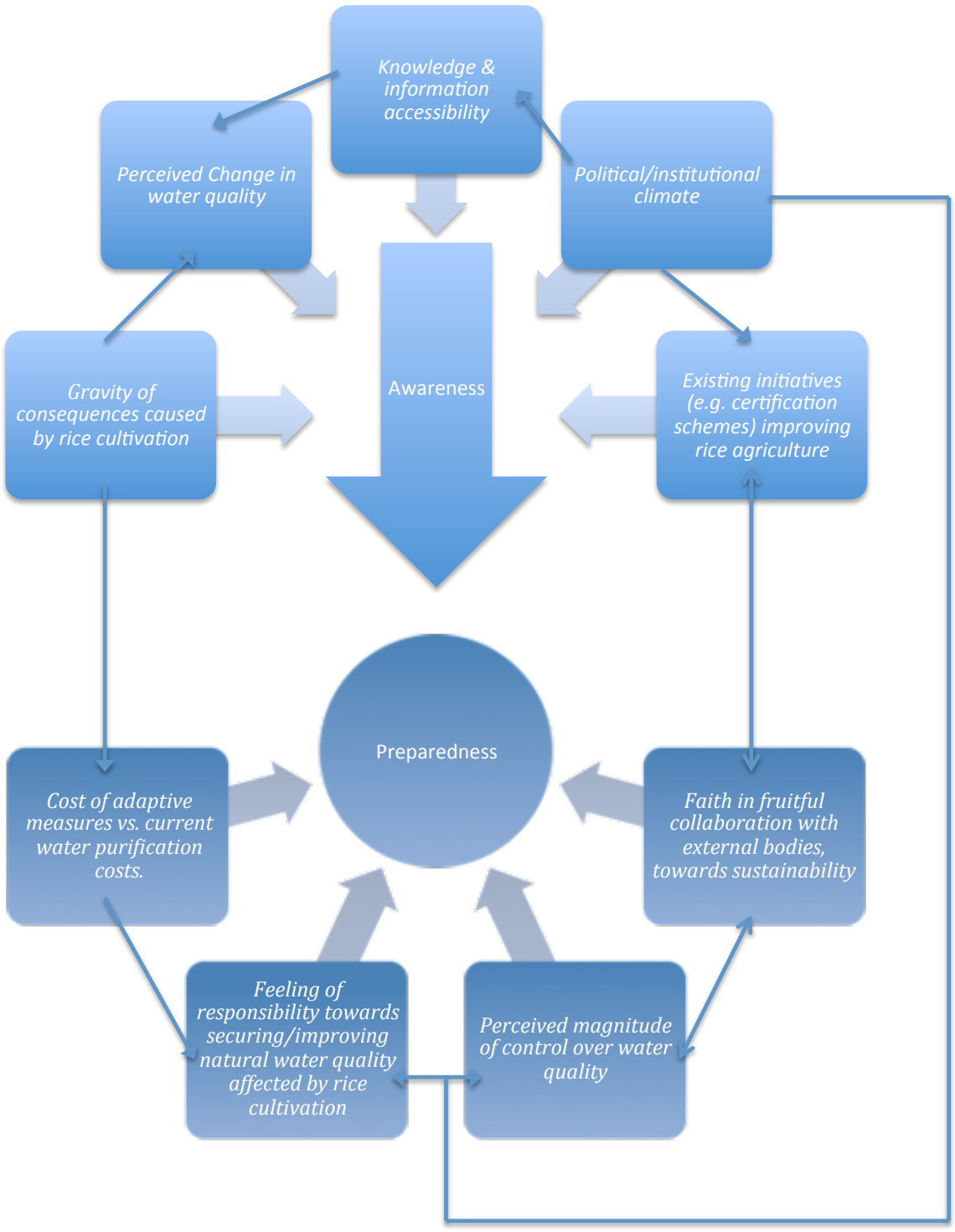

Figure 10 : Conceptual Model, the factors affecting the awareness and preparedness of water sector stakeholders.

The conceptual model in Figure 10 shows factors derived from the sub-questions and covers those issues that, prior to the interviews, were known to hypothetically influence 'awareness and/or preparedness'. These factors are interrelated and influencing each other too. Arrows indicate all relations and the most important ones to this research, those affecting 'awareness and preparedness', are the bolder ones. One can see that those factors influencing 'awareness' do not automatically also affect 'preparedness'. This needs additional factors and only comes when awareness is there.

Conceptualization of 'Awareness' and 'Preparedness'

This research aims at mapping the perception of the Thai rice-water nexus by looking at the awareness and preparedness of the stakeholders. Therefore 'awareness' and 'preparedness' are conceptualized in line with the conceptual model. During the discussion of the interview outcomes in chapter 6 attentions is paid to the presence of the conceptualized notions to determine the extent of awareness and preparedness of the stakeholder interviewed. The following notions contributing to one's awareness and preparedness' are based on the conceptual model, yet altered in order to be able to 'measure' their presence or absence in stakeholders' interview answers.

Awareness:

1. Perceived decrease in water quality
2. Belief there is a causal relation between water pollution and chemicals used during rice cultivation and that the gravity of consequences is substantial.
3. Research initiatives to verify this causal relation and increase the knowledge base
4. Knowledge about what should be done to reduce water pollution.

Preparedness:

5. When purification costs have risen and will continue to do so
6. Feeling of responsibility towards securing/improving natural water quality affects by rice cultivation.
7. Perceived magnitude of control creates a sense of ownership.
8. Initiatives and willingness to collaborate with external public- or private sector organisations towards sustainability.

Chapter 7 will discuss the findings in chapter 6 by reviewing them in light of the theory and literature and the conceptualization of 'awareness and preparedness'. 'Scoring' of the notions 1-8 mentioned above does this. The presence of one of these is specified by e.g. [Awareness 3], whereas the indicated absence is specified with 'Awareness -3]. Chapter 6.3 summarizes all scores and gives one point for each notion present and deducts one point for each notion absent. This will lead to a total score (the average of the scores based on the research population's interviews and the control group's interviews) indicating a water sector stakeholder's relative extent of awareness or preparedness. This can vary from -4 till 4. If the score is '0', this means a relative zero as this stakeholder in this case has scored as many present notions as well as absent notions, therefor all scores are relative.

This qualitative nature of measuring is to indicate their awareness of the issues in the rice-water nexus and their preparedness to contribute to sustainability within, based on the conceptualized notions indicated above. It will lead to relative scores and an overview of the difference among stakeholders and of awareness vs. preparedness.

5.3 Research Population and Research Area

Research Population

The research population of this research exists out of water sector stakeholders to the Thai rice-water nexus. As mentioned in chapter 4.3 the term 'stakeholders' is used when referring to bodies with a stake in promoting sustainability in agricultural practices. This could be a stakeholder working with water, currently not represent a role in the rice supply chain: e.g. water bottling- or purification plants.

The Thai water sector stakeholders who are representing the research population are found through purposive selection via the snowball effect. In case of this research, the researcher started with 3 existing contacts received from the UTZ Certified and Sustainable Rice Platform network, through which new stakeholders were defined and addressed. This proved a very successful technique as it quickly brought the researcher in touch with many professional officials in Central Thailand. It proved even more official due to the fact that one can get access to stakeholders much quicker and more effective via existing contact than via other means. Personal of professional relations deemed vital in order to be able to do any successful research in Thailand.

At first the research population had to be addressed via connections of UTZ Certified, GIZ Bangkok and the Thai Rice Department. They introduced me to their staff members and suggested the conference of the United Nations Forum on Voluntary Sustainability Standards (UNFVSS) in order to become more familiar with the Thai agro-commodity chain and increase my network locally. Although UTZ Certified is the host organisation, with the headquarters in Amsterdam, a workplace was offered at GIZ Bangkok, which helped to quickly get to know Thai staff and other professionals. The Rice Department has also forwarded me to several private sector companies, which appeared very reluctant to discussing the rice-water nexus due to its importance and sensitivity. Some connections were found via friends that the researcher had met or knew before arrival in Thailand.

The desk study executed before leaving to Thailand had already mapped as many water sector stakeholders, such as government departments, state enterprises, the private sector and farmers. Though the purposive selection method all these stakeholders were at least contacted in the hope to eventually also interview them.
In total 11 interviews were conducted with the research population. The stakeholders have proven very difficult too reach; yet the 11 reached, are fair representations of the water sector stakeholder to the rice-water sector in Thailand. For detailed information about the research population, please see Figure 12 in Chapter 6.

Control Group

In order to increase the knowledge base derived from interviews, the researcher decided to use secondary source information about the water sector stakeholders. Therefore a 'Control Group' has been set up, with expertise in the rice-water nexus, a professional background in Thailand and stake in the discussion about the rice-water nexus. This Control Group not only validates the answers given by the research population, but also increases the information base by adding their expertise covering the subject of the research population's awareness or preparedness. This Control Group is found via the same purposive sampling with snowball effect as the research population. It is comprised of 13 professionals belonging to International Organisations, Universities and independent researchers. For detailed information about the control group, please see Figure 13 in Chapter 6.

Research Area

As discussed in chapter 4.1; Thailand features the most farms in Central Thailand, as this river basin is the most developed irrigation system. This river basin is called Chao Phraya River and the “rice bowl” of Thailand. Central Thailand is responsible for 50% of national rice production, while it covers only 20% of land. This high intensity of cultivation is reached through irrigation systems, a high level of mechanization and a ample application of agro-chemicals.

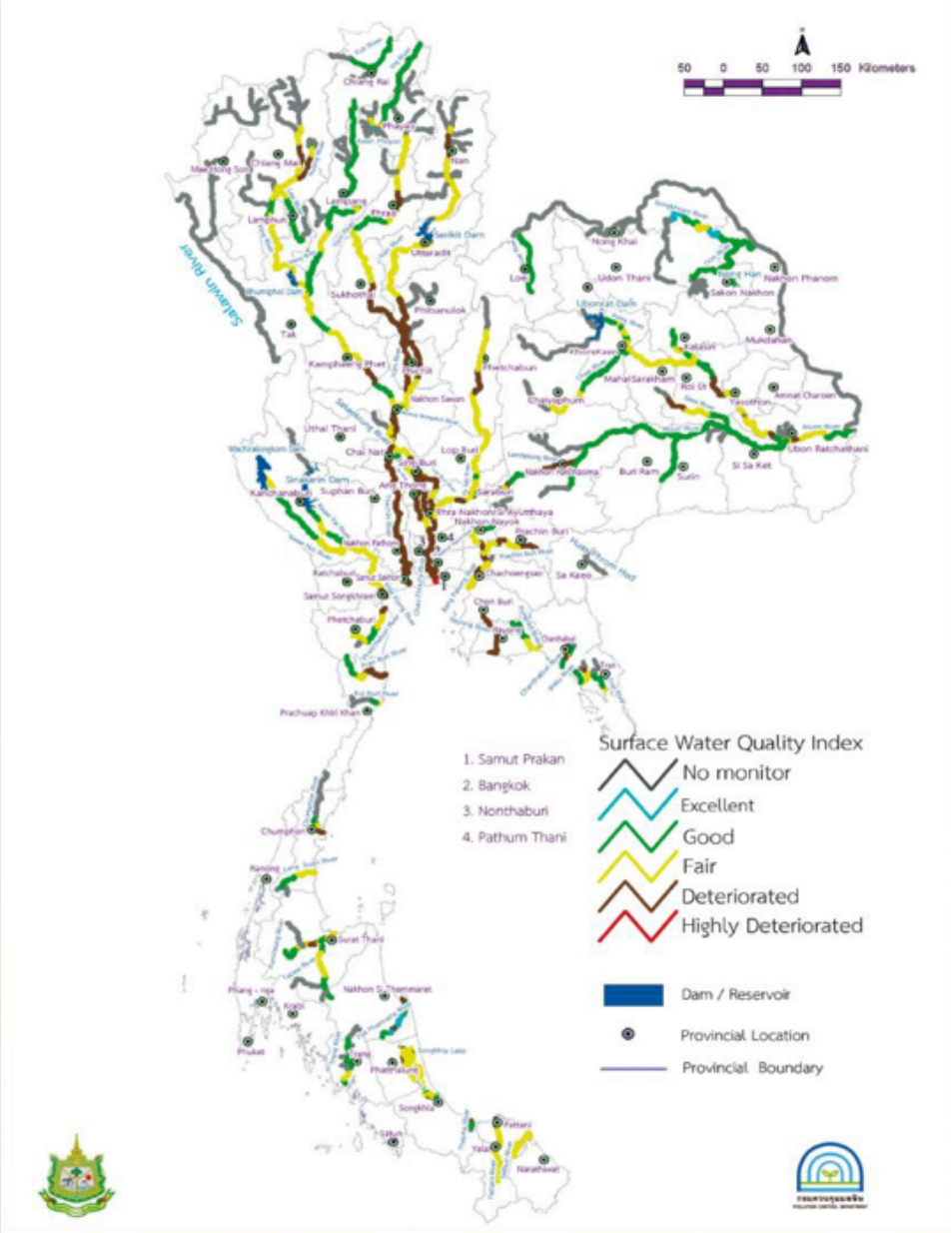

Figure 11: Research Area and Surface Water Quality Index (Juisiri 2013)

Figure 11 shows that Central Thailand, mainly the area around Bangkok with the brown lines, experiences a ‘deteriorated-highly deteriorated’ surface water quality index. As discussed before, also the ground water in Central Thailand is polluted through among others agriculture. Due to the combination of intense rice cultivation and the severity of water pollution, this area is chosen as research area.

5.4 Research Methods

In this chapter the researcher indicates what research methods and techniques are used in order to answer the questions of the research and add to the knowledge on the Thai rice-water nexus. The research is a qualitative study based on conference attending, work discussions, desk research but most on interviews. This qualitative research method will be discussed in the following part.

As Desai & Potter describe in 'Doing `development Research', there are over five different types of research:

- Explorative research: Fact-finding: Describing 'reality'. Collecting empirical information.
- Explanatory research: Exploring relationships /Searching for causalities and testing assumptions (hypothesis-driven).
- Perception research. Understanding reality as a 'construction'): local perceptions/ opinions.
- Evaluation research and/or impact studies (focusing on particular interventions)
- Participatory research/ action research (e.g., giving a voice to the voiceless)(Desai & Potter, 2006).

This research is one of an explorative nature, as it will be the first research executed related to rice in Thailand for UTZ Certified assessing the potential of the Book & Claim model. Although the model is ready as a framework it calls for explorative research to determine the extent expected collaboration from the Thai water sector and the likability of successful implementation.

Interviews

The interviewees are selected according to purposive sampling, e.g. snowball or convenience selection, as I am depending on the network of the three contact organizations available at start (Desai & Potter, 2006).
There are three different kind or interviews;

- Structured interviews follow a pre-determined list of questions, which are often standardized for all interviews.
- Semi- structured interviews follow a sort of interview schedule with suggested themes, but there is flexibility for the interviewees to develop their responses.
- Unstructured interviews provide the interviewees with the opportunity to take the discussion in whichever direction they choose. Such interviews are often more 'conversational' in that they are not directed by the interviewer and may cover topics which are completely unexpected (Desai & Potter, 2006).

By using semi-structured interviews the researcher can ensure coverage of topics belonging to research questions, via a topic list, yet the interviewer can also give the interviewees the freedom to bring up their own concepts and considerations. It if for the above reasons that a semi-structured interview research method is most suitable and preferable. This was the starting point for each first interview with a new stakeholder. However, as meetings became more frequent also unstructured interviews proved successful in the search for valuable information. After each conversation (or during) the researcher made notes and processed these into stories afterwards.

A total of 24 official interviews were conducted of a semi-structured nature. Furthermore unstructured interview notes were used for the conversations with those who I met to discuss the research more than once. This occurred with UTZ Certified, UNEP, GIZ, FAO and the Thai Rice Department. The knowledge derived from this are added to the interview findings with the corresponding person as a reference.

All interviews were transcribed on the same day of the interview and sent to the interviewee for review. It is with their consent that quotes are used throughout this research.

5.5 Validity and Justification of Research

Validity of Research

Even though this research is well prepared, thought trough, well guided and of exploratory nature it is important to bring to the attention that it is hard to influence and lead all external factors towards absolute validity of this qualitative research. An example is the cooperation of stakeholders in such a way that they are open to discussing the issues of the rice-water nexus and trust I will use their interviews only in a scientific way. The topics of rice and water are politically, economically, socially and environmentally sensitive topics and it is very possible that not all belonging to the research group are willing to express their perceptions in this regard. This research is supportive and relevant to the rice-water knowledge and other studies related to this. However due to external factors, such as those mentioned above, and the small-scaled scale of this research thee research outcomes should not be completely generalized.

Despite the fact this is a qualitative research and relatively seen of small-scaled nature, the researcher aimed at full validity and finds this research to be contributive to the host organization UTZ Certified (and SRP) and to the general scientific knowledge about the rice-water nexus, Thai agro-commodity chains and sustainability of the world's scarce natural resources.

The researcher's coordinator at UTZ Certified, Gieljan Beijen checked my trajectory in the field and contributed significantly with his knowledge and perceptions on problems encountered or questions the researcher had during the field research as well as during the writing period.
Guus van Westen, the researcher's University of Utrecht supervisor also contributed significantly with his support and advice on research desk study content, data collection, research population approaches, data analysis and the report writing.
Last, as mentioned before, the interviewees themselves validated the information in interviews conducted with them.

Justification of Research

This research is innovative as the possibility of a specific incentive mechanism in this political, social and environmental day and age of Thailand has not been researched before. Also it is a research aiming at contributing to the platform of SRP and UTZ Certified, as it provides more knowledge prior to their pilot proposal. As it is a research prior to any such certification it is of exploratory nature and therefore interesting and valuable in this context. This research ill also support the more general knowledge about certification models and agro-commodity chains in a food-energy-water nexus, which becomes more important on a daily base.
In addition this research is justified as part of the master international development studies curriculum and aims at fulfilling the curriculum in order to graduate.

5.7 Overcoming Limitations and Risk of Research

During the start-up phase of the research, once arrived in Thailand, it appeared difficult to get in touch with the research population. Even though I received excellent assistance from the host organisation in Amsterdam, UTZ Certified and in Bangkok, GIZ and the Thai Rice Department companies were reluctant to accept my interview request.
It became a time consuming process to get in touch with private sector companies and related ministries. Many stakeholders did respond to my request, but with initial hesitation and a request for a supporting ministerial letter confirming my objectives. This was no problem as one of my local hosts was the rice department, which is part of the Ministry of Agriculture and Cooperatives. After this, some stakeholders opened up and the 'snowball began rolling'.

In addition, there was a cross-cultural difference, which needed special thoughtfulness during interviews. Thailand has a more polite and official way of conversing than Dutch businesses culture often upholds. In addition there sometimes was a language barrier. Sometimes very long answers were given, but the translation to English was very short. Even though it is understandable that some information alters slightly, it was hard to avoid as most stakeholders assigned a interpreter themselves. This interpreter often was someone belonging to the company. The interviews with farmers groups were executed with assistance from the government officials from the Rice Department and were experienced by the researcher as more reliably interpreted.

Moreover, as during my research some articles were published in newspapers about rice and the potential of chemical contents as well as rice gone missing under the pledging scheme, the rice-water nexus topic became even more sensitive. Many people and organizations chose their words careful, as it all became a political matter. Often interviewees wanted to be sure I was a student, whereas others preferred the fact of me being a representative for UTZ Certified. I tried to estimate beforehand which 'role' was most suitable. I also ways told everyone contacted I was both, but changed the approach to the role most appropriate.

In addition, with regards to the outcomes of this research, hypotheses are formulated and used to draw a conclusion answering the main research question. However, as this research is built up from qualitative data, validation and invalidation of the hypotheses are relative and built upon the conceptualization in this chapter.

6. Outcomes of Interviews Research Population & Control Group

This chapter showcases the outcomes of the interviews with stakeholders and professionals who belong to- or are experts in the rice-water nexus in Thailand. A total of 24 interviews has been conducted and are transformed into six paragraphs, which each represent a different organization within the Thai water sector. The interviews with the Thai water sector stakeholders aim at envisaging their perceptions of the rice-water nexus in Thailand, upon which the extent of awareness of the rice-water nexus and preparedness to contribute to sustainable improvement will be based. The following stakeholders give a representation of the Thai Water Sector and belong to the research population: (1) Ministry of Agriculture and Cooperatives (MOAC) & Thai Rice Department, (2) Royal Irrigation Department (RID) under MOAC, (3) Ministry of Natural Resources and Environment & (Water) Pollution Control Department (PCD), (4) Provincial Waterworks Authority (PWA), (5) Singha Beverages (Private Sector) and (6) Farmer Organizations. The research population is divided in (1) Policy Level Stakeholders and (2) Operational Level Stakeholders. The government departments belong to Policy Level Stakeholders as they design policies to manage and regulate water related issues. Operational Level Stakeholders exists out of those organisations adhering to the policies and working with water more direct and comprise of the state-enterprise and Private sector (including farmer organisations).

A network of connections deemed very necessary in order for the stakeholder to be willing to receive the interviewer for an interview. In order to give a relatively complete and fair representation of the Thai water sector, stakeholders at all levels were interviewed; Government departments, state-enterprise, private sector and the rice farmers.

Type	Organization interviewed	Interviewee Position
Government	Ministry of Agriculture and Cooperatives (MOAC) & Thai Rice Department	1. Senior Agricultural Specialist on Food Safety Programme 2. Rice Production Promotion Expert.
Government	Royal Irrigation Department (RID) under MOAC	1. Ecological Economic Specialist 2. Director of the Office of Project Management 3. Director of Water Management and Hydrology Division
Government	Ministry of Natural Resources and Environment & (Water) Pollution Control Department (PCD)	*(Based on indirectly retrieved information)*
State-Enterprise	Provincial Waterworks Authority (PWA)	1. Director of Planning Division 2. Engineer Construction Division
Private Sector	Singha Beverages (Water bottling focus)	1. Executive Vice President and Director
Private Sector	Farmer Organizations	1. Farmer Group trained on GAP 2. Farmer Group not trained on GAP

Figure 12: Research Population: Thai Water Sector Stakeholders

Figure 12 shows which organizations and professions were interviewed as part of the Thai water sector and therefore represent the research population. However, the research population's answers are most likely slightly coloured by the agenda of the organizations they work for and the consciousness of the interviewees about the importance of the subject; the rice-water nexus in Thailand. Therefore the extent of their awareness and preparedness is also based upon interviews with several international organization and academics that work in Thailand and have rice-water related professional backgrounds. These international organisations and academics represent the control group of the research population and can be viewed in the table below.
The control group's findings are more objective than those of the interviews belonging to the research population, as they are less steered by commercial goals or governmental policies. Their expertise is valuable to this research to cover all aspects of the rice-water nexus in Thailand and approach it from all angles possible. Academics contribute to the rice-water in Thailand nexus by increasing the knowledge base with their research.

They operate as individuals with the goal of providing objective research outcomes. Although international organizations hold similar interests, they often exist out of collaborations between multiple stakeholders, which could also hold governments. Contributing to the sector via a platform for knowledge sharing, representing interests and lobbying for change is an international organization's key goal. Figure 13 shows the organizations and professionals that were interviewed for thorough embedding of findings.

Type	Organization interviewed	Interviewee Position
International Organisation	Food and Agriculture Organization (FAO), part of the United Nations (UN)	1. Senior Water Expert 2. Bioenergy Officer & Climate Change Coordinator, Natural Resources & Environment Group 3. Promotion of Rural Development through Development of Geographical Indications at Regional Level in Asia 4. Livestock Specialist 5. Agriculture Officer (Value Chains, Rural Finance and Marketing)
International Organisation	German Society for International Cooperation (GIZ)	1. Project Director ASEAN Sustainable Agrifood Systems. 2. Program Director of the nexus project (water/food/energy)
International Organisation	United Nations Forum on Voluntary Sustainability Standards (UNFVSS)	1. Representatives of different sectors.
International Organisation	Embassy of the Netherlands, Bangkok	1. Agricultural Counselor at the Office of Economic Affairs, Agriculture & Innovation 2. Assistant to the Agricultural Counselor
University	Asian Institute of Technology (AIT)	Assistant Professor Agricultural and Natural Resource Economics
University	Chiang Mai University	Senior Advisor and Value Chain Specialist
Independent Consultant	Researcher rice in Thailand	Consultant and Doctor of Philosophy

Figure 13: Control Group: International Organizations and Academic

This chapter keynotes the interview outcomes of the interviews with the Thai water sector, academics and international organizations. Their expertise is combined, with sometimes a statement highlighted in grey to get a more lively understanding of the topics discussed. Note that all information in the following six paragraphs represents the interviews and does not represent the opinion or knowledge of the interviewer. Attention is paid to the conceptualized notions introduced in chapter 5, stating the conceptual model and conceptualization of 'awareness' and 'preparedness' (repeated in Figure 14), in order to determine the extent of each. They will be repeated in the following paragraphs by stating their numbers [Awareness 1] till [Preparedness 8] to refer to the specific conceptualized notion as can be seen in the table below.

[Awareness] conceptualized.	**[Preparedness] conceptualized.**
1. Perceived decrease in water quality 2. Causality perception between water pollution and chemicals used during rice cultivation and that the gravity of consequences is substantial. 3. Research initiatives in causal relations and increasing the knowledge base. 4. Knowledge about what should be done to reduce water pollution.	5. When purification costs have risen and will continue to do so. 6. Feeling of responsibility towards securing/improving natural water quality affected by rice cultivation. 7. Perceived magnitude of control creates a sense of ownership. 8. Initiatives and willingness to collaborate with external public- or private sector.

Figure 14: Conceptualization of 'awareness' and 'preparedness'

6.1 Policy Level Stakeholders

6.1.1 Ministry of Agriculture and Cooperatives (MOAC) & the Rice Department

This department was helpful to this research, as it has collaborated from the start by offering their network, knowledge and assistance at any time. The rice department is a part of the Sustainable Rice Platform and provided some guidance during the start of this research, which clarifies its dedication. It is a department keen to work towards solutions and collaboration with international public- and private sector organisations.

This institute influences the use of water, through agriculture, on a policy level. It is considered a major player in the Thai water sector, even though officially handling agricultural (rice) and not water. Interviews were conducted with several professionals belonging to this department. During interviews with these professionals, the emphasis was placed their perception of the rice-water nexus in Thailand, current initiatives, and possible solutions. The Senior Agricultural Scientist working at the rice department states the following about actual water quality problems originating from agriculture:

> *"My belief is that the water coming from (rice) farms is deteriorated. However, the Thai Ministry of Agriculture and Cooperatives (MOAC) has not research the actual effects on one entire watershed. External reports do claim this effect to be significant, but MOAC needs and will conduct its own research project to come up with site-specific solutions" (Viriyangkura, 2013).*

As introduced in the chapter 'defining the stakeholder', the (MOAC) and the Rice Department currently train farmers 'Good Agricultural Practices' (GAP) to promote better quality of farming and agricultural products and to help them achieve optimum yield and maximum benefit. Most farmers don't know in what type of soil they cultivate and what kind of agricultural practices lead to optimum results. This is aimed for by offering them tools to decrease costs and increase yield while using appropriate dosses of chemicals through site-specific recommendations. These recommendations encourage reducing chemical fertilizer and pesticides among farmers and simultaneously reduce water and ground pollution and pre-harvest costs. As Thailand imports all fertilizers they end up being quite expensive for farmers. The department communicates to farmers about the management of fertilizers and increases awareness about the effect of farming on the natural resources and health **[Awareness 2].**

The MOAC's rice department trains farmers on GAP, site-specific recommendations and is actively involved in the realization of SRP's objectives **[Preparedness 8]**. During GAP trainings, MOAC is actively promoting the fact that water coming from farms is polluted and that Thailand is suffering from worsening water quality. It believes and has experienced that this decrease in quality is for a big part due to the over-application of chemical fertilizers and pesticides **[Awareness 1]**. It therefore tries to increase the knowledge about this causality among the farmers.

MOAC's rice department actively implements Good Agricultural Practices to improve rice-farming practices and improve environmental- and human health. At this moment the department experiences a relatively low adoption rate of the GAP as farmers find the administrative tasks, such as registering their fertilizer use and yields, too much work and often believe that by reducing chemical fertilizers yield will also be reduced. For years private sector companies have excessively promoted chemical application to increase yield, advertisement with no restrictions from the government. MOAC now emphasized that yield will not go down (significantly) and that using a mixture of chemical and natural fertilizer already achieves better yield and profit.

MOAC indicated that its budget is not very big and therefor only a few agricultural extension officers execute GAP trainings and research initiatives are few **[Awareness -3]**. In addition it remains a voluntary standard, which gives the farmers a lot of freedom to join and quit. Some farmers, interviewed for this research, confirmed the problem about the administrative burden, which can be read in the last paragraph of this

chapter. MOAC has found out that many farmers adopt the practices and knowledge gained from the GAP trainings, yet leave out the administration. This way the farmers do benefit from more efficient and effective practices and higher yield, but are not 'GAP trained farmer' certified. When selling the rice via the government pledging scheme a higher income is generated anyway (Farmer Group GAP trained 2013). A market for 'better produced products' is not viable at this moment due to the government's pledging scheme **[Awareness 4].**

In addition to former info, a Rice Production Promotion Expert working at MOAC emphasized the following about the domestic market's sustainability awareness:

> *"The Thai consumer market pays attention to quality of a commodity in terms of type/variety and origin and not so much its production method"* (Soitong 2013).

The sustainability awareness increases in the domestic market and the rice supply chain should increase before the next step in certification after GAP is taken. This can be on pack labelling of sustainably produced products as a market incentive. MOAC emphasizes the need to mix sustainably produced rice with conventional rice in order to keep costs throughout the supply chain low and collaboration throughout the value chain high. This issue has been touched upon before under the characteristics of the Book & Claim model in Chapter 4. As MOAC is very aware of the long way ahead, it sees the current GAP training a steppingstone in this process to increase awareness, built a relation with farmers, collect experience and reduce chemicals. More demanding (market) incentive schemes can be implemented when the domestic sector and these potential financial incentive models are more aligned **[Preparedness 6] [Preparedness 7]**. MOAC has indicated this is why it is active in more platforms such as SRP.

Control Group supporting interview information

Based on the interviews at MOAC and the Rice Department, this part of the government is motivated to contribute with initiatives, research and collaboration. Working towards sustainable agricultural products also fits into the goal of the Thai government to make Thailand the 'kitchen of the world'. However, multiple academics interviewed for this research have indicated this is, with the current safety standards of the Thai food sector, a farfetched goal. If the government wants to boost export, its first responsibility is to improve the food safety of products meant for export- and domestic markets (Ananvoranich 2013)(Jourdain 2013). As currently the complete lack of standards in the domestic market also hinders the knowledge, expertise and awareness about sustainability in the agricultural sector meant for export. Therefore the opinion of academics about the Thai government, specifically the Ministry of Agriculture and Cooperatives, does confirm the awareness to be present **[Awareness 2],** but preparedness to be too little **[Preparedness -6] [Preparedness -7]**.

Conclusion

MOAC and the rice department have concluded water quality in Thailand to decrease. It also trains Thailand's farmers that this is partially due to the application of agro-chemicals during rice cultivation and supports and promotes the causality of the rice-water nexus in Thailand. However, this government department has little budget and mandate to increase awareness among farmers further, let alone to execute throughout research into the magnitude and solutions of this problem. Therefore it continues with GAP trainings and SRP participation as a steppingstone towards more impact and scope in the future when the domestic market and supply chains are also more aware and prepared to use knowledge and network MOAC has gained in the mean time. However the control group is critical about the government's efforts and preparedness to actually impact when possible. This group finds the complete lack of agricultural commodity standards for the domestic market a sign of ignorance and the goals of improvement a farfetched goal with current efforts are so small-scaled.

6.1.2 Royal Irrigation Department under MOAC (2)

This organisation was, together with the Rice Department in the previous part, the most open and collaborative in the discussion about the Thai Rice-water nexus for this research. They have been assertive during interviews, helpful in providing further leads and had a more knowledgeable manifestation than many others interviewed. At the Royal Irrigation Department, which is part of the Ministry of Agriculture and Cooperatives, interviews were conducted with an Ecological Economic Specialist, a Director of the Office of Project Management and a Director of Water Management Division at the Office of Water Management and Hydrology.

The following working paper published by RID shares the notion of Thai waters being polluted as a result of rice cultivation:

"Water Pollution Caused by Rice Farming in Thailand" (Royal Irrigation Department 2007).

This article describes that water pollution from paddy fields, which is 30% of total agricultural area, is a substantial problem **[Awareness 1]**. The government has introduced some initiatives as mentioned in the previous chapter, but due to the implementation of the rice-pledging scheme farmers are only incentivized to push yields; realized by increasing the amount of chemicals.

RID motivates farmers to reduce their total number of harvest per year from 3 to 2. It does so to break the cycle of constant rice production, which has a causal relationship with pests' outbreaks (continues rice cultivation is continues nutrition for pests) and is responsible for the reduced fertility of its soils. Soil needs time to recover its fertility after a harvest, before new rice seeds are planted to grow, which is the usual occurrence. Also when the soils rest and no rice is grown for a short period of time, pests have cannot feed themselves and will reduce in outbreaks. When the number of pests outbreaks can be reduced this way, chemical combat methods can be diminished naturally. RID provides the farmers with sufficient water for only 2 harvests through its irrigation systems. This is a push-strategy, as farmers have no choice but to adapt to the water availability. RID does communicated in advance to farmers when they will receive water, which is done via a cropping calendar. MOAC's Department of Agricultural Extension (DoAE) simultaneously provides knowledge to the farmers to use more natural chemicals **[Awareness 2].**

In case an area is effected by pollution RID finds it is this the DoAE responsibility to step up to reduce this pollution as this is the institute transferring better knowledge and technology, based on research outcomes, to farmers. However RID aims at contributing to de governments efforts by e.g. offering a cropping calendar and by being active in debates to improve water quality in irrigation systems **[Preparedness 6]** (Prajamwong 2013).

The Director of the Office of Project Management Royal Irrigation Department, after asking about his interpretation of change in water quality, indicated that Central Thailand suffers from pollution more than Northern Thailand where agriculture is smaller scaled, rain-fed and for subsistent purposes:

> *"Water pollution in irrigation areas is higher than in rain fed areas, yet in the rain season the water quality recovers itself as the water is naturally replaced by rain. Water in the dry season is more polluted" (Prajamwong 2013).*

Yet this Director also thinks industries and its factories to be bigger water polluters than agriculture, yet agriculture is responsible for a significant part. However, the Director Irrigated Water Management Division, Office of Water Management and Hydrology of Royal Irrigation Department when asked the same question answers all irrigated water to be all right and not polluted as he states:

> *"Thailand has no polluted natural resources as most water comes from rain or upstream sources where only a small amount of chemicals is used for cultivation. Even if there is a reduced water quality, after irrigation the water will be used again downstream in other irrigations systems" (Prakunhungsit 2013).*

As one can see, both quotes above show different opinions about the origin and magnitude of water pollution. RID has planned its own research in 2014, to measure if the quality of water has changed, what has changed and which of the above expressions is most correct **[Awareness 3].**

RID emphasizes that research, communication, but most of all responsibility and ownership are needed in order to control water quality and ensure its health for the future. RID's research planned for coming year will research the different 'allegations' of water quality and will study paddy rice, gas methane emission and (rice related) Water Footprint of Thailand. RID remains neutral until the results of it own research indeed proof alarming. Until then it will not express an opinion about which specific institute should be held responsible for polluted water. It seems open to collaboration toward sustainable practices in agriculture and discussing the future of Thai waters. Even though not all interviewees agree with all statement with regards to pollution, the general atmosphere is that of open discussions and an enabling environment for future contact and support **[Preparedness 8]**.

Control Group supporting interview information

Thailand has no institute responsible for controlling water quality and researching pollution from agriculture, industries or domestic water use. The consequence of this is that institutes working with water are not fully informed about the current condition of water quality, good or bad. The control group has also raised the problem of lack of ownership and responsibility over Thai waters, since no institute seems accountable for protection, dialogue and regulation of healthy water. RID measures the water before irrigation and afterwards, before it enters the river, to make sure the water quality in irrigated area is safe enough to be used for irrigation purposes and for release into the watershed. However, these measurements are executed with very low standards and without analysis of the data. This is a shame in the light of pollution irrigation water encounters, affecting other water users in the same watershed **[Preparedness -6]**.

Conclusion

RID has published several articles and reports indicating the causal and alarming relationship between chemicals and excessive water use during rice cultivation and water pollution. It therefore supplies the farmers in Central Thailand at this moment only enough water for the firmest to harvest only two crops a year instead of three. This decreases the water used and breaks the pest cycles naturally, leading to less agro-chemical application. As can be concluded RID is actively contributing to improvement, yet does not feel it has the end-responsibility over the quality of Thai waters. Research is executed and planned to measure the severity and causality of rice-water nexus and to determine the role of RID within. In the mean time RID is active in international initiatives and networking and emphasizes the responsibility and need for ownership of all stakeholders in the Thai water sector. But the control group finds organisations, such as RID, have to increase responsibility and actually analysis the data collected.

6.1.3 Ministry of Natural Resources and Environment & Pollution Control Department

This department is a vital stakeholder to the rice-water nexus. Unfortunately this department was not able to meet in Bangkok within the given timeframe and has therefore not been interviewed. Therefore an analysis of the information about this department and its initiatives, the ministry's website, information from other ministry employees who were interviewed is combined, according to the sub-questions, to give an idea of its perception on water pollution through rice cultivation.

Several ministries are involved with water management in terms of its allocation, quality and quantity. In Thailand water scarcity is considered a bigger problem than its pollution, which is why most policies and initiatives aim at reducing scarcity and floods (Ananvoranich 2012). As the management of continuous and sufficient water is a problem, attention to its quality and the use of chemicals in agriculture, comes afterwards.

The most relevant department under the Ministry of Natural Resources and Environment is the Pollution Control Department (PCD), this department controls, prevents, decreases and eradicates pollution in general and conserves and restores the environment. Of course the environment exists out of multiple elements, but for this research we only look at the objectives regarding water.

The website of PCD mentions that the overall quality of Thai surface waters is reasonable and has shown an improving trend over the last couple of years. Yet the area of this research, Central Thailand, shows a worsening surface water (major rivers) quality, which is blamed at discharge from agriculture, etc. **[Awareness 1]**. More ground water can be found in the Central Thailand as land is lower here, than in the Northern mountainous areas. It is for this reason; this region is used to meet growing water demand in Thailand.
Central Thailand is the only 'region' in Thailand with available data on ground water quality. PCD has a very clear opinion, about the pollution of groundwater:

> *"Agricultural run-off, coastal aquaculture, industrial effluents and domestic sewage are responsible for the pollution of groundwater in Thailand" (PDC 2013).*

According to PCD, Thailand definitely has a deteriorating ground water quality and one of the main polluters is agricultural runoff **[Awareness 2]**.

Their initiative suggested is a pricing policy that would reduce the current over-exploitation of the ground water and controls the quality of ground water. The pricing policy suggested is called PDC's 'Polluters Pays Principle' (PPP) **[Awareness 4]**:

> *"The owner or possessor of the pollution source is held responsible for all costs of construction and operation of their treatment facilities or paying service fees to send their waste to the government's central treatment/disposal plant" (PDC 2013).*

This principle shows similarities with the Payment for Environmental Services principle as pollution is tackled at its source. However in the PES-system e.g. farmers are incentivized to cultivate more sustainably. With PPP the polluted water leaving the premises has to be send to a wastewater facility or cleaned at the origin. In case of non-point pollution, such as water polluted due to agricultural run-off containing chemicals, it is practically impossible to clean water before its release to the environment. However, the payment policy is similar as the source of pollution will pay or be paid to reduce this pollution and improve its practices **[Preparedness 7]**.

Today's groundwater extraction, by farmers or private sector companies, is scantly registered and demand is expected to double per decade in the next twenty years. The extent of pollution is simply not known on a national level. In light of this perspective, PDC believes improvement of Thai waters can be achieved when all institutes authorize local officials as pollution control officials. These officials should be held responsible for their own provincial environment and the (water) resource management within. Similar to the RID, PDC emphasizes an institute controlling this to be urgently needed if Thailand wishes to sustain its quality of water and control further use of it. Some measures are already taken by PDC towards improving environmental acquiescence and reduce pollution. PCD has set up Compliance Assistance Centres in an attempt to partner with the (water) sector. In these centres trainings and technology workshops are held containing information about best practices to reduce pollution and control waters and aim at attendance from sector leaders **[Preparedness 8]**.

Control Group supporting interview information

During this research several interviewees belonging to the control group, have indicated that some government officials nowadays have their own 'alternative' agenda and are somehow careless about the actual national goals and objectives of their ministry. This 'bold' statement resembles some characteristics of the political games played in Taksin's time, when business officials executed governmental tasks in order to push business goals instead of national goals (Baker & Phongpaichit 2005). It is however hard to determine what department suffer from this.

The non-response to this research experienced of the Ministry of Environment and Natural Resources does not have to be due to business interests over national interests. Based on information from interviews conducted with the international organizations, academics and Thai government officials, water management, in terms of quantity and allocation, is a lot higher on the Thai research agenda than water quality and pollution **[Awareness -3].** This is because the major problem of Thailand is the water management, availability and

allocation. Although e.g. RID has built a lot of small reservoirs, but little infrastructure, such as waterways, is in place to divert water to the rice fields. According to many, this is Thailand's main problem; the rice yield is quite low due to the lack of water management. Some interviewees have even indicated it is too early to pay attention to water quality in this time of water quantity problems **[Preparedness -7]**. The awareness is not here yet, because all efforts and polices are aimed at improving the basic infrastructure and allocated of water (Ananvoranich 2013).

Based on information from FAO the following additional initiatives were found adding to those found in PCD's own reports. The Thai Ministry of Natural Resources and Environment, has implemented a regulation for waste management for livestock farms and has developed a Code of Good Agricultural Practice for the certification of standard farms which includes conditions for management related to health, food, water, animal welfare and waste management. In addition, regulations that ban the discharge of wastewater into surface water have been put into place. These initiatives are comparable to GAP and other practices in agriculture towards the reduction of pollution. Nevertheless, reducing wastewater in agriculture is more difficult than in livestock production, as water percolates from the field into the ground.
According to FAO, the Ministry of Natural Resources and Environment is actively reducing the level of water pollution in Thailand **[Awareness 1]**. The fact that they also focus on pollution from multiple sources adds to the fairly positive image of this department with regards to its policies and initiatives combating water pollution **[Awareness 2].**

Conclusion

Ministry of Natural Resources and Environment & Pollution Control Department measures ground water quality throughout Thailand and has seen an overall improvement. Only Central Thailand is suffering from a decrease in water quality, which is linked to various non-point source pollutants. Of which agriculture is one of the biggest. PCD's improvement initiatives are twofold; Polluter Pays Principle (with similarities to PES) and Compliance Assistance Centres (public-private partnership). This shows PCD believes control is possible and responsibility is with all stakeholders. . However due to the water quantity and lac of basic infrastructure in Thailand, attention to water quality is often snowed under and needs to be improved first. The control group is fairly positive about this ministry; it is taken supported in its efforts and spam of control.

6.2 Operational Level Stakeholders

6.2.1 State-enterprises

For this research water related state-enterprises were approached to ask about their perception of the rice-water nexus in Thailand. Within a state-enterprise multiple interviews were conducted to cover a wider range of professions and their knowledge on agriculture related water issues in Thailand. Provincial Waterworks Authority (PWA) is a state-enterprise responsible for water allocation for domestic purposes in Thailand's provinces except for the Bangkok region. At PWA interviews were conducted with the Director of Planning Division and an Engineer from the Construction Division. This state-enterprise is similar to Metropolitan Waterworks Authority (MWA), which is responsible for the Bangkok region. For this research only PWA was reached, yet their policies and influences in national waters are aligned to those of MWA.

PWA's controls its incoming water by looking at colour and scent and cleans it with chlorine. This amount is small and still allows for the water to be drinkable. Although Thai tap water is drinkable it logically does not meet the quality of bottled water, but also not the standards of tap water of the West and could eventually lead to health issues. The interviewees at PWA perceive water quality as having decreased over the past 10 years **[Awareness 1]**. They have not analysed water quality, but have experienced this decrease via adjustments that were needed in the purification process:

"The water quality is going down; we know this because we now use more chemicals to clean the water than before. The water is contaminated through intensive agriculture and industries, yet still usable for this

state-enterprise" (Poupong & Punlum 2013).

This supports one of this research' hypothesizes; that pollution from agriculture increases the costs of purification from Tai water sector stakeholders. PWA covers for these costs by making the water supply to households more expensive. Costs of purification have gone up by an estimated 3% over the past 10 years **[Preparedness 5]**.

However PWA also indicated that costs have gone up due to in increase in prices for chemicals used to clean, salaries and energy. When pollution from agriculture or any other pollution is stopped, their costs of purification would, according to the interviewees, not reduce as a result. The fact that a reduction of agricultural pollution would not lower purification costs together with the other sources of increased total costs, contradict the earlier given answer stating an increased use of chemicals due to more polluted water **Awareness -2]**. Unfortunately this discrepancy could not fully be taken away as the interviewee repeated the second answer as well as the first. Therefore one can only conclude PWA's costs have gone up, yet the actual source remains unsure and probably consists out of multiple factors.

Control Group supporting interview information

The control group clarifies PWA's 'lack' of initiatives and sense ownership to improve water quality, as their water standards are 'at such level' that some pollution increase is not a problem **[Preparedness -5] [Awareness -1]**. This is one of the reasons tap water is not drinkable in Thailand.

Conclusion

Although PWA suffers from an increase in cost of purification, it is not determined through objective research what the reason behind this is. PWA even seems to think that bettering agricultural practices would not positively affect their cost of purification. According to the control group, this can be clarified by PWA 's relatively low standards of water quality. Although water purified by PWA is officially drinkable, on the long run it is expected to cause health issues. Therefor it is hard to conclude whether or not this organisation really suffers from a worsening water quality, let alone if its aware of this and prepared to work towards improvements.

6.2.2 Private Sector

The private sector companies of which contact details, from relevant staff members, were retrieved appeared most difficult to open up to the discussion of the Thai rice-water nexus. Several professionals in the water sector have forwarded their contacts at private sector companies relevant to this research. Unfortunately even with supporting letters from government officials, actually being allowed to conduct a semi-structured interview as student or as UTZ Certified staff member, appeared very difficult. Often emails or phone calls were simply not answered, but also the sensitivity of the Thai rice-water nexus was given as a reason not to open doors for an interview. Several water and beer bottling companies therefore missed out on sharing their experiences and potentially their ideas for improvement and could not be included in this research.

However, via personal connections an interview with the executive Vice President and Director of Thailand's leading beer and bottled water producer Singha Beverages (Boon Rawd Brewery) was arranged. A supporting letter from the relevant ministerial department was only a formality after the interview was already planned. Although only one company and two interviews, this contact is very valuable to this research as the biggest market shares in the national beer and bottled water markets are hereby covered. Keeping in mind that other private sector companies were reluctant to discussing the Thai rice-water nexus, Singha can be considered open to discussion and aware of the issues related to the topic. This, because Singha clearly mentioned that it wishes to contribute to the (international) debate discussing sustainability in the water sector.

Singha Beverages receives its water from two different sources. The first source is MWA, as described above, the state-enterprise allocating water in the Bangkok area for domestic purposes. This water is mainly used for

utilities, such as cooling boilers and for water bottling. The second and smaller source is groundwater or, as it is pumped up from deeper than 100 meters under the ground, well water. Singha pumps up water itself, which is regulated via a contractual agreement with the government, when MWA's cannot offer a network of pipelines to one of Singha's factories to transfer water. It is important to mention that well water is purified from scratch at the premises. Water received via MWA is also further purified by Singha, but had received some sort of purification by MWA. It is not common in Thailand to drink tap water as this contains a high level of iron, which can cause e.g. kidney stones. Singha aims at having the highest standards for its bottled beverages and are therefore an important water stakeholder. Water pollution can hypothetically affect Singha's purification costs with such high purification standards, if pollution indeed is a (perceived) problem.

The answer to the question of "whether Singha perceives water pollution as a problem affecting its purification practices", the answer was a confident 'no' **[Preparedness -5]**. This was clarified by an explanation about the natural filtration process of ground water:

> *"Water from the surface is more polluted than ground water. This because pollutants in water sinking lower into the ground are naturally filtered through layers of clay. Some areas have five layers of clay, meaning the water underneath is very clean, these are the areas we base our factories in"* (Debhakam 2013).

Herewith, Singha acknowledges the existence of polluted surface water, yet indicated that this natural filtration process is enough to clean the ground water. Singha tries to avoid pumping up water, which is contaminated by bacteria, chemicals and heavy metals from livestock cultivation, agriculture, urban areas and industries. However, as Singha stated above, this is only the case with surface water **[Awareness 1]**. Only when the polluted surface water affects the groundwater (in the future) it will become a problem to Singha.
The proclaimed decrease in water quality during the dry season, as pollution gets 'washed away' during the monsoon, also is not affecting Singha. However, the interviewee emphasised that this is only tested during the purification and therefore only tested upon parameters set by Singha and not measured generically.

Initiatives related to sustainable water use at Singha can be considered as Corporate Social Responsibility (CSR) policies. Singha recycles water to flush its toilets and therefor does not need to use fresh water. Singha does not set up initiates improving the water quality at the origin, which is on of the pillars of this research, as it has not experienced an increase in costs of purification due to their well-chosen factory locations. Singha hereby does not deny the existence of the initial rice-water nexus related problems, yet knows to avoid being affected by them **[Preparedness -8]**.

Singha indicated it is hard to protect natural resources, as these often do not fall under one person's or institute's supervision and responsibility. It is hard for one institute to take responsibility over e.g. all activities affecting natural resources in one watershed. As an example Singha brings up 'electric cars'; these are not so popular, because nobody wants to pay for sustainable initiatives by himself while others continue polluting.
This introduces the subject of 'payments for ecosystems services'. Investing in protecting water resources from pollution by agriculture sounds like a too ambitious goal in the ears of Singha. Singha thinks it, since it is not a government body able to enforce policies and set rules, cannot make sure that e.g. households and farmers do not pollute **[Preparedness -7]**.

Singha has a corporate culture, which promotes responsibility for ones own actions:

> *"We have to start with ourselves first, by not being wasteful with our resources and we keep an eye on changes in the sector. At this very moment there is no need to invest in initiatives outside of our factories"* (Debhakam 2013).

Collaboration is an option in the future, yet Singha wishes to wait and see what other private sector initiatives will look like and what the role of the government in the future will be. Additionally Singha indicates that Thailand first needs to be thought how to use e.g. water more thoughtfully; how to reduce wastewater. Only

after this measures should be implemented to prohibit pollution through payments for ecosystem services. Government is responsible for the creation of awareness and the implementation of basic infrastructure.
The entire value chain needs to start using water and other resources more wisely as otherwise also Singha will face difficulties in the future **[Preparedness 6] [Preparedness 8]**.

Control Group supporting interview information

The most important reason, according to the control group, for the private sector to invest in any initiative improving agriculture is a cost benefit. Incentive schemes are expensive and governments do not own enough money to implement such schemes alone, which is why the private sector related to e.g. water is needed. However, this sector will only contribute when their benefit is a reduction of e.g. purification costs. These costs have hypothetically gone up due to increased pollution of water. The business case therefore only works when investment costs are lower than purification costs and impact is as predicted. The academics stress the fact that transparency and traceability are needed in order to reduce corruption, pollution and better the Thai rice market and waters affected, yet it does not expect any cooperation towards these goals from the private sector **[Preparedness -6] [Preparedness -7]**. The awareness at this front is compared to that of the west a decades ago; slightly there but participation awaits **[Awareness 2]** (Jourdain 2013) (Bickel 2013).

However, the bigger private sector companies do not seem to experience any water problems, in terms of quantity or quality. They either make deals with the government to be allowed to pump up ground water or find it easier to control their own costs and resources. They invest in water treatment themselves, which is cheaper than to have someone else control the entire watershed and train farmers in better agricultural practices. Private sector, according to the interviewees from GIZ, prefers to internalize control and as much of their processes as possible**.** The independent consultant interviewed indicates that trust in third parties to be able to improve anything with regards to farming practices is low:

> *"Thai private sector companies do not believe a third party to be there forever to train the farmers, so it is better for them to take upon this task as long as they are can and not rely on foreigners/third parties to improve the quality of water, if necessary" (Ananvoranich 2013).*

When looking at these claims about the private sector, it seems unlikely that they will show interest in contributing to the sustainable production of rice **[Preparedness -8]**. Faith in collaboration between third parties, government and private sector is a first step and vital element of any successful incentive scheme.

A 'Project Coordinator for Promotion of Rural Development through Development of Geographical Indications at Regional Level in Asia' working for FAO, contributed to this research with insights to local markets, the possibilities of certification and what problems have to be overcome first.
He indicated that the Thai domestic consumer market as well as supply chain in general is not as open to certified and sustainably produced products as most western countries are. One of the problems is corruption and a general lack of long term planning in the supply chain. Both of these factors are important to consider when implementing any kind of certification or traceability model. These factors also make stakeholders, who are affected by bad practices in rice cultivation, hesitant to contribute to its improvement, as they create insecurity and a value chain difficult to control.
The Project Coordinator's experience has thought him that the Thai private sector, is reluctant to outsourcing processes part of the value chain operating in. This negatively affects the potential of public-private partnerships towards improvements in the Thai rice-water nexus **[Preparedness -8]**.

> *"Internal control is preferred as the private sector can then make up its own rules and will not depend on third party bodies for improving agriculture or certification"(Passeri 2013).*

Several supermarket chains have created their own certification standard, yet these are unreliable due to the lack of an objective third party auditor and have little impact. With internal control, the private sector can decide itself about costs, degree of control and duration of an initiative. If this also holds true to the water

sector, which is claimed above and by one of the academics interviewed, it decreases the likability of water sector stakeholders investing in sustainability training for rice farmers to improve the overall water quality.

During the United Nations Forum on Voluntary Sustainability Standards (UNFVSS) in Bangkok excessive attention was paid to the improvement of the Thai food sector and how to remain compatible in the international agro-commodity market. This conference was organized in the light of the increasingly demanding sustainability- and quality standards and Thailand's goal to become the kitchen of the world. The participants, from government officials to leading agro-commodity exporters, paid attention to the western demand for quality standards and how to cater to these. These quality standards were perceived as high and increasing in quantity and complexity, but fair and based on expertise and extensive education of the West (UNFVSS 2013). The standards themselves were excepted as the west was portrayed as knowledgeable in this regard. What was striking is that these standards were implemented, yet not copied and applied to the domestic market. The local market has no standards for products, which means theoretically that products not meeting western standards are allowed for sale domestically **[Awareness -2][Preparedness -6].**

Conclusion

The private sector interviewed or discussed has so far not suffered from an increase in water purification costs. It does acknowledge the fact that Thai surface waters are polluted, but indicates that (1) ground water due to natural filtration is not polluted and (2) it only places its factories at locations not suffering from polluted. Without ignoring the problem, the Thai private sector is not suffering from pollution but does keep an aye on its development to ensure it will not become a problem in the future either. In case it does, it is felt that the government is and should be able to enforce policies. The private sector is not the body that can make sure that e.g. households and farmers do not pollute. This ties into the general notion of internalized control over costs and power significant for the Thai private sector according to the control group. The private sector does seem to be eager to be a frontrunner when it comes to implementing knowledge from foreign standards to domestic markets. Neither does it feel responsible or powerful enough to make a change.

6.2.3 Rice Farmer Groups

Two farmer groups were interviewed to get an impression on what actually is the perception of the rice-water nexus in the field with those at the roots of the value chain. One farmer group benefitted from the GAP trainings and represented 12 farmers and the second group, consisting out of 17 farmers did not. Both groups lived in Nakornsawan Province, yet in two different villages. It was voluntary for the farmers to participate in the interviews, which is why the total number of attendees vary. It is interesting to see what the difference is between the two groups in chemical use and what they know about the effect their agricultural practices have on the environment and water in particular. Also it is interesting to find out what they need and what could be an incentive for them to participate in any Payment for Environmental Services scheme.
The interviews were carries out with assistance from the Thai Rice Department and the International Rice Research Institute (IRRI) as they had farmers in their network who were willing to participate and contribute with their knowledge. However the presence of these prestige institutes could hypothetically influence the answers given by farmers. For example the farmers trained on GAP know what correct answers about the use of fertilizers are as the rice department trained them, but not actually apply this knowledge.

The farmer groups both indicated to have severely suffered from the floods two years ago, which washed away their crops and is one of the reasons the rice pledging scheme is very beneficial to them. They sell their harvests individually to millers who are sub-contracted by the government as part of the rice-pledging scheme.

GAP-trained farmers

Only 24%-50% of land is actual property owned by the interviewed GAP-farmers, the remainder is rented from landowners. As mentioned in the chapter on political populism, land rents increased due to the rice-pledging scheme, because landowners knew farmers would start to earn more. Farmers now have to spend a

significantly large percentage of income on rent. The amount due is paid for with rice and depends on the yield and on the price received through the pledging scheme. GAP-farmers indicated that they are able to pay for the land rent, rented machinery and external labour, indicating they do not currently face severe financial insecurity. The good price they receive for their rice via the pledging scheme is one of the main contributors to this secure financial situation. The farmers receive between 10.000THB-14.000THB (USD322-USD450) per ton, depending on the level of moisture(Farmer Group GAP trained 2013), which is 30-40% more than the market price.

When discussing the GAP-farmers' daily stresses and their perception of the rice-water nexus, water appeared not to be an issue. Its availability does not seem to be a problem, as there always is enough water through irrigation or via rainfall. The farmers have indirectly seen the quality of water decrease and fish dying in the water during the times of ample chemical use. Now they have increased their knowledge and reduced chemical use and the water and fish look better **[Awareness 1] [Awareness 2].**

In addition, the farmers indicated the soil to be too compact, hard and rusty due to the overutilization of chemicals and lack of rest; it often was too hard to grow rice. Via GAP trainings the farmers had learned how to recognize and reduce this. This has also led them to be more aware and concerned about their own health accordingly. The farmers interviewed now recognize that better agricultural practices can significantly better their lives and natural resources, yet not everyone has access to this knowledge:

> *"Now we know how to manage chemicals which is why the risk has reduced. However, not everyone received training and knows the consequences of chemical use to themselves as well as to consumers' and the environment's health. Labourers who apply chemicals do not have a long life as they usually die within 5 years"* (Farmer Group GAP trained 2013).

This group, which seems to be aware of the risks chemicals hold, now applies fewer chemical fertilizers, because they mix with natural fertilizers; they mix conventional chemicals with natural fertilizers **[Awareness 4]**.
However, as the mix still contains some chemical content they would never let their kids play in rice fields like they did when they were grew up around rice farms.

Contrary to what the rice department declares, the GAP-farmers do experience a decrease in yield now they have replaced parts of their chemical fertilizers with natural fertilizers. However, the farmers do not want to go back to the conventional fertilizer mix, as this would reduce the fertility of soils with reduced yields as a consequence. The GAP trained farmers understand and agree that using the mix is a more sustainable solution to ensuring the natural resources and decreasing the health dangers to people and planet **[Preparedness 6]**.

For the future they would like to see their pre-harvest investment costs to be reduced as now both land and chemical fertilizers, but also labour is quite expensive. They do already diversify their income a little by e.g. raising a small amount of livestock. This group is an eager to learn type of group and they wish to continue learning from GAP and the agricultural extension officer of MOAC. Best practices are discussed and eagerly adopted. Continued support, dialogue and information is what they most need **[Preparedness 7]**(Farmer Group GAP trained 2013).

Farmer Group not trained on GAP

The second group of farmers is not trained on the Good Agricultural Practices, as the Thai Rice Department simply has not been able to reach out to all farmers. This group is a good control group to compare with the first group of farmers and see if their awareness and preparedness differs.

This group indicated to own about 50% of the land they cultivate, which percentage wise is more than the first group. It is however not said they actually own more land and absolute hectares. How this difference existed is hard to tell, as it is a combination of access to land, finances, etc.

When discussing stresses in farmers' livelihood the first thing answered was 'finances'. Their pre-harvesting costs cover, although they can afford it, a large part of their income high with land, chemicals and labour topping the chart. Farmers borrowed money from the Agricultural Bank to pay for all this, which led to accumulating loans. The pledging scheme has enabled them to pay off their debt at the agricultural bank. The price this group receives for its rice is the same as the first group as this group also sells all its rice to the government scheme. The fact that their cultivation practices are different does not affect the rice price received as this is based on moisture level and not on farming practices. The farmers unfortunately do not consider investing in better farming practices, as they prefer to ensure their futures differently by saving money at the bank and by buying more land, housing or furniture **[Preparedness -6] [Preparedness -7]**(Farmer Group not GAP trained 2013).

In addition to finances, the group indicated that, despite the predetermined times of water release covering two harvest a year; they still suffer from water scarcity at the end of each dry season. If they need extra water, they have to pump up water. The government, who tries to control and reduce this via laws and regulations, does not support this uncontrolled pumping up of ground water. However it seems that these laws are endangered by RID's policy to only supply water for 2 crops yearly leading to uncontrolled pumping. This means that currently, as farmers still suffer from pests, diseases and weedy rice, ample chemicals to combat these are used **[Awareness -1].**

The farmers have claimed that in the past they applied significantly more chemicals and knew the water coming from rice fields indeed was more polluted as a consequence than the water not yet used for irrigation **[Awareness 1][Awareness 2]**. The total amount of chemical fertilizers is reduced, but the content is still 100% chemical. They have reduced the total amount through mouth-to-mouth knowledge transfer about the consequences.
When pests break out they increase the amount of chemicals again. The difference in amount, applied between the normal situation and during the pest break out, is used as an indicator of using 'a lot or little' chemicals. When they do not suffer from pests and use their normal amount of fertilizers, this is perceived as 'little', and when pests break out 'a lot' is used:

> *"Today it is safe to play in the rice fields. 2 Years ago, due to chemical use against pests there were too many chemicals. Now we use less, which is why it is safe for our kids"* (Farmer Group not GAP trained 2013).

This group uses very little to no natural fertilizers as they feel that the utilization of organic fertilizers is more complicated than that of chemical fertilizer. Natural fertilizer indeed is a little more difficult to mix with conventional fertilizer, as the mix gets sticky and is therefore harder to spray over rice fields. Also the costs of application are higher when they outsource this task to external labour. According to them these external labourers charge more when a farmers asks for natural fertilizer application, probably due to the fact it is somewhat more difficult to apply.

Despite not being trained, they perceive their yields to have gone up due to the adoption of better farming practices learned from each other and the continues use of ample chemicals. This leads these farmers to be less open to suggestions on how to manage land, water and chemicals better as they are very attached to the idea of not reducing the yield. The fact that their yields do not reduce is however only a short-term benefit as they soil in which they cultivate will decrease in fertility. Decreases in soil fertility will eventually also lead to reduced yields. The fact that this group is short of water and the first group is not, with the same amount of water, also indicated that the GAP training proofs sustainable in terms of water management **[Awareness -4].**

As all farmers seem to be keen in copying the best practices from their neighbours, any potential incentive schemes will have to start at the farmer group already trained on GAP's best management techniques and hope results proof other farmers better farming results in a better future.

Control Group supporting interviews information.

According to the Control Group, over application of chemicals during rice cultivation is a severe problem polluting the water. Farmers are difficult to convince about practices better for both yield and the environment. Farmers learn to farm from their ancestors and neighbours and barely accept or implement advice from outsiders. Few farmers stick to practices learned from GAP or do not stick to the administration that comes along with it. Therefor the scores given by the control group are given t both groups of farmers, the one trained on GAP and the one not trained on GAP.

With regards to their awareness and preparedness, most farmers in Central Thailand are familiar with the causal relationship between chemical use and polluted waters. They are grouped farmers who benefit from knowledge and research outcomes, yet do not always believe the improvements suggested **[Awareness 2]** (Bickel 2013).
Also, as most do suffer from stressful livelihoods, they will invest in their own futures as much as possible and not in more organic farming to sustain natural water resources. The sense of responsibility unfortunately generally lacks among farmers **[Preparedness -6]**. Collaboration and implementation of initiatives will need a strong incentive mechanism alongside or beating the current rice-pledging scheme **[Preparedness -8]**(Jourdain 2013)(Facon 2013).

Conclusion

The **farmers who have been trained on GAP** have increase their knowledge are aware of the fact that water suffers from agro-chemicals. They have indicated to have reduced total amount of agro-chemicals used and that the environment now is a lot healthier and less dangerous. They apply fewer chemicals and mix with organic fertilizer, even though they experience a minor decrease in yield. They have voluntary chosen to stick to the healthier practices, to ensure soil, water en personal health. It is a group eager to learn more and prepared to act, when the benefits are clear.

However, the **farmer group, which has not been part of the GAP** trainings, still combat pests, diseases and other issues with excessive chemical increases. The farmers indicated that they had already reduced total amount of agro-chemicals and therefor increase this again when pests break out. They are also aware of the effect on water, yet feel its quality has improved because of their decrease in application. They do suffer from a water quantity deficit, unlike the first farmer group. When discussing the future of land and water, the farmers feel they have the right to invest in other things improving their direct and current livelihoods. The perception is that collaboration with external organizations towards improvement of land and water is only fair when there is an incentive attached. The general feeling of responsibility is outdone by the struggle to improve ones livelihood.

6.3 Concluding Scorecard of the Stakeholders' Awareness and Preparedness

Figure 15 below summarizes all the conceptualized notions presented in this chapter, which determine the extent of awareness or preparedness. The numbers in the columns 'research pop and 'control group', do not represent total points, but which specific conceptualized notions is present or not present (-). When a number features a minus it means a clear and mentioned absence of this conceptualized notion. The numbers in the column 'research population' refer to the presence or absence of a notion at the specific Thai water sector stakeholder's end, based upon the interviews with professionals belonging to this organisation. The numbers in the next column under 'control group' are based on interviews with the control group, but address the presence or absence of this notion at the end of the discussed Thai water sector stakeholder. The third column 'end score' rates the average relative 'awareness' and 'preparedness' and is based on one point per conceptualized notion, with one point deducted when it features a (-).

			Awareness			Preparedness
Thai Water Sector Stakeholders	Research Pop	Control Group	End Score	Research Pop 2	Control Group 2	End Score 2
Ministry of Agriculture and Cooperatives & Rice Department	1,2,-3, 4	2	1.5	8, 6,7	(-)6,-7	0.5
Royal Irrigation Department	1,2,3	2	2	6,8	(-)6	1
Ministry of Natural Resources & Pollution Control Department	1,2,-3,4	1,2,-3	1.5	7,-7,8	(-)7	0
State-enterprise	1,-2	-1	-0.5	5	(-)5	0
Private Sector	1,-2	2,-2,-4	-0.5	(-)5, 6, -7, -8, 8	6, -6, -7, -8, -8	-2
Trained Farmer Groups	1,2,4	2	2	6,7	(-)6,-8	0
Not Trained Farmer Groups	1, -1, 2, -4	2	0.5	(-)6, -7	(-)6,-7	-2

Figure 15: Rating and Notions of awareness and preparedness present based on numbers.

For example; in the first column and row MOAC states the notions '1,2,-3,4' based on interviews with MOAC itself (research population), which means that (1) Perceived decrease in water quality, (2) Causality perception between water pollution and chemicals used during rice cultivation and that the gravity of consequences is substantial (3) Research initiatives in causal relations and increasing the knowledge base and (4) Knowledge about what should be done to reduce water pollution, all have been addressed during the interview with staff members of this organisation. The Control group gives MOAC a number (2) Causality perception between water pollution and chemicals used during rice cultivation and that the gravity of consequences is substantial, which means that according to the control group MOAC understands the causal relationship of the rice-water nexus.

The 'Awareness End Score' is based on one point per notion. MOAC therefore receives (+1+1-1+1) 2 based on their own interviews and (+1) 1 point received based on the control group, therefore the average score is a relative ((2+1)/2) 1.5 score for awareness.
The minimum possible is -4, when all conceptualized notions for awareness are absent. The maximum is +4, when all conceptualized notions of awareness are present.

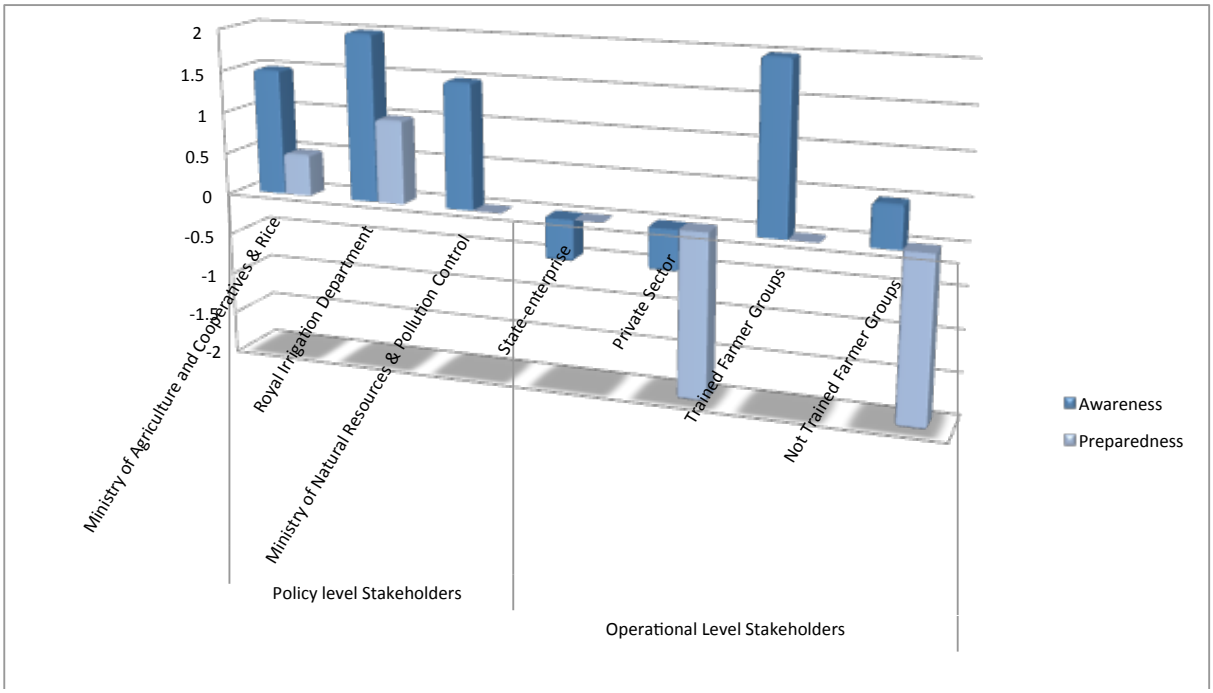

Figure 16: Relative Extent of Awareness and Preparedness of the Thai Policy- and Operational Level Water Sector Stakeholders based on interviews with the research population and the control group.

Figure 16 envisages the ratings in a bar chart, which also shows the relative '0' points given to the preparedness of Ministry of Natural Resources and Pollution, State-enterprises, the private sector an Trained Farmer groups. Since no stakeholder scored 4 or (-)4 the bar chart's reach has been diminished from (-).5-2,in order to show a more detailed difference among stakeholders.

What stands out from the figure above is the difference between the public and the private sector with regards to the extent of awareness. The public sector has high positive scores, whereas the private sector has negative scores. Also trained farmer groups received a relatively high score on 'awareness'. They show a big difference between awareness and preparedness, which is due to several factors that will be explained in chapter 7. The figure above also clearly indicates that only part of the public sector is prepared to work towards improvement s in the rice-water nexus with regards to sustainability. None of the other stakeholders in the research population scored a relative positive score. Note, that these scores are relative. The private sector, for example, did score two sixes ('feeling of responsibility towards securing/improving natural water quality affected by rice cultivation'), but these were overrules in total core due to the absence of the conceptualized notions '8' (Initiatives and willingness to collaborate with external public- or private sector).

Unfortunately there is a clear overall low score and discrepancy between 'awareness' and 'preparedness'. The public sector and Farmers trained on GAP are relatively aware, but most stakeholders scored negatively or a relative 'neutral' for their preparedness. This means that those aware, are not automatically prepared to act upon this. Thailand has a long way to go in raising the bars for 'preparedness'. The public sector has the highest extent of both and therefore is the starting point when implementing sustainability initiatives such as the Book & Claim model, suggested by SRP and UTZ Certified.

6.4 Extracurricular Interview Findings

In the previous paragraph one can already see the differences between stakeholders' awareness and preparedness, which is valuable information in order to answer the research question. This research primarily aims at clarifying the extent of awareness and preparedness of the Thai water sector to contribute to sustainability in the rice-water nexus. Then, the likability of success of the, by SRP and UTZ Certified' proposed, B&C Model will be discussed, based on the outcomes covering the 'preparedness' of the Thai water sector. This was the interview topic storyline during the semi-structured interviews conducted. However, as interviews and informal conversations with the research population and the control group also brought about valuable information external to the research focus, this chapter is added to elaborate on this. This extracurricular knowledge is important and interesting to frame the rice-water nexus in Thailand further and touches upon topics for future research or recommendations.

Multiple Sources of Water Pollution

A Senior Regional Water Management Officer for Asia and the Pacific working for FAO brought up the following about the main sources of pollution in Central Thailand, which relates to the hypothesis of this research:

> *"In the lower Chao Phraya the decrease in water quality is not solely due to rice cultivation, it is more related to industries, urban areas and livestock production around urban areas*(Facon 2013)*".*

This information weakens the hypotheses as it questions the source of water pollution and therefor also the foundation to the reason behind invest in sustainable cultivation of rice and use of water. Its short-term benefit is the reduction of current costs (of e.g. water purification) and the acknowledgement of the long-term benefit is to ensure the future of stakeholders industries and agriculture". When (rice) agriculture seems not to be main polluting source of water, water stakeholders will have less faith in the ability to improve the water quality through better agricultural practices. If industries and livestock hold a bigger pollution percentage, stakeholders might prefer to invest in the development of better practices, if at all aware and prepared, for these sources of pollution. It is important to bear in mind that all water polluters have a relative importance; livestock, rice cultivation, industries and salinization (elaborated upon below). Their relative importance and consequences for water quality will have to be determined before water sector stakeholder's will mature their awareness in actual preparedness to contribute to preserving the nexus (Facon 2013).

An Agricultural Officer Value Chains, Rural Finance and Marketing also working for FAO pointed out another problem affecting the rice-water nexus. Salinity intrusion, where salt water pushes fresh water away, has increased due to unregulated and excessive groundwater pumping. Subsidence increases of around 2cm yearly and increased Salinity affect the cultivation of rice. Salinity is an issue of the rice-water nexus affecting rice cultivation. This thesis mainly focuses on the effect of rice cultivation on water quality, yet this also is part of the nexus and problems affecting Thai agriculture. The salinity increase of soils adds on to the hardening soils, which has been a problem experienced by the GAP-trained farmers. These farmers indicated that, due to over-application of agro-chemicals, their soils hardened. This led to less fertile grounds and a decreasing yield. However, there also is an advantage to hard soils for rice cultivation as this keeps water above ground. This way the water does not sip into the ground and keeps the rice plants wet. It could hypothetically reduce total water use and natural runoff of 'wastewater' into the ground (Houtman 2013). Point of this is that any Payment for Environmental Services system, will incorporate better agricultural practices, but it has to be determined what these should be and for which farmers exactly. The Thai government has a set of site-specific recommendations already taking into consideration a farmer's location, crop and soil. The two different perspectives on hardened soils discussed above will have to be researched further.

The interviewees above question the actual magnitude and role of rice pollution to water quality. In addition to this, the Assistant Professor Agricultural and Natural Resource Economics at the Asian Institute of Technology has indicated that general 'pollution from rice' possibly will reduce in the future. Farmers shift to more industrial crops and prefer high value and less labour-intensive crops such as palm and coconuts, causing a

trend of decreasing intensity in rice production. Rice actually is not that profitable to grow, but is supported by the government with the rice pledging scheme money. This money has altered Thai (rice) agriculture as now farmers can afford to use more fertilizers and pesticides, whereas before these imported chemicals were unaffordable. However, assuming the rice pledging scheme is not sustainable financially and environmentally, the long-term trend is one of reduced rice cultivation and increased more profitable agro-commodity production (Jourdain 2013).

Thailand's Rice Pledging Scheme

As discussed above, the relative magnitude of and correlation between the agro-chemical use and a decrease in water quality is yet to be determined. However, fact is that due to the current rice-pledging scheme farmers have increased their financial security. In order to increase income further, Thai farmers now apply even more chemical fertilizers and pesticides to boost yields. This increase of agro-chemicals during rice cultivation also increases the presence of these chemicals in surface- and ground waters. Therefore the rice-pledging scheme, they way it is now has a negative effect on natural resource, such as fresh water, but most likely also on human health. The Thai government surely did not have this in mind when aiming at gaining farmers' votes via the pledging scheme.

A recommendation made by the Assistant Professor Agricultural and Natural Resource Economics at AIT, is to combine the rice-pledging scheme with sustainable production requirements (and eventually certification). This would make the pledging prices function as an incentive for farmers to better their agricultural practices and be rewarded with a higher price for their rice. At the moment the pledging scheme has no requirements, no leverage to stimulate farmers towards sustainable practices and no external control body following volume and money flows. The current increased use of chemicals, under the pledging scheme is counter affecting the initiatives from e.g. MOAC and the Royal Irrigation Department to make farmers more aware and reduce pollution and water use. This current mismatch between policies can be reduced by collaborations between the Thai government and external bodies towards more aligned policies and practices. The government scheme provides the network and the incentive and the e.g. certification scheme organisations or the private sector supports the implementation and costs that come with any form of incentive mechanism. Best-case scenario is to eventually include certification and a certain degree of traceability in order to follow flows of volume and money. Traceability and certification of an incentive mechanism can reduce corruption in the rice supply chain (Jourdain 2013).

The Thai rice value chain has suffered from increased corruption now there is more money, through the rice-pledging scheme, involved**.** Farmers sell to those millers, who are sub-contracted by the government as part of this pledging scheme. The money for the rice ends up at corrupt millers and fails to reach the farmers. In addition, several newspapers have posted headlines indicating government' rice has gone missing as it is sold further by millers without government consent. However, when an incentive mechanism and certification is added to the current pledging scheme, these millers might not lose their power and money. Particularly in the Book & Claim model, with its low in cost and traceability, corruption is harder to avoid. Some of the academics interviewed vow for a pledging scheme similar to that of the former yellow-shirt government, which is briefly touched upon in the chapter 'Political Populism' about the aftermaths of the pledging scheme. Payments were based on plot sizes and not at total yield, which in light of the aim to reduce chemical use would be more sustainable. The yellow-shirt democrats also paid directly to the farmers and not to the millers. This would empower the farmers and give them the actual prices promised. However corruption at the farmer's side should not be forgotten as they can also lie about plot sizes, just like corrupt millers lie about rice amounts (Jourdain 2013).

Sustainability Demand in the Domestic Supply Chain and Consumer Market

As rice is a commodity eaten mainly in Asian countries and only 1.8% of Thai production is exported, it is interesting to know how the local market feels about sustainability, as this market is the biggest. With the Book & Claim model, which allows for low costs, sustainable rice for the domestic (Asian) markets would make the most significant impact in terms of scale and scope. Unfortunately awareness in the private sector has proven low and the public sector has multiple agendas of which 'increasing awareness in the domestic market' has not been made priority.

A 'Project Coordinator for Promotion of Rural Development through Development of Geographical Indications at Regional Level in Asia' working for FAO, contributed to this research with insights to local markets, the possibilities of certification and what problems have to be overcome first.
He indicated that the Thai domestic consumer market, as well as the private sector is generally not as open to certification and sustainably produced products. Besides the export market, which already is subject to many western quality standards, local suppliers do not. One of the problems is corruption and a general lack of long term planning in the supply chain. Both of these factors are important to consider when implementing any kind of certification or traceability model. These factors also make stakeholders, who are affected by bad practices in rice cultivation, hesitant to contribute to its improvement, as they create insecurity and a value chain difficult to control. This business culture of full control also reflects in the Thai private sector. This sector is reluctant to outsourcing processes part of the value chain operating in in order to maintain full control and not suffer from corruption caused by external parties;

> *"Internal control is preferred as the private sector can then make up its own rules, have full control and does not have to depend on third party bodies for improving agriculture or certification"(Passeri 2013).*

Several supermarket chains have created their own certification standards, yet these are unreliable due to the lack of objective third party auditing. With internal control, the private sector can decide itself about costs, degree of control and duration of an initiative. If this also holds true to the water sector, which is claimed above and by one of the academics interviewed, it decreases the likability of water sector stakeholders investing in sustainability training for rice farmers to improve the overall water quality. Even though the private sector is reluctant, the government is motivated to make Thailand the 'kitchen of the world'. With the current safety standards of the Thai food sector, this is a farfetched goal. If the government wants to boost export, its first responsibility is to improve the food safety in products meant for exported- as well as for products for domestic markets. If the government is serious about this, there is a chance to achieve improvements in this sector in a slightly different way than in the West.

There are 3 different consumer groups for sustainable agro-commodities:
1. Export market; this market is more demanding, has higher standards, more competition and is benefits of the biggest financial flows.
2. Local Expats; foreigners living in Thailand, generally are more educated and represent a significant percentage of the consumer market. Definitely in Bangkok and Chiang Mai, this is a big market.
3. Thai middle class; this group is attracted by the idea of higher standards product and sensitive to promotional attractiveness. However they are not fully educated/aware about the meaning of sustainably produced products and its higher quality (Passeri 2013).
The last two consumer groups are, next to the first consumer group, interesting markets to the private food sector, yet are currently buying imported goods, which do meet their preferred standards of quality and sustainability. It was interesting to see the public and private sector not discussing the possibilities in the markets number 2 and 3. Although most private sector representatives at the UNFVSS were exporters, clarifying the attention to market number 1, the discussion about the other two markets would have been relevant to the conference subject and the government officials present. The conference felt as 'how to cater to standards imposed upon Thailand' instead of 'how does Thailand stay ahead as a main exporter of agro-commodities with initiatives enhancing 'food quality'. During this meeting, awareness about the Thai rice-

water nexus and local consequences and the subsequent preparedness to invest in initiatives, beside those bettering the export products, was missing.

Multiple interviewees have stated that, apart from the 3 markets mentioned above, the Thai domestic market values different things in agro-commodities than the western consumer market:

> *"The Thai markets' motivation to choose products is based on where a product comes from and what variety/type of agro-commodity it is"(Ananvoranich 2013)(Jourdain 2013)*

Variety and origin are of bigger influence on the decision making process of the Thai consumer market than e.g. production methods, agro-chemical use and environmental footprint. Although Thai awareness for the latter three should improve, the first two focal points do hold potential for a different variety of certification, which will also include sustainable production and protection of environmental resources. Certifying products based on Geographical Indicators (GI), such as Champagne, might be a solution more suitable the Thai domestic consumer market. With a Geographical Indicator, a product's origin, production method and know how are protected and certified. A product with good potential for this in Thailand is Jasmine rice. When this commodity is protected in its origin, e.g. China can no longer sell rice with a very little percentage of Jasmine rice content as Jasmine Rice. Including Geographic Indicators in certification caters to the domestic market, the cultivated land will be better taken care of to ensure the future of e.g. Jasmin rice and it can even attract tourists. Repositioning itself in the international rice market is something that might be an option for the Thai government in light of the current negative publications and continuous reduction of exported rice (Passeri 2013).

7. Discussion of Interview Outcomes

This chapter discusses the interview outcomes of chapter 6. This page starts with discussing the difference in overall awareness and preparedness extent, between policy level stakeholders and the operational level stakeholders. Paragraph 7.1 then aims at clarifying the extent of awareness of the policy level stakeholders followed by the operational level stakeholders. Paragraph 7.2 follows upon 7.1 by clarifying why the stakeholders that are aware are (not) also prepared to contribute to sustainability in the rice-water nexus. Also this paragraph is divided into policy level stakeholders and operational level stakeholders. Paragraph 7.3 discussed whether or not there currently is a solid basis in the Thai rice-water nexus and its stakeholders, to implement an incentive scheme such as the Book & Claim model.

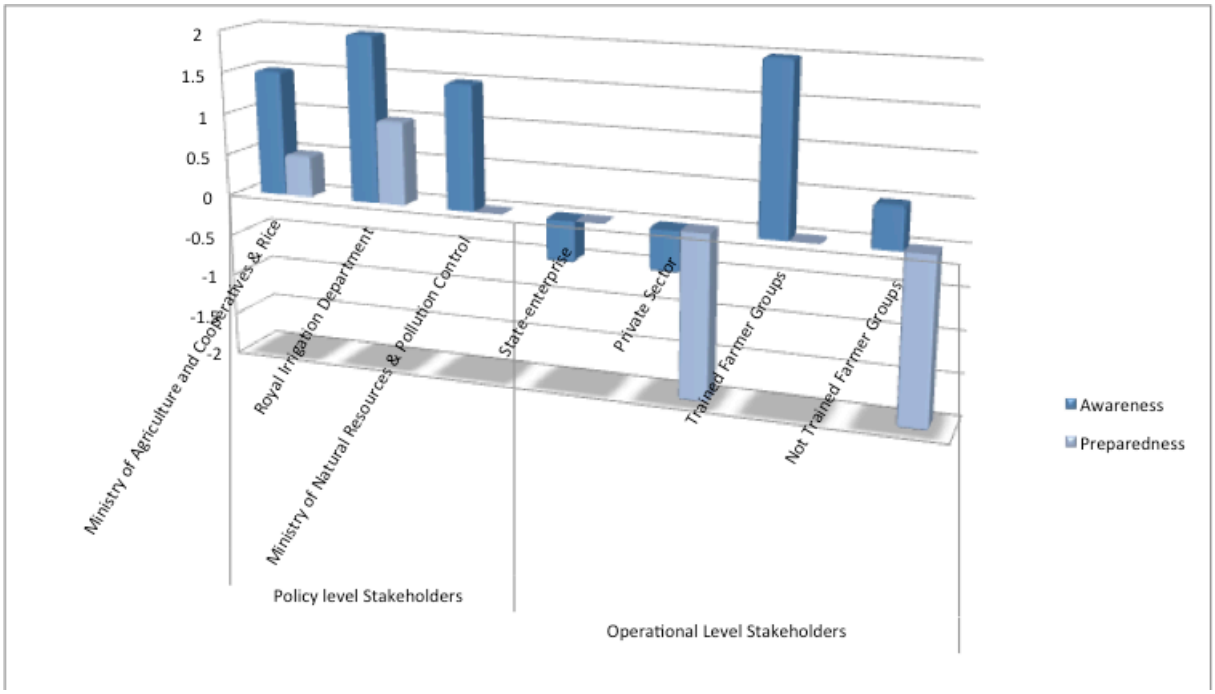

Figure 17: Relative Extent of Awareness and Preparedness of the Thai Policy- and Operational Level Water Sector Stakeholders based on interviews with the research population and the control group.

Figure 17 also featured in chapter 6 (as Figure 16) and is repeated here to link the discussion below easily to the awareness and preparedness extent scores. Note once more that this figure shows the relative extent of awareness and preparedness and not the content of what determined this. The content can be retrieved from the last table in chapter 6, noting which conceptualized notions were present or absent at stakeholders. This will further be discussed in 7.1 and 7.2. The goal of this chapter is to discuss the interview results and analyse these against the backdrop of knowledge of chapter 3, 4.

In general the figure shows that most stakeholders interviewed are aware of issues related to the rice-water nexus'. All policy level stakeholders are relatively aware as they score 1.5-20, which is higher than the awareness of the operational level stakeholders who score -0.5-2.0. However, it is the farmers who are Gap-trained who score 2.0 as an outlier. The others in this group are actually scoring -0.5-0.5, which is relatively low, knowing the scores can be -4 till 4. Therefore the general conclusion when comparing policy- and operational level stakeholder, is that the policy level is relatively more aware than the operational level stakeholders in the Thai water sector

From the seven different groups (splitting farmers in GAP-trained and not GAP-trained) five are relatively aware of the problems related to the rice-water nexus in Thailand. This means that not everyone in the water sector sees pollution from rice cultivation in Thai waters as a problem or knows about it at all. Nevertheless,

the majority is aware of this causality, knows about the deteriorating water quality in Central Thailand and has devoted some sort of research to distinguish what solutions are and what role they can play in achieving so. (5/7) equals 70% and therefor the figure shows that the majority feels the future of the rice-water nexus calls for operating businesses sustainably. However 2 groups out of the 7 in total, equal to 30%, have committed time and energy to manage and implement initiatives according to the figure above. Of those 70% that are aware only (2/5) 40% are also prepared to contribute. This means the remaining 60%, to a certain extent aware of the problem, are not relatively willing to contribute. However, as mentioned before, these score indicate the relative extent and not the actual content. For example: the Ministry of Natural Resources and Environment scores positive for preparedness in 'Perceived magnitude of control and sense of ownership as well as for 'Initiatives and willingness to collaborate with external public- or private sector', based on the research population itself. It is scores given to this ministry by the control group that reduced their score to a relative '0' for their total preparedness to contribute. This Ministry is therefore not unwilling and has potential, yet needs to improve if it wishes to score relatively positive.

As indicated in paragraph 3.7, the environmental and social awareness increases in Asean countries, just as it has in the West, companies will begin to implement company policies with more emphasis on the triple 'P' concept: People, Planet, and Profit. This paragraph 3.7 indicated that Thailand, compared to the other Asean countries was behind in terms of awareness and preparedness. The figure above also shows Thailand has yet to improve its comprehension of the concept of sustainability and credibility to follow. Many interviewed water sector stakeholder representatives are unsure how to start and what the role of their organization is within the bigger sustainability process. This included all stakeholders to the rice-water nexus. The biggest problem that surfaced from the interviews is the general lack of the ability be responsible and show ownership to improve a problem, which crosses sectors, commodities, boarders and stakeholder levels. This also is not easy to the western companies who are somewhat more familiar with the notion, yet solutions remain difficult to implement, monitor and evaluate. Most interviewees indicated that it is not their job to invest in the improvement of such a large cross-sector complex phenomenon, as their impact would be too little. In general hope is focused on the government to investing in basic infrastructure, increasing the awareness within Thailand and financing in e.g. PES.

7.1 The Water Sector's Awareness of the Rice-Water Nexus

7.1.1 Awareness of Policy Level Stakeholders

This paragraph will discuss and analyze the extent of awareness of the policy level stakeholders, based on the outcomes of interviews in chapter 6.

The public sector has scored relatively well on 'awareness' as it scores between 1.5-2.0, which is the highest range of the two levels of stakeholders. The ministries interviewed have acknowledged the problems of water pollution, as well as the causal relationship with rice farming practices. In addition to these first two conceptualized notions of awareness, the ministries also contribute with (planned) research and continued participation in dialogues with international organisations. Also the fourth notion 'knowledge about general what practices that will improve water quality and decrease the agro-chemical leakage into watersheds', proved to be present during the interviews. Even better, the public sector has already initiated some initiatives, such as GAP and the reduced water supply to reduce total amount of yearly crops. These initiatives aim at reducing agro-chemical and water use in Thailand.

Political/institutional climate

Considering the Awareness determining factors in the Conceptual Model in chapter 5, one can conclude that governmental departments are more influenced by the factors affecting one's awareness compared to the operational level stakeholders. First of all the government belongs to Thailand's political/institutional climate and therefore is more closely involved with policies shaping this climate. It collaborates with other department

and is part of the decision-making processes on a policy level. As a government one has easier access to international research outcomes, knowledge & information as is therefore most likely better informed about the gravity of consequences caused by rice cultivation. Most research outcomes that are important are lobbies through universities or NGO's to make sure the information reached the specific government department. This means MOAC, RID and the PCD have access to international research outcomes, but most likely also to national objectives and departmental agendas. However, these three factors counter-affect each other when agendas collide, influencing the extent of preparedness. This will be discussed further in paragraph 7.2.

Existing initiatives

One example to this research is the rice-pledging scheme. The Thai government, as an electoral promise to support rice farmers and remain a top exporter, implemented this initiative where it gives 30%-40% more money for the rice than it is worth in the international markets. It has won the votes of Thai farmers, but is costing the government enormous parts of the national budget to pay the farmers such high prices for their rice. Deficits have already been reached, leaving little budget for other initiatives, such as environmental protection plans. As long as the pledging scheme is in place, it might even make little sense to invest in the reduction of agro-chemical use. This, because farmers are using more agro-chemicals are used to maximize yields and therefor income through the pledging scheme. Until the pledging-scheme was introduced, Thailand was number one exporter of rice globally. This pledging scheme is the main cause of losing this title, due to the high prices of Thai rice, which the government create to balance out its expenditures for the scheme. The Thai government aims at regaining this throne of number one rice exporter in the world and becoming the 'kitchen of the world'. However, the question is how it wishes to achieve this with the little aggressive and voluntary GAP program and a lack of standards in the domestic market. Competitiveness is achieved when qualitative production is incorporated into the entire Thai agro-commodity value chain and not solely at that part meant for export. If the government wants to raise the quality of its export products it can only achieve so when the national standard of food is relatively high already. The difference between the quality of export products and domestic market products should not be too big. Additionally, benefits of sustainability should also be wanted for domestic markets. If the long term benefits, causality and danger are understood, the government should want to improve the rice-water nexus for its domestic market.

This clash of governmental agendas indicates that some initiatives actually promote agro-chemical use among farmers and that sustainability standards are solely planned for export products. With this in mind it is hard for the three interviewed government departments to pull the cart of increasing awareness in Thailand and implement mandatory and high standard initiatives. Other political policies are holding them back.

Gravity of consequences caused by rice cultivation

In addition, the gravity of consequences caused by rice cultivation is overshadowed by the need to control the water quantity problem in Thailand. The droughts and floods Thailand is suffering from (the latest major flood was in 2011), affects the urgency of awareness for other factors such as water quality. As rice fields were flooded too and harvests were lost, the current prosperity in rice cultivation through pledging scheme money is celebrated.

To conclude and against the backdrop of the conceptual model; the awareness of need to sustain the rice-water nexus is existing, but the political/institutional climate and the knowledge about the (long-term) gravity of consequences is overshadowed by the need to develop agriculture towards more production and a better water management in terms of quantity.

7.1.2 Awareness of Operational Level Stakeholders

This paragraph will discuss and analyze the extent of awareness of the operational level stakeholders, based on the outcomes of interviews in chapter 6. The extent of awareness of this group ranges from -0.5 to 2, which is a bigger difference within than the previously discussed policy level stakeholders. However, the farmers trained on GAP, is part of this group and responsible for the outlier with score '2'. When this group is isolated, the range varies from -0.5 till 0.5. The fact that this farmer group scores so different than other operational level stakeholder is explained in twofold; (1) they are trained on the rice-water nexus by the relatively aware MOAC and (2) the interviews conducted with these farmers, was in the presence of some officials belonging to MOAC and IRRI. It is hypothetically possible that the farmers' answers were influenced by their presence and answers adjusted according to the GAP-trainings' knowledge, but do not fully represent the reality. However, the score of '2' is still representing their awareness extent and is much higher than the knowledge about water pollution and causality with rice cultivation than their fellow farmers, who were not trained on GAP.

The private sector discussed and interviewed for this research scored a relatively negative score of -.5, which was lowest and the only negative score of all stakeholders. At this moment of time this group does not see the problems related to the rice-water nexus, its causality or a need to research this nexus further. This can be due to several reasons of which some are already touched upon in the previous part. Based on interviews but also third party information it seems that the knowledge about general causalities between water deterioration and agricultural practices is there, but that the magnitude and urgency of the nexus is not yet comprehended. All the private sector company representatives agree that the rice-water nexus is an issue keep an eye on to make sure it will not become a (bigger) problem in the future. This means that the current first three affects of the Conceptual model, influencing 'awareness' (1) Knowledge & information accessibility, (2) Gravity of consequences caused by rice cultivation and (3) Perceived Change in water quality, are currently somewhat missing.

Access to knowledge/Information & Political Climate

With chapter 3 of this research showing Thailand to score not so well in terms of water use during rice cultivation, there is a gap in the communication of this score and actual implemented initiatives to increase awareness. This affects the knowledge and actions of stakeholders in the rice-water nexus. These stakeholders are today's business people managing Thailand, but were students during Taksin's ruling. The students of the Taksin time have not been educated about the problems of the rice-water nexus and are not schooled to be aware of sustainability. This might also clarify why there are so little (research) initiatives implemented today. Few business or government officials are familiar with the nexus and do not know what to do and who is capable of making a significant impact. Maybe the next generation who has been more thoroughly educated about the current rice-water nexus and is more familiar with sustainable business will be more prepared to act with the right set of tools.

To conclude: the fact that the problems of the nexus are felt to not play a significant role yet and that general knowledge and perception of the gravity of consequences as well as experienced water deterioration have not triggered the awareness of the private sector, indicate that communication about issues in the nexus can be improved. The knowledge about the actual presence of agro-chemicals in ground water specifically and the consequences to human- and environmental health have not been research sufficiently or outcomes have not received enough publicity. This leads to a private sector too little aware of the severity of water pollution through agro-chemicals in Thailand. It seems that access to knowledge from research and the political climate Thailand has, have a lot to improve if awareness increase is desired.

7.2 The Water Sector's Preparedness to Sustain the Rice-Water Nexus

7.2.1 Preparedness of Policy Level Stakeholders

This paragraph will discuss and analyze the extent of preparedness of Policy Level Stakeholders following up upon the awareness discussed in 7.1. It will indicate what factors influence ones' preparedness and why some are aware, yet not prepared. It will analyze this, based on the factors affecting preparedness indicated in the conceptual model in chapter 5. The policy level stakeholders interviewed scored for the 'extent of preparedness' a range from '0-1'. The Ministry of Natural Resources and Environment has scored a relative '0', MOAC a relative 0.5 and RID a relative '1'. Hereby is RID the one stakeholder scoring relatively seen highest on preparedness to improve sustainability in the rice-water nexus. This is due to their openness towards collaboration with public- and private organizations and their magnitude of control over water quality. These 2 out of 4 factors affecting one's extent of preparedness have given RID this high score. However, MOAC also scores relatively well, definitely in light of the overall relatively low scores of the water sector. They have a feeling of responsibility to contribute, which RID does not. Also the magnitude of control and collaboration with external bodies are scores, which have determined MOAC's awareness. It is the information given by the control group that makes both of these organizations score lower. The control group finds the ministries 'soft' in the preparedness and more (mandatory) initiative should contribute to sustainability in the rice-water nexus.

Feeling of responsibility towards securing/improving natural water quality affected by rice cultivation

The reason behind why most policy level stakeholders are prepared to contribute to sustainability within the rice-water nexus might be, as they feel more responsible for securing and improving the natural resources affected and rice cultivation in general. Policy level stakeholders also have the power to implement policies that aim at improving the use of water during rice cultivation, but also to train e.g. farmers on how better their agricultural practices. Their magnitude of control and responsibility is bigger than the private sector or farmers in the initial phases of the sustainability process. Governments are the enabling factor to implement basic infrastructure and kick off awareness of its nationals. On the long run it needs the private sector to sustain sustainability efforts with financial and supply chain support.

Collaboration with external bodies, towards sustainability

Even though most ministries have indicated to be in favour of collaboration with external bodies towards sustainability, collaboration among each other is in need of improvement. Most policy level stakeholder representatives interviewed have some data internally, but do not share this data with other ministries or the private sector. Trust in collaboration among stakeholders, but also with external bodies, is said to be high, yet it is not occurring. Thailand's business climate seems to be one of maximum internalized control and responsibility and ownership within ones business walls. It might therefor indeed be the government's role to create more discussions, and implement the basic infrastructure and act as a stronger institution working towards initiatives. However, it is also the government disabling alteration of the supply chain with its rice-pledging scheme. All farmers sell rice to the government for a fairly high price, without having to comply to 'better practices' conditions. Research into the possibility of combining certification/traceability with the pledging scheme should be executed to reveal its feasibility. At the moment the pledging scheme is hindering, yet without full government support, its network and experience, sustainable agriculture is farfetched.

To conclude: The willingness to act of the policy level stakeholders is there and they are active in platforms working towards sustainability. They also take responsibility for the influence they have on e.g. farmers and impose policies improving water and agro-chemical use. However the extent of preparedness is, according to the control group, not as high as the rice-water nexus calls for. As the notion of sustainability is relatively young to Thailand it most likely will develop over time and efforts will increase in magnitude and control. Thailand might not be a frontrunner of Asean countries, it is increasing its research efforts and standard of agro-commodities in order to become the 'Kitchen of the World' and regain its leading export position.

7.2.2 Preparedness of Operational Level Stakeholders

This paragraph will discuss and analyze the extent of preparedness of Operational Level Stakeholders following up upon the awareness discussed in 7.1. It will indicate what factors influence ones' preparedness and why some are aware, yet not prepared. It will analyze this, based on the factors affecting preparedness indicated in the conceptual model in chapter 5. The extent of preparedness of operational level stakeholders is the lowest score of this chapter. All stakeholders have scored a relative '0' till '-2'. Of course scoring less than 0% in unpreparedness is impossible, but this figure shows the relative preparedness and the extent of unpreparedness. The 'private sector' and 'farmers not GAP-trained' have scored lowest with a '-2' score for their extent of awareness. This is mainly based on the fact they find the government responsible for initiating sustainability initiatives, as this would then be paid from national budget. Private sector companies and farmers are not willing to invest money in the rice-water nexus as they feel the magnitude of impact to be negligible and ineffective when others do not invest the same way.

Feeling of responsibility towards securing/improving natural water quality affected by rice cultivation

As discussed in chapter 4, Thailand has only recently developed itself in a more prosperous economy with an increased GDP and more development in rural and urban professions. It has quickly developed from a country depending on subsistence agriculture to an export oriented economy. However, private sector' and 'farmers still struggle to become or remain competitive and ensure the future of its businesses and income. It might therefore not be very strange that the current private sector (including farmers) is still focused on short-term goals, such as 'developing' and generating income more than long-term responsibility over something like sustainability. The notion of sustainability that also western countries' business struggle with is; what really is the impact of current investments of finances and energy in the future and the future of my business and is it worth it to take action?" Thailand's private sector specifically has not reached the point that it apprehends that the ability to operate sustainability is not a public- relations stunt or CSR strategy. Hopefully these companies, that don't have sustainability strategies and accountability in place yet, will increase understanding of the risk of distancing investors and reducing their competitiveness in international trade. The latter is of utmost importance to the Thai GDP (which for a significant part is based on agro-commodity export), the government's goals of regaining its number one rice exporter position and becoming the 'kitchen of the world'. The private sector, in responses to sustainability, has published e.g. pictures of executives handing gifts to those in need or planting trees. This 'CSR', often referred to as 'green washing' without actually aiming at a significant impact, does not lead to improvement in the rice-water nexus. Instead of Michael Porter's 'creating shared value', Thailand is still in the 'growth phase' of the 'process (actually product) life cycle' of sustainability and responsibility over the rice-water nexus.

However, some of Thailand's bigger companies are now slowly seeing the need to do more and focus less on the media as a tool to promote their CSR-initiatives as sign of preparedness to contribute to sustainability. Their awareness is increasing, as mentioned in the previous paragraph and it is only a matter of time before environmental considerations reach Potter's 'Maturity' phase and become part of the business strategy. The Thai domestic market and NGO's lobbying will also grow and trigger demand for sustainability efforts in the rice-water nexus and agro-commodities part of this.

Collaboration with external organizations (in data exchange)

What is also sticking is that no stakeholder interviewed indicated to have a monitoring system that collects data in place. All interviewees have access to some sort of data collected, but this is often not analyzed or shared among stakeholders. When preparedness grows and reaches maturity, initiatives will follow a natural path of efficiency increase and collaboration among stakeholders. At this moment of time collaboration in data collection is missing and the private sector, as discussed before, prefers to be responsible for all processes part of the company, including data collection. Collaboration among stakeholders is yet to be created.

Farmers' feeling of ownership and responsibility

An additional result of the rice-pledging scheme is that land rent increased immediately. Most farmers actually own only a small portion of the land they cultivate and rent the remainder of more affluent landowners. As a consequence, farmers invest even more in chemicals aiming at achieving the highest possible yield. The farmers, who are aware, have indicated to be afraid to eat some produced rice, as multiple chemical fertilizers are used. These farmers buy rice from trustworthy millers who bought rice from Northern Thailand where rice farming is less modernized; rain fed and less agro-chemical are used. Since the flood of 2011, productivity has reportedly been low and as a result all land is used and exhausted via cultivation. Land is not given a break to restore its fertility in the battle for high yields to sell rice via the government's pledging scheme. This information indicates that however farmers are aware of the sustainability need in the rice-water nexus, they are struggling to ensure more income and better their livelihoods.

Land rent, expensive fertilizers and fear of floods all influence the livelihoods of farmers in such a way that they pay less attention to sustainability, as this is a more long-term goal. They are fighting against high pre-harvesting costs and environmental threats and aim at living a secured livelihood from the earnings made of rice farming. The rice-pledging scheme has played a significant role in the lives of these farmers who have struggled. For these farmers investing in their own future receives priority over investing in the future of the rice-water nexus. It is a short term way of thinking as investing in less agro-chemicals will only benefit the future of rice farming, but the interviews with farmers and professional showed that it is hard for farmers to accept this. They are afraid of losing missing out on income now. The farmers who were trained on GAP, have indicated that indeed their yields have slightly dropped now they mix conventional fertilizers with organic. However, these farmers see it as an investment in the future, sustaining the soil and bettering environmental and human health.

To conclude: Both the private sector and the farmers are still living for increasing income and developing when possible, which shows an aftermath of the Green Revolution and development of the past decades in Thailand. This more short-term way of developing is very fair in light of the threats farmers have to endure, such as floods. The private sector aims at the best competitiveness and managing their business accordingly. Unfortunately, achieving long-term benefits of sustainability are not felt to be the responsibility of the private sector and farmers. They are struggling to 'make ends meet' and perceive the public sector to be the main institute responsible for implementing initiatives that generate the collective long term benefits of sustainability in the rice-water nexus.

7.3 A sound basis for implementation of a Book & Claim incentive mechanism?

This paragraph will, based on the awareness and preparedness to contribute to sustainability in the rice-water nexus of Thai water sector, judge whether or not the Thai water sector currently is a sound basis for implementation of the Book & Claim incentive mechanism.

The policy level stakeholders are most aware of the need to sustain the resources within the rice-water nexus. However as they belong to the Thai political institute, this knowledge about the (long-term) gravity of consequences is put on second place. The objective of developing Thai agriculture, increase more production, while improving water quantity management is the first priority on governmental agendas. The Thai ministries of which several representatives were interviewed for this research all play active roles in international platforms discussing the issues of and actions needed to enhance sustainability in the rice-water nexus. Seceral government initiatives have been implemented based on knowledge derived from these platforms, such as GAP. The policy level of the Thai water sector can definitely be concluded as aware of the rice-water nexus and prepared to create policies for farmers and private sector protecting natural resources and enforcing rules and regulations. However the severity of which this is done has yet to intensify as current initiatives are not having the desired impact needed to e.g. protect fresh water from agro-chemicals through reduced application of

these by farmers. Today might not be the best time to start implementing any incentive scheme as the government's pledging scheme gets its hands on all Thai rice produced. Farmers sell to the government and are unlikely to stop doing so in order to be part of an incentive mechanism towards sustainability in the rice-water nexus. The incentive of the Book & Claim model would have to overrule the 30%-40% mark-up price farmers currently receive through the pledging scheme, which would remove the 'low costs' advantage of this flexible and cheaper incentive mechanism model. The corruption in the rice value chain in Thailand that has increased under the pledging scheme would be able to continue due to the Book & Claim's low extent of traceability and transparency. The above reasons all contribute to the conclusion that, in light of the current political objectives and policies, it might be better to wait with implementing the Book & Claim model until the pledging scheme and corruption have dissolved.
On the long run, the government's network of private sector companies, farmer organisations, and research centres and relationships built within is one of the most valuable pillars of any successful implementation of sustainable initiative in Thailand. General trust in collaboration with external parties, such as SRP and UTZ Certified, is very low in Thailand due to the business environment of keeping full control over ones business processes and not outsource any of them. Any external body therefore needs the government to start and to build a network of trust and collaboration.

The **operational level stakeholders** are yet to develop the full comprehension off sustainability and what it means in the context of the Thai rice-water nexus. Awareness is there and increasing and further research will impact the knowledge about water pollution and agro-chemical use and the causality between these. These stakeholders to the water sector all understand this nexus is important and in need of attention, but find the issues within the nexus to be less problematic than the policy level stakeholders interviewed and the statistics showing the magnitude and problems of Thai rice-water nexus. This can be considered a noteworthy gap between actual need for sustainability in the nexus and comprehension of this among the operational water stakeholders. It is needles to repeat that those 'not so aware' are also not very prepared to act upon this today.

However, most farmers are aware of environmental consequences of their agro-chemical application, but prioritize to boost production and income to improve their livelihoods. Their social, cultural and political environment upon which they have learned to trust has created conservativeness, preventing the farmers from accepted and adopting advice related to bettering current agricultural practices from external parties. As mentioned above, the current experience and network the government creates with its GAP initiative will be a good steppingstone for more demanding incentive mechanisms that are not voluntary, financed by markets and include certification, such as the Book & Claim model.

Concluding notes about the basis for implementation of a Book & Claim incentive mechanism

Thailand is developing its familiarity with the sustainability concept and is changing in agricultural politics, both with pace and devotion. It might therefore be better to continue discussing the rice-water nexus in platforms such as SRP and learn from the changes in Thai agriculture and the experience governmental initiatives bring about. When politics and agriculture have stabilized a little more, it is wise to start with a pilot project of the Book & Claim model. This means that the Book & Claim as incentive mechanism still is a good match with the Thai rice supply chain and the global increasing demand for staple crops such as rice, but that the inclusion of the Thai water sector currently is not a sound basis. This does not mean the inclusion of others who are more benefitted by sustainability in the rice-water nexus, (most directly linked; rice supply chain stakeholders) cannot invest in such incentive mechanism.

The water sector is solely offered a chance to contribute via the Book & Claim model; if it wishes to contribute to improving sustainability for the future of natural resources related to the cultivation of rice and management of Thai waters.

8. Conclusion

This research investigated if the Thai water sector's awareness and preparedness to improve sustainability in the rice-water nexus is a sound basis for successful implementation of a Book & Claim incentive mechanism. In chapter 5.1.1 the research stated 3 hypotheses, upon which the main research question and sub-questions were based. These 3 hypotheses are now used to draw the conclusion of this research based on the discussions of the findings in chapter 6.

Hypothesis 1: Water sector stakeholders are suffering from reduced water quality due to agricultural practices used in rice cultivation. The concluding answer to the first hypothesis is based on the answers the water stakeholders have given about their sufferings from reduced water quality due to agricultural practices used in rice cultivation.

The interview answers indicated the awareness of the issues in the rice-water nexus and the experienced problems this causes for water stakeholders to be not as significant as assumed prior to the research. Other issues related to water are currently influencing the livelihoods of individuals and organisations more. Thailand experiences an increasing irregular rainfall causing floorings during the monsoon period and droughts during the dry season. The vast amounts of rice-producing areas are therefore in need of well-established water management systems**.** Water quantity management, for this reason, receives a lot of attention from both the public- and private sector and its quality has been placed second. The fact that water management, allocation and control receives attention first, makes sense as it is difficult to focus on quality when basic infrastructure allocating water is yet to be improved.
This does not mean Thailand is not aware of the pollution derived from agro-chemical use and other negatively influencing agricultural practices in rice cultivation. 70% of the water sector stakeholder representatives is aware of the causality between reduced water quality and rice cultivation in Central Thailand and have implemented or planned research to increase knowledge and determine ones role in improving sustainability of the rice-water nexus.

Experienced problems of water pollution through rice cultivation are however low, with only one representative of the operational level stakeholders indicating it is possible that their purification costs have gone up accordingly. It cannot be said that the Thai water sector knowingly is affected by the worsening water quality. Water pollution measurements, knowledge and information distribution are rare, but multiple stakeholders are increasing the database. It is important that Thailand starts to share the data and analysis between public- and private sector stakeholders in order for all stakeholders to become aware of the affect of water pollution through agriculture to their operations.

In addition the current political and institutional framework enables production increase through initiatives such as the incentive scheme, via which unintentionally agro-chemical use and water pollution is boosted. This research can therefore conclude that, it is likely that the water sector is affected by some degree of water pollution through agriculture, but that policy – and operational level stakeholders are more aware of and prepared to contribute to improving (1) water management in terms of quantity and (2) development in terms of increased production in rice farming and businesses.
These results invalidate the first hypothesis

Hypothesis 2: These water sector stakeholders, exterior to the rice supply chain, are interested in investing in the upstream sustainable production of rice and use of water. The concluding answer to the second hypothesis is based on the answers given in interviews related to their preparedness to contribute to sustainability in the production of rice and use of water.

This concluding answer to the second hypothesis is based on awareness of the issues related to the rice-water nexus and the preparedness, of the water sector stakeholders, to take up ownership, responsibility and collaborate with external parties.

These three conceptualized notions of preparedness have indicated policy level stakeholders to be relatively prepared to contribute to sustainability in rice cultivation and better use of water throughout. Unfortunately the operational level stakeholders are less prepared to contribute and are currently focusing on sustaining the livelihoods of their families and businesses and aim for the highest development as such possible. Therefore if one were to implement sustainability initiatives, private sector awareness and therefore collaboration and investment efforts will most likely be relatively low. Government support is needed in order to enable basic infrastructure, finance and offer a network.

Governmental water organizations and departments are the main stakeholders able and willing to implement sustainability measures. The Thai Government is in charge of main water sector organizations and implements policies for national use of water. It has already introduced several initiatives such as quality standards (GAP), water management support facilities (yearly crops reduction and water allocation services), indicating their preparedness to invest in the objective of improving the rice-water nexus. However, current initiatives are voluntary, small-scaled and have not proven to have a significant impact, which creates a gap between current environmental pressure calling for sustainability and the impact of local initiatives in the Thai rice-water sector. This research would conclude that within the water sector, the policy level stakeholders such as MOAC, RID and other ministries have potential when investments to a certain extent are required for initiatives sustaining the rice-water nexus. However the reason behind the fact this is currently a small-scaled objective, is the national budget focussing on multiple important objectives contributing to production development of the Thai economy.
These results therefore validate the second hypothesis, but only for policy level stakeholders.

Hypothesis 3: The Book & Claim model is the correct fit if the Thai water sector is to be involved in incentive mechanism towards sustainability in the rice-water nexus. The concluding answer to the third hypothesis is based on the knowledge about the awareness and preparedness of the Thai water sector and the characteristics of the Book & Claim incentive mechanism. This third hypothesis will judge the compatibility of these two.

The Thai rice-water nexus is in need of a flexible, low-cost and relatively easy to implement scheme, which enabled the rice sector to invest in sustainable production without having to alter the full supply chain. The Book & Claim incentive mechanism allows for external parties to invest, without having to hand them the actual product, which increases the investment pool and allows for the product to go pass through the normal supply chain. It is possible to mix the sustainable product with conventionally produced rice, but can increase the sustainable product throughout time. However the government has implanted the questionable rice pledging scheme and the private sector focuses on developing and not on sustainable development. Therefore it might not be the best (1) time to implement any incentive mechanism and (2) the Thai water sector might not hold the biggest potential in terms of willingness to invest in sustainability in the rice-water sector as they are not as affected by its issues as assumed by the researcher.

If the government decides to focus more attention on (less voluntary) incentive mechanisms while it continues with the pledging scheme, the Book & Claim would be a possibility. It would then become a rice-pledging scheme, tied to good agricultural practices. The Book & Claim model would add conditions to the pledging scheme and promote sustainability within. Only those farmers complying would benefit from the incentives paid.

To conclude; Without government's support in incentive mechanisms it might be a better idea to (1) wait until Thailand stops pledging rice, (2) find other stakeholders to the rice-water nexus who are more willing to contribute to sustainability within or (3) to start a small-scaled pilot financed via the export market for western markets who do demand sustainability and are prepared to pay a little more for sustainable rice. These results therefore validate the third hypothesis, but with the three recommendations mentioned above. Without implantation of these recommendations, the researcher invalidates the third hypothesis.

"Is the Thai water sector's awareness of and preparedness to improve sustainability in the rice-water nexus a sound basis for successful implementation of a Book & Claim incentive mechanism?"

The final conclusion is based on the combination of the three hypotheses discussed above. The first conclusion of this research is therefore that the Thai water sector stakeholders are suffering less from reduced water quality due to agricultural practices used in rice cultivation than the researcher assumed prior to the research. Although most are aware of the existence of pollution through agriculture in the rice-water nexus, the current knowledge, quality standards and political environment's attention to the nexus' quality is low.

The second part of the conclusion validates that the water sector stakeholders, exterior to the rice supply chain, are interested in investing in the upstream sustainable production of rice and use of water. However the research brought forwards that efforts towards this currently can only be expected from policy level stakeholders such as the Thai Ministry of Agriculture and Cooperatives and the Royal Irrigation Department.

The last part of the conclusion validates the compatibility of the Book & Claim incentive mechanism with the Thai rice-water nexus, but with conditions as the majority of the water sector interviewed is reluctant to contributing in a time of other development objectives. As explained via the three hypotheses; the Thai rice-water nexus is a good fit for the Book & Claim model, yet the Thai water sector is still in the growth phase of becoming familiar with the long-term benefits and demands of sustainability. The policy level stakeholders are willing to discuss what, on the long run, would be best for the rice-water nexus in Thailand. Collaboration and investments are possible in the near future, not today.

9. Recommendations

As a recommendation to UTZ Certified and Sustainable Rice Platform, the researcher suggests to start the pilot of the Book & Claim model, as planned, in collaboration with MOAC and UNEP. This will enforce relations and collaboration and also create farmer adaptation knowledge and experience. Afterwards it is possible that the pledging scheme in Thailand has changed or stopped. After the pilot SRP and UTZ will either have to collaborate with or work alongside the pledging scheme or start elsewhere in another major rice producing country. However the relationships with the Thai government are very beneficial and should be maintained.

Further research is needed into the following suggestions;

1. It is important to bear in mind that all water polluters have a relative effect on water; livestock, agriculture, industries and salt intrusion (salinization). Their relative importance, consequences for water quality will have to be determined before water sector stakeholder's are able to express whether or not they are affected by water pollution and in which polluter they would like to invest towards sustainability.

2. Certifying agro-commodities, part of an incentive mechanism, based on Geographical Indicators might be a good option for Thailand as the Thai consumer market focuses on variety/type and origin of products. With Geographical Indicators exactly this is protected and certified, alongside cultivation practices protecting the future of such product. It is a chance to protects e.g. Jasmine rice and creates a link with production areas to boost tourism, one of Thailand's major income generators.

3. Further research the potential of the rice-water nexus in other main rice-producing countries, such as Vietnam and India. Social- and political circumstances are different and might also be of potential towards creating sustainability in the rice supply chain. Sustainability in these countries could hypothetically even trigger Thailand to become more active too. Thailand aims at becoming the 'kitchen of the world' and wants to regain the throne of number one rice exporter, in order to do so Thailand has to remain compatible.

4. If the water sector in Thailand is not prepared enough to contribute to sustainability of Thai waters, it is recommended to look into the stake of others in the rice-water sector. Thailand holds more institutes who work with water, e.g. the spa industry. This industry is of significant size in Thailand and already works with many organic products. Spa's have the objective of using purest products without chemicals and are devoted to healthiest treatments possible. During their treatments a lot of water as well as rice-based products are used. Further research into their potential buy-in for the Book & Claim model would be interesting.

5. Furthermore, it is possible that foreign companies, specialized in water, feel to have a stake in sustainability improvements in the Thai rice-water nexus. Many companies, e.g. Dutch professional water research centers of water purification experts, invest in projects in other countries in order to influence and maintain the future management of these.

10. References

2030 Water Resources Group, 2009. *Charting Our Water Future; Economic frameworks to inform decision-making Economic*, Available at: 2030WaterResourcesGroup@mckinsey.com.

ADB, 2012. Technical Assistance Consultant ' s Report; Support for the Association of Southeast Asian Nations Plus Three Integrated Food Security Framework; The Rice Situation in Thailand. , (January), p.25.

Agriwaterpedia.info, 2013. Living the NEXUS: Agricultural Water Management under Climate Change for Food Security Agriwaterpedia. , pp.2–3.

Ananvoranich, O., 2012. *Development of the study on the rice sector in Thailand*, Bangkok.

Ananvoranich, O., 2013. Interview Consultant and Doctor of Philosophy. , (March).

Baker, C.J. & Phongpaichit, P., 2005. "Business Populism" in Thailand; Challange and Change in East Asia. *Journal of Democracy*, 16(2), pp.58–72.

Bouman, B., 2011. The need for stainable rice production: where do we stand?

Bumbudsanpharoke, W., 2010. *Behaviours and Attitudes in the Management of Nonpoint Source Pollution: Ping River Basin, Thailand*, Bangkok.

Chapagain, a. K. & Hoekstra, a. Y., 2011. The blue, green and grey water footprint of rice from production and consumption perspectives. *Ecological Economics*, 70(4), pp.749–758. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0921800910004659 [Accessed February 3, 2013].

Chapagain, A.K. & Hoekstra, A.Y., 2010. The green, blue and grey water footprint of rice from both a production an consumption perspective. , (40), p.62.

Childs, N., Dyck, J. & Hansen, J., 2013. *Southeast Asia Projected To Remain Top Rice Exporter*,

Debhakam, R., 2013. Interview with Executive Vice President and Director of Boon Rawd Brewery (Singha). , (May).

Facon, T., 2013. Interview Senior Regional Water Management Officer for Asia and the Pacific at FAO. , (April), pp.3–5.

Facon, T. & Ti, L.H., 2001. *THE FAO-ESCAP PILOT PROJECT ON NATIONAL WATER VISIONS*, Bangkok.

FAO, Control of water pollution from agriculture. , pp.1–18. Available at: http://www.fao.org/docrep/w2598e/w2598e04.htm Page.

Farmer Group GAP trained, 2013. Interview Farmer Organisation trained on GAP. , 50.

Farmer Group not GAP trained, 2013. Interview Farmer Organisation (not trained on GAP). , 1.

IISD, 2010. Sustainable Development: From Brundtland to Rio 2012. , (September 2010).

IRRI, 2012. DRAFT SUSTAINABLE RICE PLATFORM BUSINESS MODEL. , (September).

IRRI, 2010. *Resource efficiency and ecosystems services in rice production in Thailand's central plain: Baseline research. Establishing sustainable , resource efficient agri-food supply chains*,

Juisiri, C., 2013. Effective & Efficient Municipal Wastewater Treatment & Management. , p.41.

Kedia, S.K. & Palis, F.G., 2008. *Health Effects of Pesticide Exposure among Filipino Rice Farmers*. University of the Philippines & International Rice Research Institute.

Kolinjivadi, V.K. & Sunderland, T., 2012. A Review of Two Payment Schemes for Watershed Services from China and Vietnam : the Interface of Government Control and PES Theory. *Ecology and Society*, 17(4).

Murray, E. V, 2007. Thailand - The Kitchen of the World. *Cab Calling*.

Nguyen, N. & Ferrero, A., 2006. Meeting the challenges of global rice production. *Paddy and Water Environment*, 4(1), pp.1–9. Available at: http://www.springerlink.com/index/10.1007/s10333-005-0031-5 [Accessed March 12, 2013].

Palmer, J., 2013. US rice imports "contain harmful levels of lead." *BBC News*, (April).

Passeri, S., 2013. Interview with Project Coordinator; Promotion of Rural Development through Development of Geographical Indications at Regional Level in Asia. , (May), p.2013.

Phongpaichit, P. & Baker, C.J., 2010. *"Business Populism" in Thailand*,

Poupong, E. & Punlum, P., 2013. Interview Director of Planning Division & Engineer Construction Division II of Provincial Water Authority. , (April).

Prajamwong, S., 2013. Interview with Director of Office and Project Management at Royal Irrigation Department. , pp.3–6.

Prakunhungsit, S., 2013. Interview Director of Irrigated Water Management Division , Office of Water Management and Hydrology of Royal Irrigation Department.

Pratruangkrai, P., 2013. Stringent US checks pose image problem for Thailand. , pp.1–11.

PwC, 2013. *Going beyond philanthropy? Pulse-check on sustainability*, Malaysia.

Raksanam, B. et al., 2012. Health Risk Behaviors Associated With Agrochemical Exposure Among Rice Farmers in a Rural Community, Thailand: A Community-Based Ethnography. *Asia-Pacific journal of public health / Asia-Pacific Academic Consortium for Public Health*, p.2012. Available at: http://www.ncbi.nlm.nih.gov/pubmed/23172707 [Accessed August 1, 2013].

Raksaseri, K., 2013. Farmers fret over excessive chemicals , low yields. *The Nation*, pp.1–11.

Royal Irrigation Department, 2007. Water Pollution Caused by Rice Farming in Thailand. , pp.1–16.

Soitong, K., 2013. Interview with Rice Production Promotion Expert at the Thai Rice Department. , (March).

SRP, 2012. *SRP Meeting notes*, Hanoi.

Supesuntorn, K., 2011. *Sustainable Use of Water in the Food and Beverage Sector through Product Water Footprint Labeling, with emperical evidence from Thailand*, Bangkok.

The Economist, 2013. Thailand's Economy; The rice mountain. *The Economist*, pp.1–2.

Tran, D. Van, 1997. World rice production main issues and technical possibilities. *Activités de recherche sur le riz en climat méditerranéen*, p.14.

UNDP, 2010. Sustainable Rice Production Systems : Scoping Paper. , (March), p.20.

UNECE, 2005. Sustainable development. *Sustainable Development Concept and Action*, pp.2004–2005.

UNFVSS, 2013. United Nations Forum on Sustainability Standards , March 13 th. In Bangkok: UN, p. 4.

Uraiwong, P. & Watanabe, T., 2008. *STAKEHOLDER ANALYSIS OF WATER RESOURCES PROJECTS IN*, Kochi India.

Vidal, J., 2013. Global Development; India's rice revolution. , (February), pp.1–7.

Viriyangkura, L., 2013. Interview with Scenior Scientist at the Thai Rice Department.

Wunder, S., 2005. *Payments for environmental services : Some nuts and bolts*,

The Economist

Thailand's economy

The rice mountain

An increasingly unpopular government sticks to its worst and most costly policy

Aug 10th 2013 | BANGKOK | From the print edition

IT HAS not been a happy second anniversary for the government of Yingluck Shinawatra. Thousands of diehard opponents of her elder brother Thaksin Shinawatra, himself a former prime minister, took to the streets of Bangkok on August 7th to protest against a bill that could grant Mr Thaksin an amnesty for past offences and open up the possibility of his return from exile. Probably Ms Yingluck is used by now to these kinds of protests, along with the usual rumours of coups. More worrying, perhaps, is widespread and growing dismay over her government's economic performance, supposedly its strong suit.

This week an opinion poll carried out by Bangkok University found that the government's approval rating has fallen to its lowest level yet. Most damaging to its reputation is its flagship scheme to subsidise rice. This was the brainchild of Mr Thaksin, who dictates most of his sister's policies from afar. It was a useful vote-winner during the election campaign in 2011. But its costs now jeopardise both the government's finances and the economy as a whole.

The rice subsidy was classic Thaksin populism. Two-fifths of Thais work in agriculture, most of them as rice farmers. Ms Yingluck promised that, if she were elected, her government would buy unmilled rice directly from farmers at about twice the market rate, or 15,000 baht (about $500) per tonne. This would put money into poor farmers' pockets and stimulate domestic demand. Naysayers warned that the scheme would be impossibly expensive. But Thaksin advisers said that withdrawing rice from world markets in this way would force up the price. Since Thailand was the world's biggest exporter, the government would be able to cash in later by selling its stockpiles of grain at a profit.

So much for the weird theory. In practice, other countries have undercut Thailand, whose

exports have tumbled (by about 4m tonnes, or a third, in the first full year of the subsidy scheme). India and Vietnam have overtaken Thailand as the biggest exporters. Unable to find buyers, the Thai government has been forced to stockpile 18m tonnes of the stuff and counting—equivalent to nearly half the annual global trade in rice. Buying rice from farmers is ruinously expensive, costing the Thai government $12.5 billion in the first year of operation. This year the cost is expected to rise to about $15 billion, or 4% of GDP. Storing the rice also carries administrative and logistical costs, and demands expensive new warehouses.

Concern is also rising over the quality of the rice piling up in the warehouses. Rice always deteriorates, but the suspicion is growing that stocks are being contaminated with substandard rice. Criminal gangs and bent officials are said to have smuggled in thousands of tonnes of cheap grain from Cambodia and Myanmar in the hope of profiting from government largesse. This rice has got mixed in with Thai grain. A good deal of Thailand's rice is top-grade Hom Mali, or jasmine rice. So quality, and reputation, matter.

Poor quality may be one reason why the latest auction of rice stocks was so disappointing. The government managed to sell just 210,000 tonnes, well short of a hoped-for 1m tonnes. But this was also a matter of plain economics, says Vichai Sriprasert, head of Riceland International, a family-run exporter. Why buy now when the government will be forced to sell overflowing stocks later, at almost any price?

Millstone

It is a fiasco. But having invested so much political capital, Ms Yingluck vows to continue. She has tried to tinker with the scheme, for instance, by cutting the cost of the subsidy from 15,000 baht per tonne to 13,500 baht. That only angered rice farmers, her chief constituency. She quickly backed down, but she intends to try again. Her administration is frantically trying to secure deals for other governments to buy the rice, but this is making only a small dent in stocks. Iran has bought 250,000 tonnes.

Meanwhile, daily revelations of incompetence and corruption surrounding the rice scheme take their toll on the government's standing, and investors fret about the wider effect on the public finances. Government debt levels are rising, and Moody's, a ratings agency, has warned of the risk that the rice scheme poses to the country's fiscal discipline.

From the print edition: Asia

Figure 18: Headline August 13, 2013 in The Economist, covering the populist governance of Thailand's Prime Minister in her efforts to continue with the controversial rice-pledging scheme (The Economist 2013).

Appendix 2 Student assessment form Liselotte de Vries by UTZ Certified

This assessment has to be filled by the supervisor as appointed by the host organisation. After filling and signing, this form has to be handed over the IDS internship supervisor.

Name student: Liselotte de Vries **Address:** Antoon Coolenlaan 35, Delft, The Netherlands
Name host organisation: UTZ Certified **Address:** De Ruyterkade 6, Amsterdam, The Netherlands
Name host organisation's internship supervisor: Gieljan Beijen **Function/position within host organisation:** New Programs Manager **Telephone number and email:** 06-50218888; Gieljan.Beijen@utzcertified.org
Duration of internship: 6 months **Short description of the internship:** Field research in Central Thailand, researching the potential interest of water sector stakeholders outside the rice supply chain in a Book & Claim incentive mechanism aiming to improve sustainability in rice production for UTZ Certified (to contribute to Sustainable Rice Platform)

1. Was the level of knowledge of the student enough to properly carry out the internship? *0 More than enough* ✓ *Enough* *0 Not enough* *0 Not enough at all*
2. How do you consider the level of motivation of the student? ✓ *More than enough* *0 Enough* *0 Not enough* *0 Not enough at all*
3. Did the student take sufficient initiative to make the internship successful? ✓ *More than sufficient* *0 Sufficient* *0 Not sufficient* *0 Not sufficient at all*
4. How do you consider the level of independency of the student? ✓ *More than sufficient* *0 Sufficient* *0 Not sufficient* *0 Not sufficient at all*
5. Was the student able to verbally express himself/herself sufficiently? *0 More than sufficient* ✓ *Sufficient* *0 Not sufficient* *0 Not sufficient at all*
6. Was the student able to express himself/herself sufficiently in writing? *0 More than sufficient* ✓ *Sufficient* *0 Not sufficient* *0 Not sufficient at all*

7. Did the student leave a satisfying internship report behind?
✓ *Very satisfying report*
0 Satisfying report
0 Not so satisfying report
0 No report at all
8. Was the student able to adapt himself/herself to local circumstances?
✓ *More than sufficient*
0 Sufficient
0 Not sufficient
0 Not sufficient at all
9. Was the student able to adapt himself/herself to the local culture or codes of conduct?
0 More than sufficient
✓ *Sufficient*
0 Not sufficient
0 Not sufficient at all
10. How did the student behave within the host organisation?
✓ *Very pleasant*
0 Pleasant
0 Not so pleasant
0 Not pleasant at all
11. How did the student behave in relation to the host organisation's target groups?
✓ *Very respectful*
0 Respectful
0 Not so respectful
0 Not respectful at all
12. How did the student behave in relation to local authorities?
✓ *Very respectful*
0 Respectful
0 Not so respectful
0 Not respectful at all
13. What is your general opinion about the student?
✓ *Very good*
0 Good
0 Not so good
0 Not good at all
14. Has the internship been useful for your organisation?
✓ Yes very useful
0 Useful
0 Not so useful
0 Not useful at all
15. Will you be able to use the results of the research in a practical way?
✓ Yes definitely
0 Yes
0 Somehow/probably
0 No
16. Would you like to receive any more IDS students in future?
0 Yes
✓ Yes, but under certain conditions
0 Probably

0 No

17. Do you have any particular comments?

Liselotte took a great and quite ambitious initiative to propose to conduct her thesis research in rice. To UTZ this was a very welcome proposal.
After a "warming-up" period that was needed to understand UTZ' main activities better as well as the complex rice context, Liselotte was able to define her scope of research well. She managed to independently arrange her logistics in Thailand extremely well, e.g. organizing a local host organization with whom she established good relationships, or when she needed new housing halfway.
Initially she took her research questions a bit too literally to her target group, but she adapted well, as well as her general tactics to retrieve (reliable) information from her local interviewees.
I was impressed with Liselotte's pro-activeness in local networking as she managed to contact many relevant stakeholders and was very persistent to actually arrange meetings.
Liselotte is a hard, dedicated worker, e.g. processing her recorded interviews timely, and discussing her interview findings with relevant experts to create the "case".

18. Do you have any suggestions for any future student?

More support during the writing phase by the university was expected.

Gieljan Beijen
New Programs Manager
UTZ Certified | Better farming. Better future.
De Ruyterkade 6 | 1013 AA Amsterdam | **M**: +31 6 5021 8888 | (+ 31 20 530 8000 | 7 +31 20 530 8099 |
gieljan.beijen@utzcertified.org | gieljanbeijen | : www.utzcertified.org