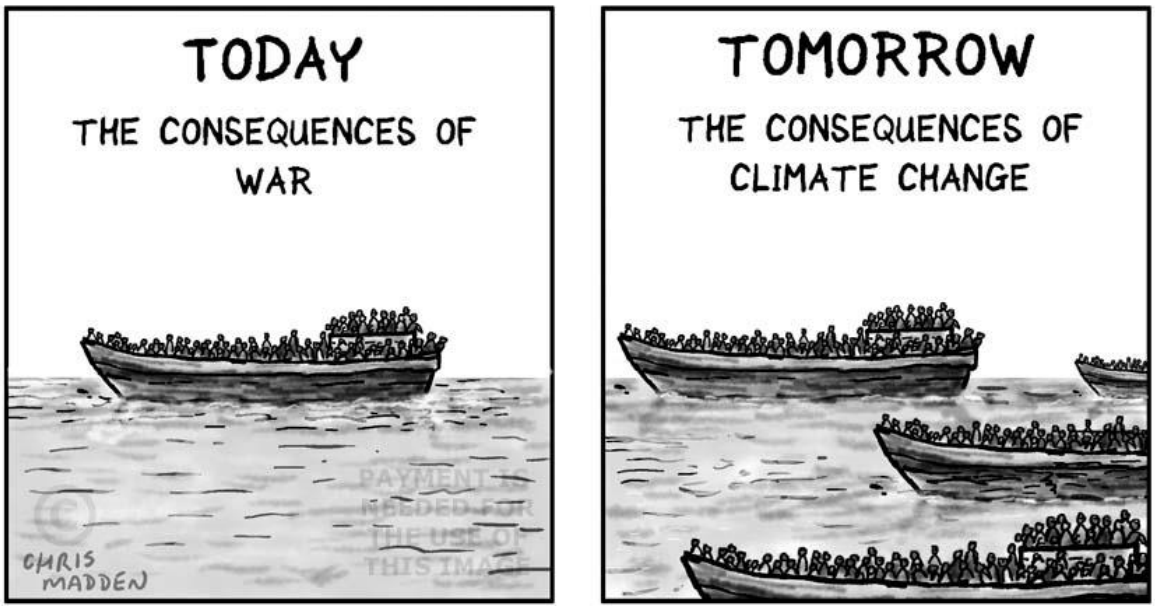
Protecting and preventing climate refugees

An interdisciplinary study on climate refugee issues and the United Nations



Liberal Arts and Sciences: Interdisciplinary Thesis

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Abbreviations

AOSIS	Alliance of Small Island States
CPI	Corruption Perception Index
COP	Conferences of the Parties
CSD	Commission on Sustainable Development
EDPs	Environmentally displaced persons
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GEF	Global Environmental Fund
GFSI	Global Food Security Index
GHG	Greenhouse Gas
HDI	Human Development Index
HR	Human rights
ICCPR	International Covenant on Civil and Political Rights
ICESCR	International Covenant on Economic, Social and Cultural Rights
IBHR	International Bill of Human Rights
IDPs	Internal displaced persons

IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
OHCHR	Office of the United Nations High Commissioner for Human Rights
OAU	Organization of African Unity
SSA	Sub-Saharan Africa
UDHR	Universal Declaration of Human Rights
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCHE	United Nations Conference on Human Environment
UNDG	United Nations Development Group
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UN GA	United Nations General Assembly
UNHCR	Office of the United Nations High Commissioner for Refugees
UNSC	United Nations Security Council

1. Introduction

The 2014 Intergovernmental Panel on Climate Change (IPCC) report on climate change describes that in the near future millions of individuals are forced to leave their homes due to climate change (IPCC, 2014). In the worst case scenario, climate change will lead to approximately 200 million refugees, 20 times more refugees than currently protected by the United Nations (UN) (Biermann & Boas, 2010). The consequences will be enormous. Mass movements of refugees lead to constrained natural resources, overpopulated areas, and may exacerbate socio-economic and political tensions. Climate refugees present one of the biggest humanitarian challenges of today (UNHCR, 2015). However, an integrative, international framework to protect and provide assistance to these so-called 'climate refugees' does not (yet) exist.

Although climate change is a global problem, its effects will be distributed unevenly. Developing countries, who depend on their natural environment for their basic existence, often have less resources to mitigate and adapt to climate change (Reuveny, 2007; Biermann & Boas, 2010). The protection of climate refugees thus requires a supranational consciousness. The international society is essential in providing assistance to this vulnerable group (Goodwin-Gill & McAdam, 2007; Docherty & Giannini, 2009; Atapattu, 2010; Biermann & Boas, 2010).

In this study we presume the potential role of the UN as a form of global governance in protecting climate refugees. The UN is an intergovernmental organization, in which representatives from Member-states collaborate on global issues. At the moment, it has 193 member-states and has therefore the widest scope in supranational consensus building. This study looks specifically at the role of several sub-organizations within the UN: the Food and Agriculture Organization (FAO), the IPCC, the UN Framework Convention on Climate Change (UNFCCC), the UN Environmental Program (UNEP), the UN Refugee Agency (UNHCR), and the UN High Commissioner for Human Rights (OHCHR). The main research question proposed in this thesis is: *What role could the United Nations play concerning climate refugee issues?*

For several reasons an interdisciplinary approach is relevant to answer the above research question. First of all, climate refugee issues are complex: there are multiple, interrelated factors involved in them, such as climate change, environmental degradation, food

insecurity, overpopulation and human rights. Secondly, there are different academic disciplines that contribute important insights to the debate, but none of them has yet been able to provide a comprehensive answer: there are serious knowledge and protection gaps in the fields of, among others, environmental sciences, international relations, international law and innovation sciences. Thus, the issue of climate refugees is essentially an issue that transcends traditional disciplinary boundaries, which is why it is not possible to achieve a more comprehensive understanding through purely disciplinary research (Docherty & Giannini, 2009). In addition to this, climate refugee issues constitute an unresolved societal issue, but nonetheless important considering the forecasts made in the IPCC 2014 Synthesis Report.

The present thesis contains three disciplinary chapters. The next chapter is based on insights from the environmental sciences, which is a multidisciplinary field of study that examines the interaction between humans and their environment. It draws on insights from social geography, policy studies, and environmental geography. This chapter will enhance our understanding of knowledge gaps in environmental academic literature and environmental policy by examining the following research question: *what are the most important knowledge gaps in the environmental literature on the influence of climate on migration?* It reaches conclusions on the correlation of climate change and refugee flows; the academic discourse around the term 'climate refugee'; and the climate refugee's place in the UN climate change debate.

The third chapter is based on insights of international studies, which is a multidisciplinary field of study that examines the interaction of political entities in the world. It combines insights from international relations, international law, history of affairs, and conflict studies. This field of study will examine the claims made to the human rights framework to determine the status climate refugees by examining the following research question: *how do actors frame the status of the 'climate refugee' in accordance with the International Bill of Human Rights?* This chapter will reach conclusions on what a human rights-approach to climate refugee protection might look like.

The fourth chapter is based on insights of innovation sciences, another multidisciplinary field of study that focuses on connecting innovation and technology to society. It draws on insights from both the natural and social sciences to examine the implementation of innovations to adapt to climate change. This chapter is an in-depth case-study analysis of FAO projects in Sub-Saharan Africa, by answering the following research question: *To what extent do projects of the FAO result in agricultural innovation in sub-Saharan Africa?*

All of the above fields of study draw on multiple disciplinary insights, thereby incorporating important insights from traditional disciplines, such as social geography, international relations, international law, policy studies and innovation sciences. However, the selection of the above three fields of study excludes insights from other disciplines that may be relevant for a full understanding of climate refugee issues. An important side-note is that, in particular, the fields of cultural anthropology, economics and public administration are missing in this study.

The disciplinary insights in the next chapters do not create a more comprehensive understanding on their own, they merely examine climate refugee issues from a disciplinary perspective. We will use the integration techniques as described in Allen F. Repko (2012) *Interdisciplinary Research: Process and Theory,* to integrate our disciplinary insights and create a more comprehensive understanding that is more than a 'sum of its parts'.

This thesis is organized as follows. The next three chapters will analyze climate refugee issues from a disciplinary perspective. Chapter five will integrate the insights by examining conflicts and similarities between disciplines and by creating common ground among them. This is used to construct a more comprehensive understanding of climate refugee issues. Finally, we will evaluate upon our results.

2. Environmental Sciences

The knowledge gaps in climate refugee literature

Environmental sciences contribute to the uncovering of knowledge gaps considering climate refugees issues. These knowledge gaps become particularly apparent in science-policy interfaces. The academic research regarding climate change and climate refugees makes clear predictions, but the policy of the UN has yet to be adapted to these findings. Effective interaction between academics and policy is important to move climate negotiations forward. To gain a better understanding of climate refugee issues, this chapter answers the following research question*: what are the most important knowledge gaps in the environmental literature on the influence of climate on migration?* The answers to this question are relevant, because they will help to close the gaps between academics and policy. To make an adequate global environmental policy, it is necessary for policy makers to consider scientific findings reported in academic literature (Turnhout, Hisschenmöller & Eijsackers, 2007; McNie 2007, Van den Hove, 2007).

To determine what role the UN could play it is important to see if there is a correlation between climate change and migrant flows, because it represents the scope of the issue. If there is such a correlation, it is of interest for policy to know where climate refugees are coming from, where they are going and what the most common reason is to leave their habitat. Section one will give an overview of: the predicted climate refugees, predicted climate change, current migrant/refugee flows and the most common reason for people to flee their habitats. An overview of these topics will be based on an analysis of the geographic literature.

Furthermore, with respect to climate refugees, it is important to understand how the climate refugee is conceptualized in the environmental academic literature. The discourse in the academic literature contains various definitions, and conceptual consensus has not yet been reached. Therefore, the second section of this disciplinary chapter shall endeavor to give an analysis of this academic discourse.

Because climate change and climate refugees are trans boundary, the international society should aim to make an overarching policy concerning these subjects. The UN is the most comprehensive form of intergovernmental governance, and has played a key role in global environmental governance. Section three will describe the existing climate policy of the UN.

After providing evidence that there are correlations between climate change and migrant flows and concluding that climate refugees are real, existing climate policy will be examined to see if they include the notion of future climate refugee issues.

The method used to answer the environmental sciences disciplinary sub-question is systematic literature review. The literature is both scientific and grey. The scientific literature is found on the United Nations Framework Convention on Climate Change (UNFCCC) website, and the Intergovernmental Panel on Climate Change (IPCC) website. Databases that are used to search grey literature include Google Scholar, Science Web and Scopus. The literature was found by snowballing and keywords. The keywords include: climate change, climate refugees, environmental refugees, climate migrants, environmental migrants internally displaced persons, migration flows, United Nations, discourse, and policy.

2.1 The correlation between climate change and future refugee flows in the geographic literature

As mentioned in the introduction of this thesis, the global climate system is changing (IPCC, 2014). This change has caused a warming atmosphere and ocean, diminishing snow and ice amounts and a rising sea level (ibid.). Under all assessed scenarios, the globally averaged surface temperature is projected to rise in the 21st century (ibid.). The predicted scenarios of the IPCC report are shown in Figure 1.

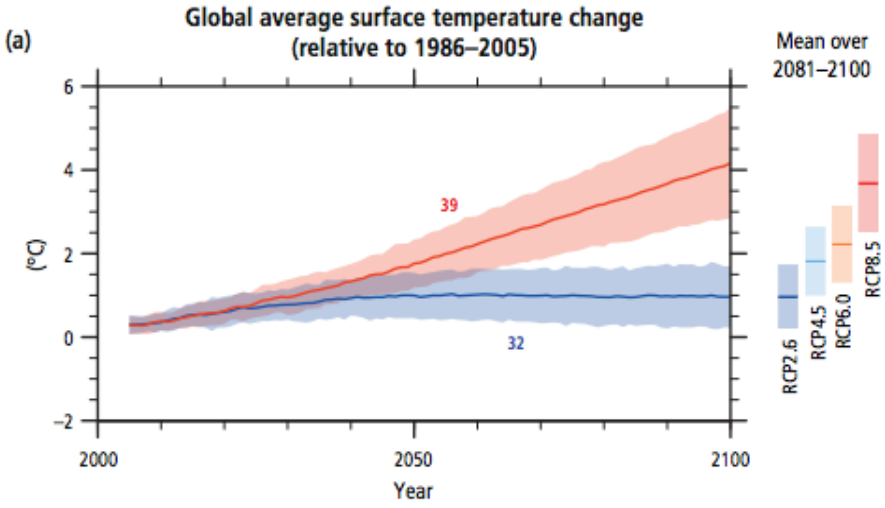

Figure 1: Predicted global average surface temperature change, IPCC Synthesis Report 2014, page 4.

According to the IPCC (2014), millions of people are forced to leave their homes due to climate change, or will be in the near future. These changes include, but are not limited to: sea level rise, coastal erosion, increased incidence of drought, coral bleaching, storm surges, desertification, deforestation, soil erosion, and water shortages (Farbotko & Lazrus, 2012). This change is mainly caused by anthropogenic greenhouse gas (GHG) emission, which has increased since the pre-industrial era, driven largely by economic and population growth (IPCC, 2014). Climate risks are unevenly distributed; their character and impact vary in different areas. Some places get drier, whereas other places get flooded. The actual developments do not only depend on climate related hazards, but also on exposure and vulnerability of human and natural systems, including their decreased ability to adapt (ibid).

According to the IPCC (2014) 'Climate change amplifies existing risks and will create new ones'. Hazards that are related to climate change increase other stressors. In many situations this has negative outcomes for livelihoods, especially for poor and other disadvantaged people and communities in countries at all levels of development (IPCC, 2014). Increasing magnitudes of warming due to climate change increase the likelihood of irreversible effects and magnify risks for livelihoods that regard food and human security, because of this people are likely to flee from their habitat (ibid). The IPCC predicts that in 2050 there will be 150 million climate refugees (IPCC, 2014). Meyers (2002) however expect that the total amount of climate refugees will be 200 million in 2050. According to the IPCC the displacement risk increases when populations lack the resources for planned migration experience increased exposure to extreme weather events. The IPCC also notes that 'the millions of people will be displaced mainly because of shoreline erosion, coastal flooding and agricultural disruption due to climate change'. According to the IPCC, especially poor countries are vulnerable to climate change risks. In Figure 2 there is a map of the World Bank (2016) showing countries and their GDP per capita in current US$.

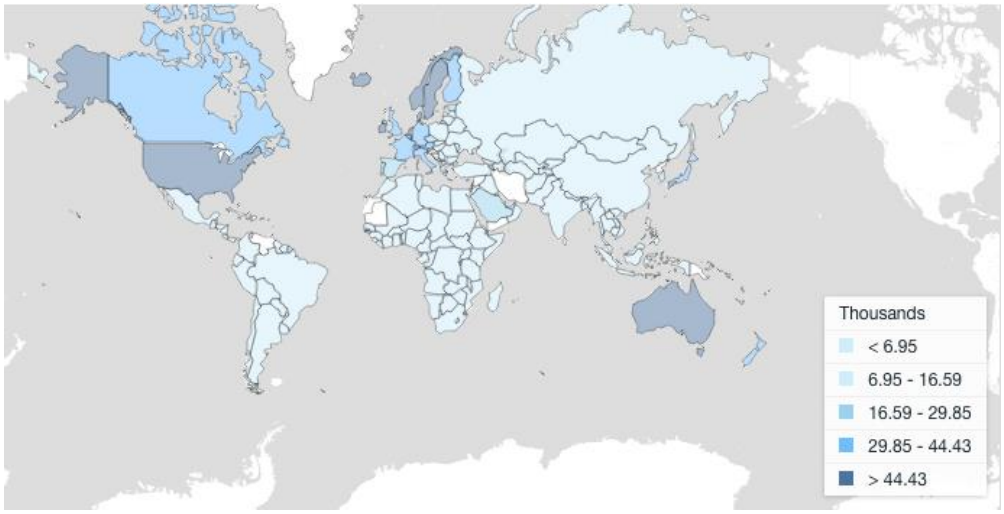

Figure 2: GDP per Capita (Worldbank, 2016).

In Figure two it becomes clear that all of Africa and the South of Asia have the lowest GDP. Bierman and Boas (2010) confirm that 90 percent of the climate refugees will come from Africa and Asia. They predict that the inability to adapt to sea level rise, droughts and water scarcity are the main reasons that people on these continents will flee. Asia runs a high risk of sea level rise, whereas Africa is more vulnerable to drought and water scarcity (ibid.). In the case of sea level rise, it is more likely that refugees will flee their homes, but stay within their country. In the case of drought and water scarcity, climate refugees are more likely to cross international borders (ibid).

It is highly certain that large migration flows will take place in the near future due to climate change (IPCC, 2014). However, there is no linear, deterministic correlation between environmental degradation and migration (Lonergan, 1998). Environmental processes are inextricably connected with social, economic, political and institutional structures (ibid). For example, it is difficult to determine whether climate changes or politics are the reason for environmental degradation, because the state of any country's environment is partly a reflection of the kind of governance in place (Deudney, 2014). Nevertheless, as previously stated, it is certain that climate change, and the environmental hazards that are the corollary of climate change events, are significant contributors to migration flows.

This section has given an answer to how climate change and migration flows correlate with each other. Climate change amplifies existing risks and will create new ones. Countries with a low GDP are extremely vulnerable to these risks because of their inability to adapt. The scope of this issue is predicted somewhere between 150 and 200 million climate refugees

by 2050. These predictions are important for UN policy, because with this data they can estimate the consequences and take further actions.

2.2 Climate refugees in the environmental academic literature

As mentioned in the introduction, discourse development and policy development influence one another (Driessen & Leroy, 2007; McNie, 2007; Van den Hove, 2007). Hajer and Versteeg (2005, 175) define a discourse as "an ensemble of ideas, concepts and categories through which meaning is given to social and physical phenomena". An unambiguous discourse is important for the naming and framing of a subject, and can either inspire concrete policy measures or merely mobilize verbal consensus (Leroy & Wiering, 2007). Both are of concern for the UN.

The academic literature contributes to the discourse on climate refugees by publishing analyses on this subject and doing any other kind of research on the subject. When there is sufficient information available on climate refugees, policy measures can be made with verbal consensus. Opinions, ideas, visions and conceptions play an important role in all kinds of social action, and certainly in policy (Leroy & Wiering, 2007). These views determine what the problem is, how urgent it is, and what the solution to the problem ideally should be. Discourses are therefore the starting point for social action (ibid.), bringing a certain order also known as 'naming and framing'. By naming and framing a subject, in this case climate refugees, the subject gets a place in the social reality (ibid.). Discourses are important for social action because of the norms, rules, and regulations that are inseparable from it, and because they determine the institutionalized practices. They do not arise suddenly, but are built on previous, often deeply historically embedded discourses in society (ibid.). This is also true for the discourse on climate refugees. Table 1 gives an overview of different scholars and their different discourses on climate refugees.

Author(s) and year published	Discourse	Term
El-Hinnawi, E. (1985)	People who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption (natural and/or triggered by people) that jeopardized their existence and/or seriously affected the quality of their life.	Environmental refugees
Westing, A. H. (1992)	Persons compelled to flee from their areas of habitual residence. They flee from natural disasters such as flooding, drought, and volcanic action.	Displaced persons/ environmental refugees
Meyers. N. (2001)	- Can no longer gain a secure livelihood in their homelands because of environmental problems combined with the associated problems of population pressures and profound poverty. - Have no alternative but to seek sanctuary elsewhere, however dangerous the attempt. - Not all of them have fled their countries, many being internally displaced. - Have abandoned their homelands on a semi-permanent if not permanent basis, with little hope of a foreseeable return.	Environmental refugees
Bates, D. C. (2002)	Involuntary: people who have absolutely no control over their relocation.	Environmental refugees
	Compelled: people with more control over the decision to migrate.	Environmental migrants
David, K. (2004)	Persons who are displaced within their own country of habitual residence or who have crossed an international border and for whom environmental degradation, deterioration, or destruction is a major cause of their displacement, although not necessarily the only one.	Environmentally displaced persons
Boon , E. K. & Tra, T. L. (2007)	People who are involuntarily removed from their land and are forced to flee to new places where living conditions are normally much worse than what they had.	Environmental refugees
Williams, A. (2008)	Those displaced by climate change both temporary and permanent.	Climate change refugees/ environmental refugees/ internal displaced person
Warner, K., Ehrhart, C., de Sherbinin, A., Adamo, S., & Chai-Onn, T. (2009)	Persons or groups of persons who, for compelling reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad.	Climate refugees
Bierman, F. & Boas, I. (2010)	- Victims of a set of three direct, largely undisputed climate change impacts. - People who have to leave their habitats, immediately or in the near future, because of sudden or gradual alterations in their natural environment related to at least one of three impacts of climate change: sea-level rise, extreme weather events, and drought and water scarcity.	Climate refugees
Farbotko, C. & Lazrus, H. (2012)	Large numbers of people predicted to be permanently or temporarily displaced by climate change effects such as: drought, desertification, deforestation, soil erosion, water shortages and rising sea levels.	Climate refugees

Table 1. Results of the discourse analysis on climate refugees 1985 - 2012.

The results above show that the first official use of climate refugees was in 1985 by El-Hinnawi, which was published in the United Nations Environmental Program (UNEP) report. The terms on the right side of Table 1 are often used interchangeably, although they sometimes refer to different concepts. All are invoked to describe populations that have been displaced or

are at risk of displacement for reasons associated with environmental change. Table 1 also reveals that the usage of the terms *'climate'* and *'environment'* have changed over the years. Initially the term 'environment' is used more often, whereas at later stages the term 'climate' seems to become more common. Also, the term 'refugee' is used more often than the term 'migrant'. The differences between these terms become apparent in their definition according to the Oxford Dictionary (2016):

> *Climate*: The weather conditions prevailing in an area in general or over a long period.
>
> *Environment*: The surroundings or conditions in which a person, animal, or plant lives or operates. The natural world, as a whole or in a particular geographical area, especially as affected by human activity.
>
> *Migrant:* A person who moves from one place to another in order to find work or better living conditions.
>
> *Refugee:* A person who has been forced to leave their country in order to escape war, persecution or natural disaster.

The shift from the term 'environment' to 'climate' is not only visible in the literature on climate refugees, but also in the United Nations Security Council (UNSC) (Detraz & Betsill, 2009), in the mainstream media and in the scientific literature (Russill & Nyssa, 2009). This shift is partly due to the media coverage of this subject (Dispensa & Brulle, 2003). The main difference between the two is that *climate change* is caused by humans (IPCC, 2014), whereas *environmental change* also includes natural changes as earthquakes. Climate change can however cause environmental change.

In the literature the terms 'migrants' and 'refugees' are used interchangeably, even though these two terms have different meanings according to the Oxford Dictionary. The groups of people concerned are forced to leave their homes due to climate or environmental conditions. This however does not always mean that these groups are forced to leave their country. As described in the next chapter, people who are forced to leave their home are often moving to another place in the same country in order to find better living conditions. Thus, neither one seems to be applicable to the persons of concern. Another term used to refer to the

people of concern is ‘internally displaced persons’ (IDPs). IDPs refers to people whom are forced to flee, but remain within their country’s borders. They are often referred to as refugees, although the current definition of a refugee is someone who is forced to leave their country. These are important differences because migrants, refugees and IDPs have different rights. The UN should have consensus on the discourse before making policy, because otherwise the same policy could result in different rights solely because of the termination. The differences between the rights of these two groups will be further explained in the next chapter of International Studies.

This section has given an answer to how climate refugees are conceptualized in the academic literature. The academic literature does not have consensus on the discourse concerning climate refugees. In the literature there is clear a shift from the term ‘environment’ to ‘climate’. These two terms have different meanings, but are used interchangeably. The same applies to the difference between ‘migrant’ and ‘refugee’, although the term ‘refugee’ is used more often, the term ‘migrant’ is not excluded. It is important to create consensus on the conceptualization of climate refugees for a consistent policy of the UN because discourse development and policy development influence one another.

2.3 The climate policy of the United Nations

The literature on environmental governance provides insights into the possibilities and limitations of international organizations like the UN regarding climate refugee issues. Because environmental problems are trans boundary, global environmental governance is an opportunity to maximize collective strengths to the benefit of global problems. E.g. by convening several Earth Summits (Arts, 2007). The first one was held in 1972 and is called de UN Conference on the Human Environment (UNCHE) (Arts, 2007). The UNCHE established the UNEP, which is currently the only environmental program within the UN (ibid.). UNEP is the most important international institution in the area of global environmental governance. An important achievement of the UNCHE was the adaptation of the Stockholm Declaration. This declaration covers functions ‘designed to facilitate comprehensive planning and thereby protect and enhance the human environment for present and future generations.’ (United Nations, 1972). Since this first Earth Summit more global environmental agreements have been established (ibid.).

As the scientific knowledge on climate change expanded, a second big Earth Summit took place: the United Nations Conference on Environment and Development (UNCED) in 1992. The UNCED yielded several results, including the Rio Declaration on Environment and Development, Agenda 21, a Commission on Sustainable Development (CSD) and a Global Environmental Fund (GEF). The UNCED was also the starting point for negotiations about fighting desertification, especially in Africa. Moreover, legally binding agreements were opened for signature including the UNFCCC. The UNFCCC entered into force in 1994 (Arts, 2007). Its ultimate aim is to prevent dangerous human interference with the climate (ibid.) The parties to the convention meet annually in the Conferences of the Parties (COP) to assess progress in dealing with climate change issues.

An important achievement of the third Earth Summit is the Kyoto Protocol (KP), which entered into force in 2005 (UN, 2014). This protocol is linked to the UNFCCC and commits its parties by setting internationally binding emission reduction targets. The KP only binds developed countries in recognition of the fact that they are largely responsible for the current high levels of GHG in the atmosphere. This puts a heavier burden on developed nations under the principle 'common but differentiated responsibility'. During the first commitment period 37 industrialized countries and the European Community committed to reduce GHG emissions to an average of five percent against 1990 levels (UN, 2014). During the second commitment period, the involved parties committed to reduce GHG at least 18 percent below 1990 levels in the eight-year period from 2013 to 2020 (ibid.).

The Paris Agreement was adopted on 12 December 2015 at the twenty-first session of the Conference of the Parties to the UNFCCC. On November 4th 2016 the Paris Agreement entered into force. The Paris Agreement has unified all nations in a combat against climate change and its effects (UN, 2014). The Paris Agreement's central aim is to 'strengthen the global response to the threat of climate change by keeping the global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.' (ibid.). Governments agreed to set more ambitious targets as required by science, provide continued and enhanced international support for adaptation in developing countries and acknowledged the need to cooperate and enhance the understanding action and support in different areas (European Commission, 2016).

The climate policies have yet to take climate refugees into consideration. All previous agreements have dealt merely with the human impact on the climate and how to moderate it,

not with the impacts on groups of people whose environment is affected by climate change and who should be held accountable. Also, there is a growing perception that the current international governance system remains weak and ineffective, because it lacks effective enforcement mechanisms and sanctions for noncompliance (Fauvre & Leverve, 2007). Hajer et al. (2005) argue that it is an illusion to think that top-down steering by governments and intergovernmental organizations alone can address global problems. Biermann and Boas (2010: 61) argue that "In these situations, climate refugees will need to rely on effective protection and support from the international community, regardless of whether climate migration is internal or transnational". The international community, as mentioned before, is not necessarily excluded to the UN, but can also include other parties like nongovernmental organizations. Hajer et. al. (2005) suggest that the global governance has to align with agents of change from business, civil society, and cities to become influential and transformative.

This section has given an answer to the question what the existing climate policy of the UN is. Despite strides on the development of climate policy, climate refugees have yet to be taken in consideration. Some argue that the UN alone cannot address these global problems, despite this it is clear that, due the trans boundary nature of this issue, some kind of international policy is needed to address the climate refugee issues.

2.4 Conclusion and discussion

The most important knowledge gap in the academic literature itself is the lack of consensus on the discourse concerning climate refugees. The gap between environmental academic literature and policy is that the proof of climate refugees is clear, but they have not yet been taken in consideration in climate policies. According to the geographic literature, there is a correlation between climate change and migration flows. There cannot be predicted how much the exact amount of climate refugees will be in the future, but the estimates are between 150 and 200 million climate refugees in 2050. The main reason for climate refugees to flee is because shoreline erosion, coastal flooding, droughts, and agricultural disruption due to climate change. Because of the trans boundary nature of climate refugee issues, global environmental governance is needed. Today, the UN is the most comprehensive form of intergovernmental governance. Before global governance can make adequate global policy on climate refugee issues, it is important that there will be a consensus reached for the conceptualization of this

group of persons. If a consensus is reached, climate refugees could be taken in consideration in climate policies.

Some authors suggest that the global governance has to align with agents of change from business, civil society, and cities to become influential and transformative and that the UN alone cannot address global problems. Another knowledge gap, not included in this chapter is that animals are not taken into account in the conceptualization of climate refugees. Animals can however have great impact on the biodiversity and ecosystems.

3. International studies

Climate refugees as human rights issue

The Universal Declaration of Human Rights (UDHR) forms the foundation of universal human rights (HR). HR are perceived as constitutive by the international community, which means that other norms should be reinterpreted in their light (Reisman, 1990). The UDHR, the International Covenant on Civil and Political Rights (ICCPR), and the International Covenant on Economic, Social and Cultural Rights (ICESCR) form the International Bill of Human Rights (IBHR), the basis for international HR protection.

Member-states affected by climate change consequences have recently drawn attention to the HR implications of climate change. These implications are a well-disputed topic amongst Member-states and academia. The debate becomes particularly important for vulnerable groups that rely on international protection. This chapter, therefore, examines the vulnerable individuals displaced by climate change: climate refugees.

Different actors relate the status of climate refugees to the HR framework. To explain how these actors frame the status of climate refugees, it is necessary to explain the theory behind 'framing' in more detail. Framing is an active process to construct reality, meant to gain legitimacy to act or not to act (Benford & Snow, 2000). A name can be framed in such a way to attain certain rights, because of the associations – and legal connotations – surrounding a name (Bhatia, 2005). Dominant frames and names therefore have real political consequences. These 'politics of portrayal' are contested battlegrounds to claim versions of reality (Demmers, 2012). However, frames are rarely fully hegemonic and always contested: they are subject to dispute, competition and resistance (Bhatia, 2005; Demmers, 2012).

The status of the climate refugee is such a contested battleground over discursive dominance. This study will examine how this status is contested by answering the following research question: *how do actors frame the status of the 'climate refugee' in accordance with the IBHR?* This chapter builds upon the previous chapter by problematizing the discursive battle surrounding the climate refugee. It adds a new perspective onto the debate through the analytical use of framing.

This study draws on insights from multiple fields associated with international studies, such as international relations, history of affairs, international law, and conflict studies. The

next section examines the relation between climate change and HR violations through a textual analysis of the IBHR and reports of the Office of the United Nations High Commissioner for Human Rights (OHCHR) (UN GA, 1948; UN GA, 1966; UN GA, 1966; Kravchenko, 2008; UN GA, 2009; Knox, 2009; Limon, 2010). The second section studies the contested legal status of the climate refugee, based on a literature review of the academic debate in international law and politics (Havard, 2007; Williams, 2008; Docherty & Giannini, 2009; Atapattu, 2010; Biermann & Boas, 2010; McAdam, 2011; Kolmannskog 2012a). The third section provides a HR-approach to climate refugees and illustrates how Member-states relate the status of climate refugees to the HR framework (McNamara & Gibson, 2008; Bettini, 2013). The last section concludes and discusses the found results. For reasons of consistency and simplicity, this chapter uses the term 'climate refugees' to indicate the target group (individuals displaced due to climate change), acknowledging that this is a contested term.

3.1 Climate change as HR violator

Reinterpreting climate change as HR issue could be an important step in reframing the debate on climate change. Generally, HR instruments have stronger compliance mechanisms than international environmental frameworks. HR bodies are firmly rooted in UN Charter organs - the HR Council, and the treaty bodies of the ICCPR and ICESCR (Kravchenko, 2008). Although HR instruments do not have strong enforcement mechanisms, HR treaties are increasingly treated as authoritative and the protection of HR is therefore increasingly perceived as a precondition of political legitimacy (Donnelly, 2007; Wotipka & Tsutsui, 2008).

The first reference to the interrelatedness of HR and the environment can be found in the Stockholm Declaration (1972). The right to life is related to the environment in Article 1: "Man has the fundamental right to freedom, equality and adequate conditions of life, *in an environment of a quality that permits a life of dignity and well-being*" (Emphasis added: UNCHE, 1972, 4). The debate on climate change and HR revived years later when the Alliance of Small Island States (AOSIS) adopted the Malé Declaration (2007). This declaration asked for a thorough study by the OHCHR on the exact relationship between climate change and HR (AOSIS, 2007). In 2009 the OHCHR set up a team to do this. The resulting report examines how climate change affects the enjoyment of HR; whether climate change violates HR; and lastly, what the national and international obligations of Member-states are (Knox, 2009).

The first conclusion of this report is that climate change threatens the full enjoyment of HR. Certain rights in the IBHR are particularly affected by climate change, namely the right to life (UDHR art. 3; ICCPR art. 5; ICESCR art. 6); the right to adequate food and the right to be free from hunger (ICESCR art. 11); the right to water (ICESCR arts. 11 and 12); the right to health (UDHR art. 25; ICESCR arts. 7(b), 10 and 12); the right to adequate housing (UDHR art. 25; ICESCR art. 11); and the right to self-determination (ICCPR art. 1; ICESCR art. 1) (UN GA, 2009).

The second conclusion of the report is that climate change is not a HR violator in a strict legal sense, because climate change itself cannot be sanctioned or persecuted as violator (UN GA, 2009). According to the OHCHR, it is furthermore virtually impossible to appoint certain Member-states as being uniquely responsible for the deterioration of HR in an area affected by climate change (Knox, 2009). The last conclusion of the report, nonetheless, describes that Member-states have obligations to protect their citizens from internal and external threats. They are thus obligated to design adaptation strategies to climate change to ensure their citizens' full enjoyment of HR (UN GA, 2009; Limon, 2010).

The 2009 OHCHR report furthermore emphasizes that the international protection of HR lies at the core of the UN Charter, and that all Member-states that have ratified the HR treaties have a legal obligation under HR law to reduce emissions to safe levels (UN GA, 2009; Limon, 2010). However, the balance between national and international obligations to protect HR is disputed. Industrialized countries argue that HR protection should remain at a national level (Donnelly, 2007; Limon, 2010). Developing countries argue that a larger emphasis should be put on international obligations, because domestic policies are unable to reduce climate change globally (Limon, 2010). Furthermore, these countries rely heavier on international assistance, because they are often less able to design adaptation strategies than industrialized countries (Reuveny, 2007; Biermann & Boas, 2010). Developing countries, who have contributed least to climate change, also state that it is possible to 'blame' industrialized countries that have contributed most to human-induced climate change (Limon, 2010). Because of the controversy over this argument, the OHCHR report does not mention a 'polluter pays'-principle or burden-sharing (Reuveny, 2007; Limon, 2010; Biermann & Boas, 2010). Nevertheless, the report clearly emphasizes that national and international HR obligations congregate in the context of climate change (Limon, 2010).

HR thus have the ability to reframe climate change agreements as obligations under international HR law (Limon, 2010). The OHCHR report reaches important conclusions on the

interrelatedness of climate change and HR (Knox, 2009). There are, however, certain issues when it comes to the international obligations of Member-states. These become particularly apparent in the case of vulnerable groups, such as those individuals displaced due to climate change. The UN has not yet translated its conclusions on climate change as HR issue to protect those 'climate refugees' (Limon, 2010).

3.2 The legal status of the climate refugee

The core task of the UN at the time of its foundation was to develop a universal tool to protect refugees from the Second World War (Havard, 2007). In 1950 the UN Refugee Agency (UNHCR) was founded. The 1951 Convention reaffirmed the UN Charter and UDHR, and was the first international legal refugee instrument. The definition of a 'refugee' here is: any individual that fears persecution, based on "race, religion, nationality, membership of a particular social group or political opinion" (UN GA, 1951, 14; Goodwin-Gill & McAdam, 2007; Williams, 2008). According to the statute of the UNHCR, a 'refugee' is an individual who has crossed an international border and whose reasons for flight are traceable to HR violations (UNHCR, 1950; Goodwin-Gill & McAdam, 2007).

Climate refugees are not fully covered by the Convention or the Statute of the UNHCR (Havard, 2007; Williams, 2008; Docherty & Giannini, 2009; Limon, 2010; McAdam, 2011). The term 'climate refugee' in itself is contested and often framed in categorizations with different legal statuses: refugees, migrants, internally displaced persons (IDPs) and environmentally displaced persons (EDPs).

There are several reasons why it is difficult to incorporate the climate refugee into the legal framework of the Convention. First, climate change consequences are indiscriminatory, thus not tied to an individual's background or beliefs (McAdam, 2011). Secondly, climate change is a gradual process, and therefore it is possible that some individuals will leave the affected area before it becomes uninhabitable. These people are labelled as 'distressed migrants'. Their displacement is perceived as voluntary, since there is no immediate danger in their areas of origin (Kolmannskog, 2012a). This relates to a third issue, namely that it is extremely difficult to disentangle the specific cause of displacement from other factors, due to the incremental impacts of climate change on the broader political and socio-economic context (Havard, 2007; Knox, 2009; McAdam, 2011). A fourth issue relates to the problematic notion of climate change as HR violator. The state might still be willing to protect its displaced

inhabitants. This relates to the final issue: the prediction that most climate refugees will be internally displaced, and the UNHCR clearly distinguishes between border-crossing refugees and IDPs (McAdam, 2011; Kolmannskog 2012a).

Attempts to include climate refugees in the Convention have met with severe opposition within the UN, particularly because member-states are worried to open the 'refugee floodgates' (Williams, 2008). The UNHCR is likely to be concerned to extend its mandate to include the potential enormous number of climate refugees that could overwhelm its institutional capacity (Docherty & Giannini, 2009). The UNHCR categorizes those displaced by climate change as EDPs. It considers the loss of national protection as key element of the refugee definition, and argues that EDPs might still be protected by their national government, and there is thus a more likelier chance that they will remain in their country of origin (Williams, 2008; UN GA, 2009; Atapattu, 2010; McAdam, 2011). The UNHCR's Guiding Principles on Internal Displacement covers EDPs, but, unlike the Convention, it has a nonbinding legal status (Williams, 2008; Kolmannskog, 2012a). The Convention, furthermore, does not include international protection to IDPs, because they are perceived as the primary responsibility of the national authorities (Hathaway, 1991; Goodwin-Gill & McAdam, 2007; Atapattu, 2010; Bierman & Boas, 2010). Displacement by climate change thus also re-actualizes the debate on how to enhance the international protection of IDPs (Kolmannskog, 2012a).

These categorizations have real political consequences. Not categorizing these individuals as 'refugees' or 'IDPs' reduces them to 'migrants', and thus as people in less need of international protection (Kolmannskog, 2012a). However, the protection of climate refugees under the Convention could also undermine the protection of political refugees (Hartmann, 2010). Biermann & Boas (2010) argue that 'EDP' serves only as a descriptive term, and they propose a definition of the climate refugee in which it does not matter whether an individual crosses a border or is internally displaced. It is this traditional distinction in international law between refugees and IDPs that is problematic for climate refugees. Several scholars argue that the traditional legal instruments are outdated, and are ill-suited to address contemporary problems (Havard, 2007; Williams, 2008; Atapattu, 2010). It is, consequently, unlikely that climate refugees will be fully protected by either the Convention, or the Guidelines on IDPs (Williams, 2008; Kolmannskog, 2012a). A lack of consensus on how to define climate refugees makes it difficult to develop an instrument to protect them (Biermann & Boas, 2010). More innovative responses are necessary to create international climate refugee protection measures.

3.3 A human rights-approach to climate refugees

A HR-approach might suit climate refugee protection better for several reasons. First, although climate refugee protection is not fully covered by traditional legal refugee instruments, they are 'still human', and thus should be able to fully enjoy the HR as described in the IBHR (Atapattu, 2010; McAdam, 2011; Kolmannskog, 2012a). Second, a HR-approach allows for complex causal relationships between the environment and socio-economic and political factors (Kolmannskog, 2012a). Third, legal refugee instruments are derived from the HR framework. The UNHCR identifies 'refugees', when reasons for flight are traceable to HR violations (UNHCR, 1950). A HR-perspective can thus expand the legal status of climate refugees. The next illustrational cases will shows how this looks like in practice for Member-states affected by climate change.

Climate change is a global problem, but it affects certain regions more than others. Instead of seeking a universal response to climate change displacement, it might be more appropriate to design regional approaches to allow for different ways in which climate change affects HR (McAdam, 2011). Climate refugees following the 2011 droughts in Somalia have different concerns than the citizens of the 'sinking island nations', such as the Maldives and Tuvalu.

Regional HR instruments often have stronger enforcement mechanisms than the UN framework (Williams, 2008; Kravchenko, 2008). At the regional level, existing HR instruments can more easily provide the basis for the 'complementary protection' status of the climate refugee (Kolmannskog, 2012a). 'Complementary protection' means that a state provides assistance to refugees that fall outside the 1951 Convention on the basis of existing HR agreements (Goodwin-Gill & McAdam, 2007; Williams, 2008; McAdam, 2011).

The case of Somalis taking refuge to Kenya after the 2011 droughts illustrates what this might look like in practice. Following the 2011 droughts, large numbers of agro-pastoralists fled the southern drylands of Somalia in search for more liveable environments (Save The Children & Oxfam International, 2012). The Kenyan government protected these refugees based on the Organization of African Unity (OAU) Convention (1974) and the African Charter on Human and People's Rights (1986). Both instruments included an extended definition of the 'refugee', including those displaced due to "events seriously disturbing public order" (UNHCR, 1974, 3; Havard, 2007; Atapattu, 2010). Furthermore, Article 24 of the African Charter states: "All peoples shall have the right to a general satisfactory environment

favourable to their development" (OAU, 1986), in which HR are explicitly linked to environmental quality (Kravchenko, 2008).[1] Consequently, regional HR approaches have been able to frame a certain legal status for climate refugees.

Regionalizing climate refugee problems will prevent mass refugee flows into other regions, but it cannot be a long-term adaptation strategy to climate change (Hathaway, 1991). At the forefront of the debate on climate change as HR violator are the Maldives. In the Malé Declaration (2007) that led to the 2009 OHCHR report, the AOSIS - led by the Maldives – recognized that the implications of a healthy environment on the full enjoyment of HR have been recognized by 118 national constitutions (AOSIS, 2007; Kravchenko, 2008). The Maldives, and other small island nations, are so-called 'sinking states', on whom global sea-level rise has severe land-degrading effects. The archipelago of islands have made specific claims to the climate refugee status, arguing that international protection should be given to IDPs and that climate refugees should be included in the 1951 Convention to protect HR (Docherty & Giannini, 2009; Kolmannskog, 2012a). The government has also started to buy new land elsewhere. President Nasheed stated: "We can do nothing to stop climate change on our own and so we have to buy land elsewhere. It's an insurance policy for the worst possible outcome" (The Guardian, 2008).

While the Maldives seem to accept their status of future climate refugees, other vulnerable island nations respond differently. UN Ambassadors of Tuvalu have made clear that they do not accept their 'climate refugee status'. They have advocated for a stronger emphasis on fighting the root causes of climate change on a global scale, instead of being perceived as passive victims of climate change (McNamara & Gibson, 2009). Tuvalu frames its citizens' HR differently, and emphasizes the right of self-determination. Bettini (2013) argues that mass climate refugees flows are not unavoidable, and that citizens of sinking states should not be reduced to passive, helpless victims: climate refugees in waiting (McNamara & Gibson, 2009). Statements made by the ambassadors as: "We do not need labels, but action" (Farbotka & Lazrus, 2012, 383), and: "We want to stand up and fight. All we ask is that […] the international

[1] A side-note is needed in this case. The droughts in Somalia are intertwined with the Somali conflict. The Kenyan government therefore recognized that they were accepted into the country for these two reasons (drought and conflict), of which the second reason falls under the 1951 Convention definition of a refugee (Kolmannskog, 2012b).

community help us in this fight" (McNamara & Gibson, 2009, 479), reaffirm the need to be cautious in our categorizations (McNamara & Gibson, 2009, 481).

3.4 Conclusion and discussion

The discursive battle on the legal status of the climate refugee will continue and remain important for international refugee and HR law. Innovative thinking is needed to design more comprehensive international protection measures. A first step is the 2009 OHCHR report that acknowledges that climate change does impact HR. HR thus have the ability to reframe climate change agreements as HR obligations.

This chapter has examined how actors frame the status of the 'climate refugee' in accordance with HR. The legal status is framed in different ways, with different names that have different legal and political consequences. It appears unlikely that traditional legal instruments are able to fully cover climate refugees, as they combine characteristics from refugees, IDPs, EDPs and migrants. It is clear, however, that international assistance is essential in protecting climate refugees.

The illustrative cases have shown the practical difficulties surrounding the status of the climate refugee. Regional HR-approaches can prove fertile, but regionalizing refugee problems cannot be a successful strategy to combat climate change in the long-term. The Maldives and Tuvalu have explicitly made claims to the HR framework, but while the Maldives focuses on protecting their future climate refugee citizens, Tuvalu refers to the root causes of climate change itself. Rather than protecting the HR of climate refugees by designing refugee protection instruments, it might be necessary to reconsider the main global goal: are we going to fight the root causes or consequences of climate change?

4. Innovation sciences

What can we do to prevent climate refugees?

Sub-Sahara Africa (SSA) has the fastest growing population in the world. In 2016, 1 billion people live in SSA and it is predicted that in 2050 the population will rise to 2.1 billion, then accounting for approximately 20% of the total world population (Alexandratos & Bruinsma, 2012). In 2012, 55.8% of the people in SSA lived below the poverty line, and GDP was 17 times less than the world average (Nationmaster, 2016). As a consequence, food scarcity is common in SSA (Global Food Security Index, 2016b). This is due to the slow growth of agricultural production within SSA over the past 30 years. Chauvin, Mulangu and Porto (2012) state that SSA-countries has very low yields compared to the rest of the world. Area expansion has contributed to agricultural growth, but it is impossible to create a sustainable agriculture based on merely area expansion. If no action is taken, food scarcity will become a major threat in SSA.

According to the finding of the environmental sciences-chapter, 90 percent of the climate refugees will come from Africa and Asia. African refugees will flee because of droughts and water scarcity. These refugees are more likely to cross international borders, with worldwide impact as consequence. Droughts and water scarcity will be one of the main reasons for food scarcity in the SSA. It is therefore important that innovations in the field of agriculture are adopted by SSA. However, SSA is the poorest region in the world, which is why they need effective support to adopt technical innovations concerning agriculture. The focus of this chapter will be on the development aid given by the Food and Agriculture Organization (FAO), because this organization has the greatest worldwide influence when it comes to improving food security. The disciplinary research question addressed here is: *To what extent do projects of the FAO result in agricultural innovation in sub-Saharan Africa?*

To answer this question, the projects in SSA that run under the flag of the FAO within SSA will be analyzed on different criteria. For this analysis the conceptual framework for promoting innovation in developing countries of Aubert (2005) will be used. This framework will be explained in section two. In section three the framework will be operationalized in order to enable a quantitative analysis of the projects. Section four will contain the analysis. After the analysis the results of the analysis will be summarized in section five. In section six

conclusions will be drawn on basis of the results. In the seventh section, the conclusions will be critically evaluated.

4.1 Theoretical Framework

The theoretical framework of Aubert (2005) "Promoting Innovation in Developing Countries" will be used for quantifying the different indicators that signal the effectivity of the support offered by the FAO projects. The framework of Aubert has been chosen because, there is a clear relation between economic growth (and the development) of a country and innovation (Nadiri, 1993). Only parts of the framework, that are useful to this analysis, with respect to what the FAO could do, will be used. Because food scarcity is currently the greatest problem within SSA, only projects that directly support innovation in agriculture are analyzed. The reason for this is that agriculture is an important factor in poverty reduction and has been the engine of growth in most developing countries, where agricultural growth has been the cause of to economy-wide growth (Chauvin, Mulangu & Porto, 2012).

Aubert's framework describes what could be done to improve innovations in developing countries. It ranges from the least developed developing countries to the most developed developing countries. Because most countries in SSA belong to the group of the least developed developing countries, we will only focus on the parts of the framework that are applicable to such countries.

The framework states that innovations do not have to be entirely new ideas, 'innovation' need to be understood in a broad sense, referring to something that is new in a given context (Aubert, 2005, 34). This form of innovation is called "technology adoption" and is the most important form of innovation for developing countries. Therefore, there will be looked if the FAO projects support technology adoption.

Next to technology adoption, there are other important activities that generate innovations for the least developed developing countries. Aubert uses the concept 'innovation systems'. An innovation system is the set of organizations that interact with each other, and their linkages, through which innovation processes develop (Aubert, 2005). Therefore, the most important factors that can be influenced by the FAO of the innovation system will be analyzed.

Creation of Indigenous knowledge

The adoption of new technologies by developing countries can lead to innovations due to indigenous knowledge. Indigenous knowledge comes from people's experience, accumulated and transmitted over generations (Aubert, 2005, 13). It is affected by North South Schemes (North South schemes are partnerships between developing countries and the developed world) and by cooperation activities within the developed world (Aubert, 2005, 24-25).

Mediation between foreign and local partners

The boosting of the outsourcing potential of a country by its acting as broker between local companies and foreign partners who intend to invest in the country is an important means of enhancing innovation within a developing country (Aubert, 2005, 27).

Improvement of linkages

Improvement of linkages contributes to the building of an appropriate research structure. Many developing countries have the problem that there is a lack of interfaces between research bodies and local communities. Linkages can be improved by financing research bodies and stimulating local entrepreneurs or producers to work together with these research bodies (Aubert, 2005).

Education

According to Aubert (2005), educational levels in developing countries are generally low. Low educational levels form a significant barrier to the development and diffusion of innovation. It is therefore important that FAO projects improve education in the country where they run.

Kind of investment

The support offered by a project needs to be as effective as possible. Aubert (2005) states the following about this support: "A key rule of thumb, illustrated by experiences of the developed countries, is the provision of a definite share of guaranteed resources (core funding), ranging from 50 to 70 percent to the total available budget, and 30 to 50 percent of more volatile resources (contracts)" (Aubert, 2005, 21). This means that, effective support

should not only focus on direct funds, but also on extra funding when certain goals are reached.

4.2 Operationalization

To operationalize the analysis of the FAO projects, the parts of the framework to be analyzed need to be transformed into indicators, so that the projects can be quantified. All above parts are indicators for effective support by the FAO for the development of an appropriate innovation structure in developing countries. The indicator 'countries where the project runs' has been added in order to make a comparison between countries where FAO projects run and where no FAO projects run. The indicator 'kind of project' has been added to examine if the project directly supports agriculture. If it does not, no further analysis of that project will be necessary, because only agricultural projects are analyzed. On the other indicators, which are part of Aubert's (2005) framework, the FAO projects can score points. All of these points will be added up. Thus each project will receive its own overall score. Table 2 shows the indicators that are used to quantify the FAO projects. The higher the score, the better the project, according to the theoretical framework.

Indicators	Sub-Indicator	Score
Countries where the project runs		In which countries does the project run?
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • Yes • No
Does the project create Indigenous knowledge?	Are there North South Schemes?	Number of partnerships between SSA countries and developed countries. 0 partners = 0pt 1-2 partners = 1pt 3-5 partners = 2pt 6-10 partners = 3pt 10+ partners = 4pt
	Are there Cooperation activities with the developed world?	Is there financial support of research projects on agriculture and/or exchange of agricultural researchers between north south? • Yes = 1pt • No = 0pt Is there participation of universities? • Yes = 1pt • No = 0pt Are there research institutes in multinational schemes to promote international R&D? • Yes = 1pt • No = 0pt
The improvement of linkages by financing of research bodies		Does the project improve linkages? • Yes = 1pt • No = 0pt
Acting as mediator between foreign and local partners		Does the project support local partners and foreign partners to work together? • Yes = 1pt • No = 0pt
Technology Adoption and local improvement regarding agriculture		Does the project support technology adoption in agriculture? - modernised agriculture • Yes = 1pt • No = 0pt
Education		Does the project support education? • Yes = 1pt • No = 0pt
Kind of investment		Is the investment in the project a guaranteed amount of money or do the projects have certain contracts for reaching goals? Only direct investment = 0pt Direct investment and contracts = 1pt

Table 2: Indicators for FAO projects and their score.

In this analysis, different variables are used, because there is a clear relation between economic growth and the development of a country and innovation (Nadiri, 1993). After analyzing all presently running FAO projects, the different project scores will be added up per country. So for example, Benin scores 5 points on project A and 8 points on project B, the total score of Benin will be 13 points. Thus, a list is created of all SSA countries and their total score on FAO projects. This will form the independent variable "project score" in the analysis, and will be used in a simple linear regression with different dependent variables. The goal of the regression is to uncover causalities between the dependent variables and the independent variable (Vocht, 2013). The dependent variables are measures for the development in a country. In order to determine whether FAO projects are truly effective for the countries where they run, the following dependent variables, are used.

GDP Growth

The average GDP growth during the period between 2010-2015 will be used to measure the contribution of the agricultural projects of the FAO to the growth of the economy of the country where they run. The average growth over the period 2010-2015 is taken as a measure because the growth over the past five years rules out possible outliers. In this way it gives a better projection of the development of a country.

Percentage of the population without education

The share of the population without primary education is used to measure to what extent the agricultural projects of the FAO contribute to diminishing the share of population without primary education in the country where they run.

Agricultural import versus export

The ratio between agricultural export and the total amount of agricultural import and export will be used to measure whether the agricultural projects of the FAO contribute to the growth of the export of agricultural products in the country where they run.

Foreign Direct Investment

Foreign direct investment (FDI) inflows can be crucial, both in stimulating change and innovation and in bringing in new technology and knowledge to a country (Aubert, 2005). Therefore, the ratio between a country's FDI and the total amount of FDI to SSA will be used to measure to what extent FAO agricultural projects contribute to more FDI inflows to the country where they run.

Protection of indigenous knowledge

Protection of indigenous knowledge is an important asset of innovation within a country (Aubert, 2005). Therefore, the protection of indigenous knowledge within SSA countries will be measured in terms of their number of patents. The total amount of patents per country will be compared to the agricultural FAO projects in order to measure whether FAO projects contribute to the protection of indigenous knowledge by creating more patents.

Human Development Index

The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development (UNDP, 2016b). The HDI will be used to measure whether agricultural FAO projects contribute to human development, as expressed by the HDI. For measuring the improvement of HDI, a four-year trend is used.

Corruption Perceptions Index

The Corruption Perceptions Index (CPI) measures the perceived levels of public sector corruption worldwide (Transparency International, 2016). The CPI will be used to measure to what extent FAO agricultural projects contribute to a decline in corruption within the country where the project runs. Also for measuring the improvement of the CPI, a four-year trend is used.

Global Food Security Index

The Global Food Security Index (GFSI) measures food security comprehensively across three dimensions: affordability, availability, and quality (Global Food Security Index, 2016a). For measuring the improvement of the GFSI, a four-year trend is used as well. It will be used to measure whether FAO agricultural projects contribute to food security in the country where they run.

4.3 Analysis

In this section the current activities of the FAO in SSA will be analyzed, using the framework in section two and the operationalization of this framework in section three. An analysis of the individual projects involved are listed in Appendix II, VI through XVI. All projects were first analyzed using the eight indicators from the framework of Aubert (2005). The maximum score that a project can reach is twelve. All project scores were added per country: the total project score per country can be found in Table 3.

Besides the analysis of the projects, the data of the dependent variables is collected. This data is specified in Table 3. The data of the dependent variables that measure effectiveness of project and the independent variable project scores per country are analyzed using SPSS. The goal of this analysis is to find causality between the variables for effective support and the

project scores. In order to do this, a regression analysis has been conducted. Because there is only one independent variable (project score) a simple linear regression was used for all the dependent variables (Vocht, 2013).

Country	Project score (independent)	% Population with no education (dependent)	GDP Growth % 2010-2015 (dependent)	Number of patents between 2002-2015 (dependent)	FDI as percentage of total FDI to SSA (dependent)	Percentage Agriculturalexport of total (import + export) (dependent)	Human Development Index (HDI) 2015 (dependent)	Corruption Perception Index trend 2012-2015 (dependent)	Global Food Security Index 4 year trend (2012-2016) (dependent)
Angola	11	-	4.1%	4	4.18%	0.74%	+1.5%	-31.8%	+0.4%
Benin	15	41	3.6%	1	0.82%	28.04%	+1.1%	+2.8%	+6.7%
Botswana	11	-	2.1%	0	0.85%	8.81%	+1.0%	-3.1%	+2.7%
Burkina Faso	9	62	3.9%	1	0.74%	28.28%	+2.3%	0.0%	+0.8%
Burundi	7	-	8.7%	0	0.02%	-	+1.3%	+10.5%	-2.8%
Cameroon	6	14	3.9%	15	1.09%	24.57%	+2.2%	+3.8%	+3.6%
Cape Verde	-	-	-0.3%	0	-	8.63%	+1.1%	-8.3%	-
Central African Republic	-	36	-4.1%	0	0.01%	1.01%	-6.2%	-7.7%	-
Chad	7	48	0.4%	1	1.65%	0%	+1.2%	+15.8%	-0.2%
Comoros	-	28	3.4%	0	0.03%	-	+0.8%	-7.1%	-
Congo	-	-	-4.8%	0	11.96%	1.82%	+2.8%	-11.5%	-
Dem. Rep. Congo	11	-	12.0%	0	-0.74%	-	+2.4%	+4.8%	+4.1%
Côte d'Ivoire	6	41	4.6%	1	1.00%	53.01%	+2.2%	+10.3%	+3.1%
Djibouti	-	-	6.8%	0	0.33%	8.77%	+1.1%	-6.6%	-
Equatorial Guinea	7	-	-4.4%	0	4.33%	-	+0.5%	-	-
Eritrea	-	25	-	0	0.10%	-	+0.3%	-28.0%	-
Ethiopia	7	-	-	2	-	26.28%	+3.0%	0%	-1.5%
Gabon	-	8	-0.02%	2	2.12%	0.62%	+1.6%	-3.9%	-
The Gambia	-	-	-1.8%	0	0.06%	12.13%	+0.2%	-17.6%	-
Ghana	13	18	3.0%	10	7.31%	30.66%	+1.2%	+4.4%	+4.0%
Guinea	9	58	6.8%	1	1.23%	10.39%	+7.8%	+4.2%	+5.0%
Guinea-Bissau	-	-	4.1%	0	0.05%	52.19%	+0.7%	-32.0%	-
Kenya	4	8	9.7%	70	2.05%	22.27%	+1.7%	-7.4%	+0.8%
Lesotho	11	-	-0.04%	0	0.10%	0%	+2.7%	-3.2%	-
Liberia	-	-	9.8%	0	0.79%	7.17%	+2.6%	-9.8%	-

Madagascar	5	18	2.4%	1	0.76%	17.63%	+0.6%	-12.5%	+0.1%
Malawi	17	20	-0.9%	1	1.56%	74.07%	+2.8%	-16.2%	-1.2%
Mali	9	64	3.8%	1	0.43%	7.11%	+1.2%	+2.9%	+2.0%
Mauritania	9	40	4.2%	0	1.09%	13.2%	+1.6%	0%	-
Mauritius	5	5	3.1%	1	0.91%	41.78%	+0.6%	-7.0%	-
Mozambique	11	22	7.4%	0	10.87%	25.15%	+2.0%	0%	-1.6%
Namibia	11	-	0.4%	1	1.07%	51.70%	+1.3%	+10.4%	-
Niger	9	69	4.1%	0	1.67%	17.10%	+1.8%	+3.0%	+0.0%
Nigeria	-	26	5.1%	16	10.12%	3.89%	+1.8%	-3.7%	+1.5%
Rwanda	13	19	7.1%	0	0.63%	17.6%	+1.5%	+1.9%	+2.4%
Sao Tome and Principe	7	-	12.1%	0	0.06%	11.9%	+0.5%	0%	-
Senegal	9	-	1.1%	2	0.75%	15.99%	+1.1%	+22.2%	+5.6%
Seychelles	5	-	8.0%	13	0.24%	-	+1.4%	+5.8%	-
Sierra Leone	-	-	11.8%	0	1.50%	5.11%	+4.0%	-6.5%	-8.4%
Somalia	6	-	3.7%	0	0.23%	-	-	0%	-
South Africa	5	8	-2.8%	1988	12.48%	55.49%	+1.1%	+2.3%	+2.1%
Sudan	-	-	4.7%	0	2.72%	5.17%	+0.6%	-7.7%	+2.9%
Swaziland	11	-	2.5%	0	0.06%	54.22%	+0.4%	-	-
Tanzania	20	21	7.2%	2	4.44%	32.98%	+2.2%	-14.3%	+2.2%
Togo	-	27	4.4%	0	0.64%	22.84%	+3.0%	+6.7%	+4.9%
Uganda	15	10	5.1%	1	2.49%	43.70%	+1.5%	-13.8%	+2.9%
Zambia	20	8	0.8%	0	3.28%	75.86%	+1.7%	+2.7%	+0.1%
Zimbabwe	11	4	7.9%	15	1.18%	9.89%	+3.7%	+5.0%	-

Table 3 - SSA countries and their indicators for improving innovation. Nagdy, M., & Roser, M. (2016); World Bank. (2016); Index Mundi. (2016); FAO. (2016f); UNDP. (2016); Transparency International. (2016) Global Food Security Index. (2016b); US Patent Trademark Office (2015).

4.4 Results

The simple linear regression analysis results in a medium strong, significant causality between export percentage and project score. There were no outliers that corrupted the outcome of the regression, so it can be concluded that there is a significant causality between export percentage and project score. The output of the complete analysis can be found in Appendix XVIII. The most important outputs of the analysis are the R square, the adjusted R square and the

unstandardized coefficient B. The R square is the determination coefficient: it measures the strength of the causality is indicative of the share of explained variance of the dependent variable by the independent variable (Vocht, 2013). While the R square often overestimates the explained variance between the dependent and the independent variable, the adjusted R square is a better indicator for explained variance (Vocht, 2013). The adjusted R square of the causality between expert percentage and project score has the value 0.211. This means that 21.1% of the variance within the export percentage is explained by the project score. The unstandardized coefficient B provides us an insight in the direction of the causality (Vocht, 2013). In the present case, there is a positive causality of 1.679. This means that with an increase of one point in project score, there is an increase of 1.679 in export percentage. All other dependent variables have no (significant) causality with the project score.

4.5 Conclusion and discussion

The analysis of existing FAO projects within SSA has found a causal relation between the score of the projects in a country and the ratio between the food export and the total food import and export of that country. This seems a good result of the FAO projects: it implies that the projects have improved the food export of the countries where they run. However, there has not been found causality with all other variables that are measures of development. There can be concluded that the FAO projects do in fact have a positive impact on the food export of a country, but they do not have any impact on the development of all the other variables within countries they run. This is due to the focus of the projects of the FAO. The projects are focused on improving the agriculture, which in his turn should improve other factors. The improvement in agriculture is found, but there is no (or not yet) improvement within the other factors that can be linked to the FAO projects.

The framework of Aubert describes a lot of factors that are interdependent with each other to promote innovation. According to Nadiri (1993) the promotion of innovation should have a positive impact on the development of the country. There is one factor for development that has improved due to the projects. However, the other factors were not influenced by this. Agricultural production has not yet been able to have a positive impact on the development of SSA countries. Therefore, the conclusion can be drawn that FAO projects do not have a significant impact on the promotion of innovations, and thus the development, of the countries as a whole. This is an answer to the research question: To what extent do projects of the FAO

result in agricultural innovation in sub-Saharan Africa? However, there is a relation between agricultural production and the FAO projects, which might have a positive influence on SSA countries development in the future.

The reason why innovations are not promoted enough is unclear. However, the analysis of the projects has provided information about how well the projects fit in the framework. The average score of the projects analyzed is 5.9. This is less than half of the maximal number of points that can be scored, which implies that most of the projects do not fit in the framework of Aubert (2005). For example, none of the projects scored points on a collaboration with universities, on the kind of investment for the project and a lot of the projects did not score points on education. The absence of these indicators from the FAO projects may be the reason why the projects do not have impact on the overall development of the country. However, there are several other factors that could play a role as well in promoting innovation in SSA countries. These other factors will be discussed next section.

The results of the present research have been obtained through a quantitative analysis of the collected data. By quantifying the FAO project, underlying factors that may impact the promotion of innovation within SSA have not been taken into account. There are many other factors that influences the measures used for development in this research. Nevertheless, it is interesting that a causality has been found between the ratio between the food export and the total food import and export of a country and its project score. Further research is needed to examine this causality.

The causality of export percentage and project score fits well within the opinion of the World Bank. The World Bank (2015) states that the development of Africa has to start with agriculture. Strengthened by the findings of Chauvin, Mulangu and Porto (2012), who claim that the agricultural sector of SSA is marked by low productivity with little application of science and technology, the causality found between export percentage and the project score is a good starting point for further promotion of innovation. Chauvin, Mulangu and Porto (2012) emphasize the importance of technology adoption within SSA. According to them the little application of science and technology is the reason that the productivity within SSA is still far below the yield potential, while SSA has the necessary fertile land and labor to be food self-sufficient. Alexandratos and Bruinsma (2012) also acknowledge the problems of the agricultural productivity in SSA. They predict that the annual crop production growth in the SSA will slow down. It is therefore important that the FAO projects have a significant impact on the promotion of innovation in SSA countries, starting with technology adoption in the

agricultural sectors, to improve yields. The present analysis is a step in the right direction since it analyzes what can be done to improve the agriculture in SSA. The fact that a causality between the projects and the export of food within SSA countries has been found constitutes a positive development. However, the projects of the FAO need to address significantly more indicators of the framework in order to be truly effective.

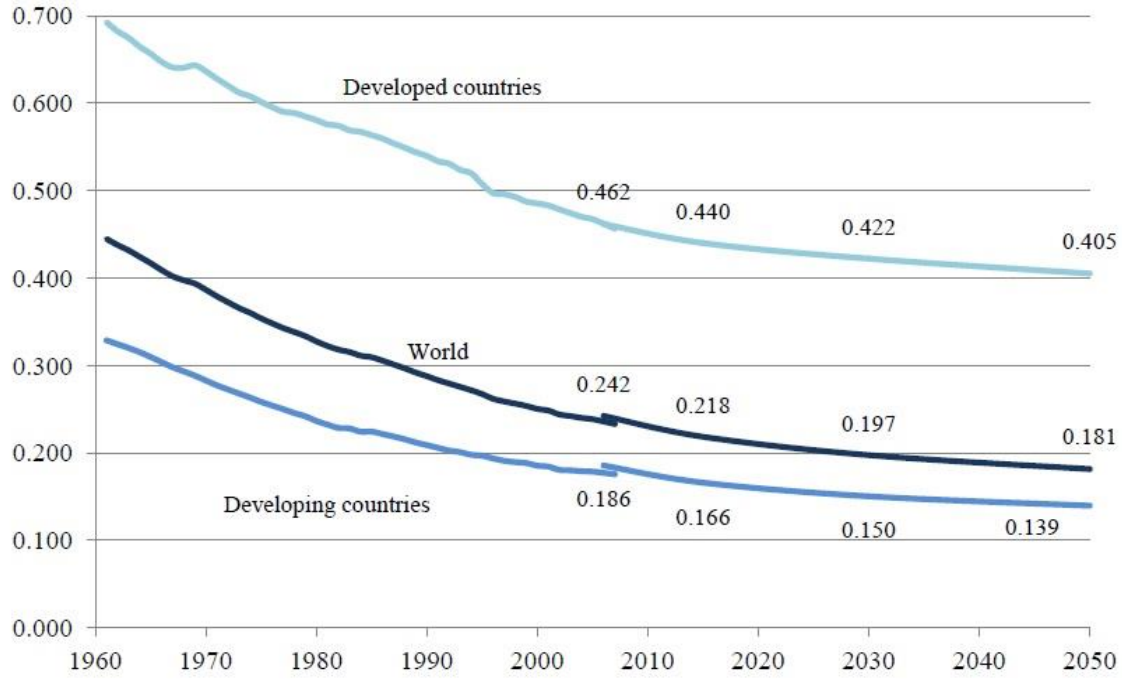

Figure 3: Arable land per ha per capita (Alexandratos & Bruinsma, 2012).

Reducing food scarcity in SSA will be of outmost importance in the future to cope with the population growth. In order to prevent climate refugees, agricultural improvement is needed. SSA countries need to adapt to climate change by adopting existing technologies in order to improve yields, while arable land per capita is declining due to climate change (Figure 3). Yield per ha need to be improved in order to fulfill the future food demand (Alexandratos & Bruinsma, 2012). An agricultural revolution is needed in SSA and the FAO should provide the technologies needed to start this revolution.

5. Integration

This chapter integrates the different disciplinary insights to create a more comprehensive understanding of climate refugee issues. To be able to integrate insights, we will identify conflicts and similarities between our insights and create common ground among them using Repko's (2012) integration techniques. After the creation of common ground and the organization of key disciplinary concepts, we are able to create a more comprehensive understanding. We will conclude by giving an answer to the proposed research question: *what role could the United Nations play concerning climate refugee issues?* Lastly, we will evaluate upon our results. We will first give an overview of the key disciplinary insights from the previous chapters.

5.1 Key disciplinary insights

The environmental sciences-chapter examined the knowledge gaps that exist in academics and policy-making regarding climate refugees. Academic research has shown that climate change and refugee flows correlate with each other. However, the literature does not reach a conceptual consensus on how to define the climate refugee. Due to a lack of consensus, climate refugees have yet to be taken in consideration in UN climate policies. The UN has played a key role in international environmental governance and the created climate change framework could serve as a basis for climate refugee protection.

The international studies-chapter examined human rights-approaches to climate refugee protection. Climate change affects the full enjoyment of human rights, and the human rights framework therefore provides an innovative approach to protect climate refugees as international obligations under human rights law. Incorporating the climate refugee in existing legal refugee instruments is problematic, because the definitions do not fully cover climate refugees and there is no conceptual clarity on how to define the climate refugee. Thus, a human rights-approach may be able to protect climate refugees more effectively.

While it is important to design international UN instruments to protect climate refugees, another effective approach may be to prevent them for leaving their place of residence by implementing agricultural innovations to stimulate economic growth and reduce environmental degradation. The innovation sciences-chapter studies whether current FAO projects in Sub-

Saharan Africa are effective in promoting more sustainable, agricultural developments. The FAO can promote the adoption and implementation of agricultural innovations to reduce environmental degradation, so that countries in SSA become more sustainable and are able to adapt to climate change consequences. Table 4 shows an overview of the key disciplinary findings.

	Environmental sciences	**International studies**	**Innovation sciences**
UN sub-organization	IPCC, UNFCCC, UNEP	UNHCR, OHCHR	FAO
Disciplinary insights	There is no conceptual clarity on the definition of the climate refugee, but there is a correlation between climate change and refugee flows.	A human rights-approach to climate refugee can provide the basis for innovative responses to international refugee protection.	Sustainable agricultural innovations are needed to reduce environmental degradation and secure rising food demands.
What does this insight mean for the climate refugee debate in the UN?	Combination of mitigation measures and adaptation strategies, within UN climate framework, are needed to adapt to climate change.	Human rights framework reframes the international obligations of Member-states to reduce climate change-effects under international human rights law.	Sustainable agricultural innovations are essential in the development of adaptation strategies to climate change to prevent mass refugee flows.

Table 4: overview of key disciplinary insights

5.2 Creating common ground

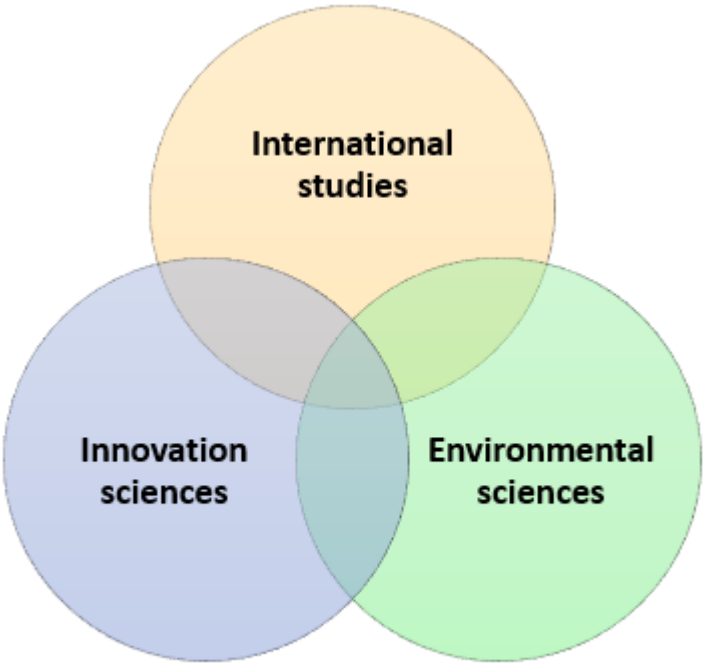

Figure 4: Venn diagram of the three disciplines

In order to be able to integrate the key disciplinary insights, we need to identify and examine similarities, differences and conflicts between disciplinary insights. The three disciplines at issue are depicted in figure 4. Similarities, differences and conflicts can be traced back to the assumptions, concepts and theories of the corresponding disciplinary perspectives (Repko, 2012). Integrating conflicting insights requires the creation of common ground among them. Repko (2012) defines interdisciplinary common ground as "one or more concepts or assumptions through which conflicting insights or theories can be largely reconciled and subsequently integrated" (Repko, 2012, 322). We will use Repko's integration techniques to achieve such common ground. First, we will examine conceptual differences and similarities of the term 'climate refugee' and the concept of 'adaptation', which are both crucial for our research. Then, we will organize the key disciplinary concepts to show how they relate to each other and contribute to a more comprehensive understanding.

5.2.1 Conceptual difference: 'climate refugee'

Integration requires the creation of a common ground-language for the formulation of a more comprehensive understanding (Repko, 2012). It is therefore important to analyse terminological differences to understand the language used in different disciplines. The environmental sciences and international studies chapters conceptualize the concept of 'climate refugee' differently. The discourse analysis provided by the environmental sciences-chapter shows how academics have used different terms to denote the same group of people, namely: those individuals displaced owing to climate change-induced environmental degradation. The discourse analysis reveals that the term 'environmental migrant' predominates in academic publications. This hints at a more or less 'voluntary' migration, caused by natural degradations

in the larger environment. The term 'Environmentally Displaced Persons (EDPs)' predominates in international studies-chapter, which is a term proposed be the UNHCR. EDPs are covered under the UNHCR Guidelines on Internal Displacement, and thus have the legal status of Internally Displaced Persons (IDPs). Conceptualizations of climate refugees as 'environmental migrants', 'EDPs' or 'IDPs', however do not fully cover the entire group of (future) climate refugees. We will use Repko's *technique of redefinition* to create common ground between these conceptualizations, and redefine the 'climate refugee' as:

Any person who, as a consequence of climate change-related environmental degradation, is forced to move within his or her country of residence or across national borders.

We emphatically use the term 'refugee' instead of 'migrant', because the displacement at issue is forced and involuntarily. Our definition further emphasizes that refugee movement can be internal as well as transnational, as climate refugees may be displaced within their country of residence, as well as transnationally (Biermann & Boas, 2010). However, we do not want to limit our definition to 'EDPs' or 'IDPs', since this will put the responsibility of protecting them on domestic governments, while we want to emphasize the obligations of the international community, and specifically the UN, to protect climate refugees. The reasons for their flight are climate change-related, which means that gradually changing weather conditions in an area have led to environmental degradation in a way that affects the livelihood of that area. We use the term 'climate refugee' rather than 'environmental refugee' to put emphasis on the consequences of human-induced climate change. This redefinition of the 'climate refugee' brings out a common meaning that exceeds disciplinary differences in language. We recognize, however, that the legal status of 'climate refugees' remains contested because of protection gaps in international law.

5.2.2 Conceptual difference: 'adaptation'

Adaptation is a term used in environmental and innovation sciences to define any adjustments made within existing frameworks, with the aim of improving and increasing future advantages. Environmental sciences uses the term to describe adaptations to climate change, by means of which actors will anticipate on the adverse effects of climate change - either by adopting appropriate measures to minimize and reduce the damage that climate change causes, or by

'taking advantage of opportunities that may arise' from climate change (European Commission, 2017). In contrast, innovation sciences uses the term to describe technological adaptation, in cases where adjustments in existing technologies are necessary to become more suitable for a more recent innovative application (The Free Dictionary, 2016). We use Repko's *technique of extension* to widen the scope of the concept 'adaptation' as it is used in environmental and innovation sciences (Repko, 2012). According to this wider scope, both sciences understand adaptations as necessary adjustments based on existing frameworks. By removing the disciplinary particularities of the term, we arrive at its broadest meaning, namely: the 'adjustment' or 'modification' of something that exists. When adaptation is understood in this sense, it becomes possible to include the term in international studies as well. This extension of 'adaptation' will help us integrate our disciplinary insights into a more comprehensive understanding of the protection of climate refugees.

5.2.3 Organization of key disciplinary insights

To clarify how the key disciplinary insights relate to the overall problem, we will use Repko's (2012) integration *technique of organization*. Connecting disciplinary insights and suggested adaptation measures to the problem of international climate refugee protection show how these insights together form a more effective approach to climate refugee issues. Figure 5 presents a schematic overview of the overall problem, the disciplinary insights, and the adaptation measures proposed by them. This scheme will provide the basis for our more comprehensive understanding. The disciplinary insights and adaptation measures suggested, are the following:

- *Environmental sciences* suggests an adaptation in climate change frameworks to include climate refugees. It is, furthermore, argued that it is important to create a consensus on the definition of the climate refugee. The main UN organizations involved in these adaptation measures are the UNFCCC and the UNEP.
- *International studies* suggests an adaptation to the human rights' status of climate refugees. The UN Human Rights framework provides as an innovative approach to determine the legal rights of the climate refugee under international law. The UN organizations involved in these adaptation measures are the OHCHR and the UNHCR.

- *Innovation sciences* suggests the provision of resources for the adoption of technologies for improving agricultural innovation, so that regions will be able to adapt to climate change. The UN organization involved in these adaptation measures is the FAO.

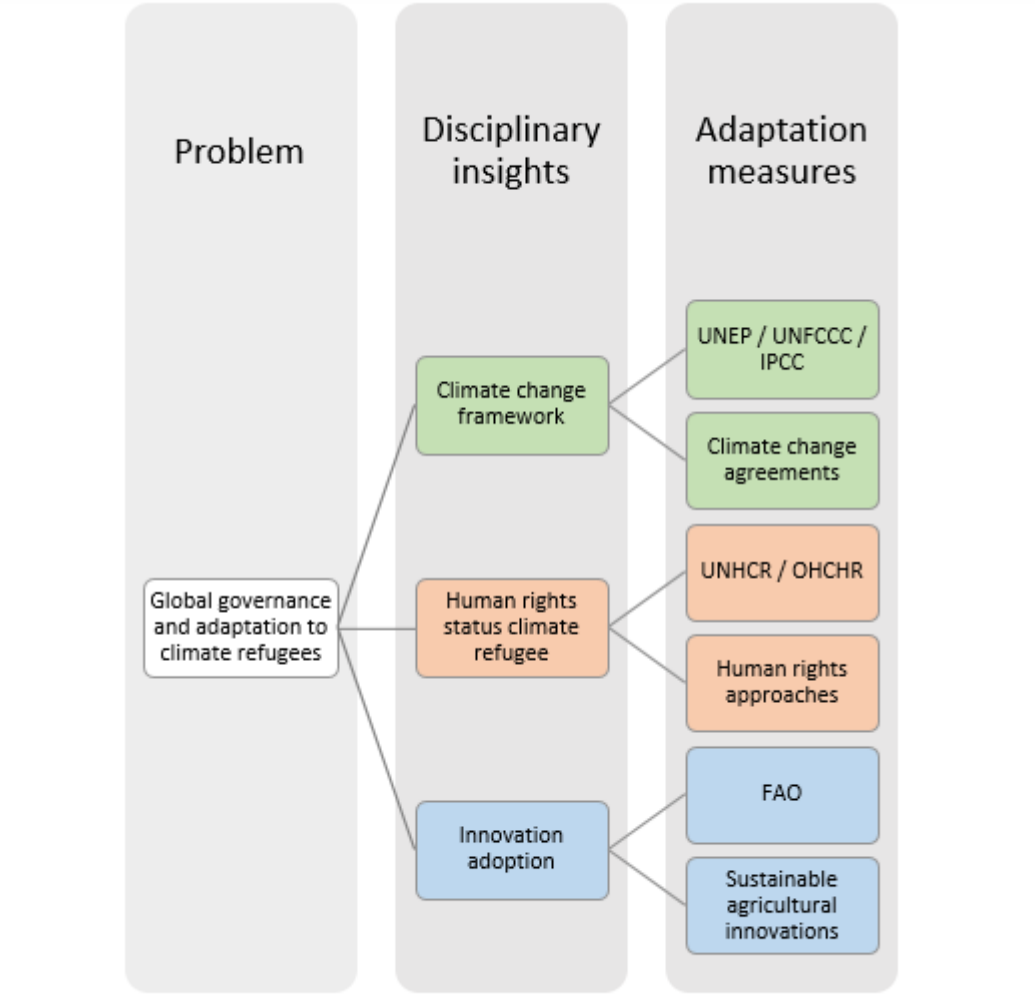

Figure 5: The problem, the disciplinary insights and the adaptation measures proposed by them.

5.3 A more comprehensive understanding of climate refugee issues

The common ground created in the previous question can be used to construct a more comprehensive understanding, the main goal of our interdisciplinary research (Repko, 2012). This new understanding is the result of integrative processes in which alternative disciplinary perspectives are appreciated and their elements combined to "produce something that is new, coherent and functionally whole" (Repko, 2012, 261). Achieving it involves taking a holistic perspective, in which relevant disciplinary insights are understood as interrelated to each other

and to the issue (Repko, 2012). Our more comprehensive understanding is based on a horizontal integration, in which our disciplinary insights are fully complementary yet focus on different aspects of the problem (Repko, 2012). We will do this by exploring the causal relationships between disciplinary insights in order to understand how they are interrelated. In doing so, we will integrate the various disciplinary insights and then examine the complex problem as a whole, giving an answer to the proposed research question: *what role could the United Nations play concerning climate refugee issues?*

5.3.1 Global governance and adaptation to climate refugees

All three disciplinary chapters emphasize the need for global governance to develop a comprehensive climate refugee policy, because climate change is a global problem and solutions should therefore have a global reach. Climate change does not discriminate between nationalities, which is why transnational consensus building is essential. Adaptation measures regarding climate refugees consist of existing frameworks to which innovative thinking has been applied, so that new innovative ideas build on an existing foundation. A comprehensive climate refugee understanding consists of several parts that complement each other.

First of all, the existing lack of consensus on how to define climate refugees complicates the determination of policies. Our redefinition of the concept 'climate refugee' can provide as a first step towards transdisciplinary consensus building. With the help of this redefinition, international obligations to protect climate refugees can be secured under international law. Nevertheless, global governance should acknowledge that designing climate refugee *prevention* tools are even more important than *protection* tools. Prevention instruments should build on existing climate agreements to reduce greenhouse gases worldwide, in order to prevent a further intensification of climate change.

It is impossible, however, to prevent today's climate change, because it is the reality of today. In areas most affected by climate change, there needs to be some form of *damage control*. Technological innovations can support agricultural development within risk-countries affected by climate change, by increasing local food production and economic growth, while at the same time minimizing environmental degradation.

It is, thus, not appropriate to base a comprehensive climate refugee framework only on protection. Equally important is the adaptation to climate change by reinforcing international measures for reducing and preventing further intensification of climate change, and adaptation

to technological innovations to improve an area's liveability and reduce its environmental degradation. This does not mean that protection measures should not be taken into account or that existing refugee protection instruments are satisfactory. Climate refugees are already part of today's climate change-reality. Damage control by innovations is theoretically easy, yet hard to implement in practice, because the funds are limited and the risk-countries are often developing countries that depend on international funds for adopting innovations. Furthermore, it is not a matter of course to expect full compliance to climate change treaties from countries that are not (yet) affected by climate change. Therefore, the interrelatedness of the three aspects - prevention, damage control and protection – constitutes an integral part of a more comprehensive climate refugee policy. Figure 6 presents this study's horizontal integration graphically. Preventing the intensification of climate change (A), while protecting the human rights status of climate refugees (B), and by doing damage control via the adoption of technological and sustainable innovations (C) will lead to a more comprehensive climate refugee policy.

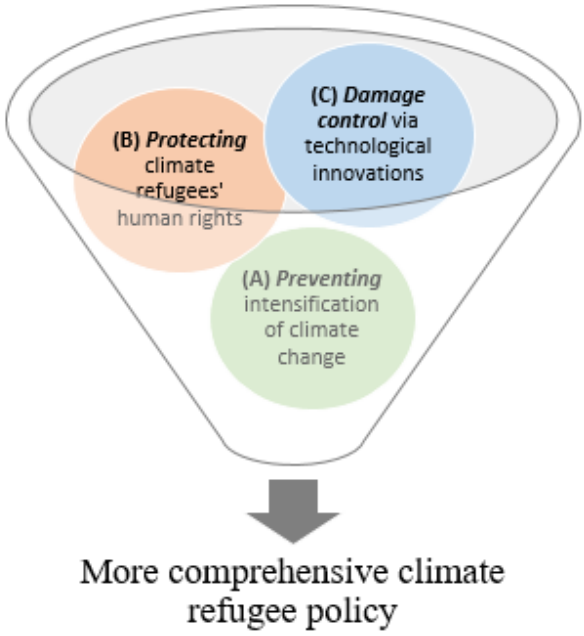

Figure 6: A more comprehensive climate refugee policy: key disciplinary insights are mixed and combined in a funnel, where they form a more effective and comprehensive understanding of climate refugee policy.

5.3.2 Conclusion: the United Nations and climate refugee policy

The aim of the present interdisciplinary study has been to identify what role the United Nations can play concerning climate refugee issues. The UN is a promising candidate in dealing with climate refugee issues, because it has played a key role in the development of both the

environmental and human rights framework, and because it comes closest to a form of global governance. We have tried to get a picture of what various sub-organizations of the UN can do to solve these issues. It is clear that all these organizations may play a significant role in solving climate refugee issues, but that collaboration between them is needed. The present situation thus necessitates a more comprehensive understanding of climate refugee issues.

This study provides such an understanding. While collaboration between sub-organizations of the UN has taken place, they have not been able to integrate and complement each other's mandates, but mainly collaborated by working separately on the same project. Nonetheless, they do not exclude each other: there is room for more intensive cooperation. This can be done in several ways. Connecting the UN human rights framework to the UN climate change convention framework explicitly relates the quality of the environment to an individual's enjoyment of human rights. Furthermore, allowing for the FAO to attend and take place in climate change conferences can bring the attention of Member-states to the importance of damage control to adapt to climate change. There are also rewarding possibilities for collaborations on the ground. The OHCHR and UNHCR can collaborate with the FAO to prevent individuals from being displaced by environmental degradation - which is in itself a human right. These are only a few suggestions on how the sub-organizations could collaborate.

A global problem such as climate change asks for global approaches to refugee protection and enforcement mechanisms to ensure this protection. However, before it is possible to design effective protection instruments, a consensus should be reached on how to define the climate refugee, what his or her legal rights are and what the role of the international society is to protect and prevent climate refugee flows. The most important international agreement that UN Member-states should comply with, is to reduce emissions to safer levels, to prevent an intensification of climate change. The UN as intergovernmental, overarching organization should take the lead in preventing climate change and climate refugees. Consequently, the debate on how to adapt and mitigate to climate change needs to continue.

5.4 Evaluation

An interdisciplinary approach to climate refugee issues has led to more innovative responses on how the UN can protect and provide assistance to climate refugees. By using insights from environmental sciences, international studies and innovation sciences, this study was able to create a more comprehensive understanding. We have acknowledged earlier that the use of

three disciplines is limited to gain a full understanding of the complexities surrounding climate refugees. Particularly the fields of cultural anthropology, economics and public administration can bring important new perspectives into the debate.

The sub-organizations of the UN analysed in this study are part of the UN Development Group (UNDG). There are many other sub-organizations included in the UNDG that can be important concerning climate refugee issues. We acknowledge that results may differ when different sub-organizations are examined, but are nevertheless convinced that the UNFCCC, the UNHCR, the OHCHR and the FAO are main players concerning climate refugee issues.

Although we are wary that the results of this study provide a full comprehensive understanding to the issue, we would like to emphasize that this research is a good starting point for further research on climate refugees. The found disciplinary insights complement each other, whilst adding important new perspectives, which is why the more comprehensive understanding can be perceived as more than merely a 'sum of its parts'.

The novelty of this problem makes it an understudied topic. Many suggestions can be done for further research. For example, research should be done on the ability of climate change to exacerbate socio-economic and political tensions, and even conflict. Furthermore, the 'sinking island nations' require novel thinking on how to deal with the outlook of being 'stateless'. More research can also be done on how mass migrations causes severe constrains on natural ecosystems. More generally, more interdisciplinary research should be done to unravel interrelated aspects of the problem that transcend traditional disciplinary boundaries. A problem such as climate refugees necessitates an integrative, innovative response.

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7. Appendices

Appendix I: Thesis presentation

DRAFT FOR ADOPTION

UN PROTOCOL ON DISPLACEMENT DUE TO CLIMATE CHANGE-INDUCED ENVIRONMENTAL DEGRADATION

We, the Heads of State and Government and High Representatives,

Having met at Utrecht, 28 October 2016,

Reaffirming the principle that human beings shall enjoy fundamental rights and freedoms without discrimination, as stated in the Charter of the United Nations and the Universal Declaration of Human Rights (UDHR 1948),

Reaffirming the 1951 Convention relating to the Status of Refugees and the 1967 Protocol as the foundation of the international refugee protection regime (New York Declaration 2016),

Considering the obligation of States under the Charter of the United Nations to promote universal human rights (ICESCR 1966),

Recognizing that climate change represents an urgent and potentially irreversible threat to human societies and the planet and thus requires the widest possible cooperation by all countries (Paris agreement 2015),

Acknowledging that climate change is a common concern for humankind. Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights (Paris agreement 2015),

Expressing concern that environmental degradation and climate change leads to an increasement of (internally) displaced persons,

Emphasizing the enduring benefits of ambitious and early action, including major reductions in the cost of future mitigation and adaptation efforts (Paris agreement 2015),

Considering that previous Declarations and Protocols on refugees do not include a comprehensive framework for climate refugee policy,

Recognizing the urgent need for an integrative understanding to be able to respond to these flows of (internally) displaced persons due to climate change-induced environmental degradation,

Agreeing to uphold and promote regional and international cooperation in order to mobilize stronger and more ambitious (climate) action by all Parties and non-Party stakeholders, including global civil society, the private sector and financial institutions (Paris agreement 2015),

Agree upon the following articles:

Article 1 Evidence for refugee flows due to climate change.

We take note and welcome the 2007 report on climate change by the Intergovernmental Panel on Climate Change. We are concerned about their prediction that in 2050, an approximate of 150 million people will be forced to leave their homes due to climate change-induced environmental degradation (IPCC 2007). The Head of States and High Representatives are therefore determined to provide an instrument meant to deal with these climate refugee flows, as presented in this Protocol.

Article 2 Definition of the term 'climate refugee'.

We acknowledge that the definition of the 'refugee' as described in the 1951 Convention and the 1967 Protocol does not include climate change-induced displacement. Therefore, for the purposes of this present Protocol, the term 'climate refugee' shall apply to any person who:

1) As a result of climate-change induced environmental degradation, can no longer live under humane circumstances in his direct environment.

2) Is internally displaced within the country of residence **or** transnational displaced by climate change-induced forces.

Article 3 Principle of non-discrimination.

The Contracting States shall apply the provisions of this Protocol without discrimination as to race, religion or country of origin (1951 Convention).

Article 4 Freedom of movement.

Each Contracting State shall accord to refugees lawfully in its territory the right to choose their place of residence to move freely within its territory (1951 Convention).

Article 5 Prohibition of expulsion or return ("refoulement").

1. No Contracting State shall expel or return ("refouler") a refugee in a manner whatsoever to the territories where his basic human rights to life, health and adequate food are threatened due to climate change-induced environmental degradation.

2. The situation that arises from displaced due to global climate change-induced environmental degradation asks for more permanent asylums, as climate change causes long-term degradation. *We ask for more research* into this matter and a way to incorporate permanent climate asylums into existing international refugee law instruments.

Article 6 Extending basic human rights.

The right to life, health and adequate food are interlinked with the human environment and its degradation (Stockholm Declaration 1972). *We recommend and suggest*, building on the International Covenant on Economic, Social and Cultural Rights, that it is necessary to extend the meaning of basic universal human rights to gain a more inclusive understanding of the human rights of climate refugees.

Article 7 Reducing climate refugee flows.

We acknowledge that policy measures to anticipate on climate refugee flows alone are not enough. In association with the UN Development Group, and particularly the FAO, we recommend the following measures to reduce climate refugee flows in the future:

1) The promotion of food production and economic development in the developing countries most affected by displacement due to climate change-induced environmental degradation.

2) The adaptation of technological innovations to reduce environmental degradation and to promote sustainable forms of agriculture in light of climate change considerations (Kyoto protocol 1997).

Article 8 Cooperation of the national authorities with the United Nations.

1. The present Protocol will be monitored by the newly established Committee on Climate Refugees Protection, established and administered by the UN Development Group.

2. In order to enable the Committee to make reports to the competent organs of the United Nations, the Contracting States undertake to provide them in the appropriate form with information and statistical data requested concerning:

a) The condition of climate refugees,

b) The implementation of this Protocol, and;

c) Laws, regulations and decrees which are, or may hereafter be, in force relating to climate refugees (1951 Convention).

Article 9 Funding and support from Member-States.

Member-States will be obliged to invest in an international fund to protect and prevent climate refugee flows. A new fund will be established for these means: the Climate Refugee Protection Fund.

We acknowledge the crucial role of FDI in stimulating change and innovation and in transferring new technologies and knowledge into a country, and therefore promotes high-tech FDI in poorer countries most affected by displacement due to climate change-induced environmental degradation, by giving companies advantages on the international market in return (Aubert 2005).

Article 10 Collaboration within United Nations Development Group.

We suggest that a new collaboration within the UN Development Group is needed for further research into climate refugee issues and to guard the principles stated in this Protocol. The UNEP's scientific research on climate change, the OHCHR's reports on human rights conditions of climate refugees, the UNHCR's report on climate refugee flows and the FAO's development projects to improve sustainable agriculture and food security need to be combined and integrated. Collaboration between these agencies is necessary for a more comprehensive understanding of the climate refugee issues and a more inclusive policy response.

Article 11 Integrative response.

We suggest that an integrative response is necessary to gain a more comprehensive understanding of climate refugee issues. *We recognize* that climate change is one of the biggest drivers behind the depletion of soil quality and droughts, which leads to food insecurity. These triggers lead in turn to the displacement, internally or transnational, of people affected by climate change-induced environmental degradation, as their basic rights on humane living conditions are threatened. An integrative response within the UN Development Group (in particular a collaboration of UNEP, FAO, UNHCR and OHCHR) is needed to minimize the effects of displacement due to climate change-induced environmental degradation. *We recommend* an extension of basic human rights to incorporate climate refugees' universal human rights. *We recommend* furthermore an integration of the refugees' human rights into climate change policies. *We express the need for* development projects to implement and adapt to innovations in the areas affected by climate change-induced environmental degradation. These three components will provide a more comprehensive framework for UN climate refugee policy.

Article 12 International cooperation.

We underline the centrality of international cooperation to the refugee protection regime (New York declaration 2016).

In faith of whereof the undersigned, duly authorized, have signed this Protocol on behalf of their respective Governments,

Done at Utrecht, this twenty-eighth day of October, two thousand sixteen, in a single copy, of which the English, Arabic, Chinese, French, Russian and Spanish texts are equally authentic and which shall remain deposited in the archives of the United Nations, and certified true copies of which shall be delivered to all Members of the United Nations.

Appendix II: Attachments to chapter 4 Innovation sciences

I: FDI in millions (2014) (Index Mundi, 2016):

Angola	1921.7
Benin	377.3
Botswana	393.2
Burkina Faso	341.9
Burundi	6.9
Cameroon	501.2
Cape Verde	-
Central African Republic	3.5
Chad	760.5
Comoros	14.0
Congo (Brazzaville)	5502.3
Democratic Republic Congo	-343.6
Cote d'Ivoire	462.0
Djibouti	153.0
Equatorial Guinea	1993.0
Eritrea	46.5
Ethiopia	-
Gabon	972.9
The Gambia	28.4
Ghana	3363.4
Guinea	566.0
Guinea-Bissau	21.5
Kenya	944.3
Lesotho	46.5
Liberia	363.0
Madagascar	350.7
Malawi	715.7
Mali	198.9
Mauritania	501.9
Mauritius	418.4
Mozambique	4998.8
Namibia	493.3
Niger	769.0
Nigeria	4655.8
Rwanda	291.7
Sao Tome and Principe	27.1
Senegal	342.7
Seychelles	108.3
Sierra Leone	690.3
Somalia	105.5
South Africa	5740.7
Sudan	1251.3
Swaziland	26.6
Tanzania	2044.6
Togo	292.1
Uganda	1146.6
Zambia	1507.8
Zimbabwe	544.8

Total amount of FDI in 2014 was 46 billion dollar.
Of the countries without a number, no data is available.

II: Food import and export per country in SSA.

Food Import per country in 1000 tons (2011) (FAO, 2016a)

Angola - 3099 Benin - 1255 Botswana - 725 Burkina Faso - 870 Burundi - no data Cameroon - 1685 Cape Verde - 233 Central African Republic - 98 Chad - 303 Comoros - no data Congo (Brazzaville) - 754 Congo (Democratic Republic) - no data	Côte d'Ivoire - 2410 Djibouti - 1165 Equatorial Guinea - no data Eritrea - no data Ethiopia - 2623 Gabon - 482 The Gambia - 507 Ghana - 3315 Guinea - 638 Guinea-Bissau - 131 Kenya - 3418 Lesotho - 446 Liberia - 207	Madagascar - 738 Malawi - 307 Mali - 614 Mauritania - 1128 Mauritius - 843 Mozambique - 1387 Namibia - 441 Niger - 635 Nigeria - 13504 Rwanda - 412 Sao Tome and Principe - 37 Senegal - 2286	Seychelles - no data Sierra Leone - 353 Somalia - no data South Africa - 6326 Sudan - 3374 Swaziland - 331 Tanzania - 1898 Togo - 456 Uganda - 1139 Zambia - 301 Zimbabwe - 1749

Food Export in 1000 tons 2011 (FAO, 2016a)

Angola - 23 Benin - 489 Botswana - 70 Burkina Faso - 343 Burundi - no data Cameroon - 549 Cape Verde - 22 Central African Republic - 1 Chad - 0 Comoros - no data Congo (Brazzaville) - 14 Congo (Democratic Republic) - no data	Côte d'Ivoire - 2719 Djibouti - 112 Equatorial Guinea - no data Eritrea - no data Ethiopia - 935 Gabon - 3 The Gambia - 70 Ghana - 1466 Guinea - 74 Guinea-Bissau - 143 Kenya - 979 Lesotho - 0 Liberia - 16	Madagascar - 158 Malawi - 877 Mali - 47 Mauritania - 172 Mauritius - 605 Mozambique - 466 Namibia - 472 Niger - 131 Nigeria - 546 Rwanda - 88 Sao Tome and Principe - 5 Senegal - 435	Seychelles - no data Sierra Leone - 19 Somalia - no data South Africa - 7886 Sudan - 184 Swaziland - 392 Tanzania - 934 Togo - 135 Uganda - 884 Zambia - 946 Zimbabwe - 192

III: Countries with agricultural projects and their scores.

1.	Angola	6 + 5	= 11
2.	Benin	6 + 9	= 15
3.	Botswana	6 + 5	= 11
4.	Burkina Faso	9	= 9
5.	Burundi	7	= 7
6.	Cameroon	6	= 6
7.	Chad	7	= 7
8.	Côte d'Ivoire	6	= 6
9.	Democratic Republic of Congo	6 + 5	= 11
10.	Ethiopia	3 + 4	= 7
11.	Equatorial Guinea	7	= 7
12.	Ghana	6 + 7	= 13
13.	Guinea	9	= 9
14.	Kenya	4	= 4

15. Lesotho 6 + 5 = 11
16. Madagascar 5 = 5
17. Malawi 6 + 6 + 5= 17
18. Mali 9 = 9
19. Mauritania 9 = 9
20. Mauritius 5 = 5
21. Mozambique 6 + 5 = 11
22. Namibia 6 + 5 = 11
23. Niger 9 = 9
24. Rwanda 6 + 7 = 13
25. Sao Tome & Principe 7 = 7
26. Senegal 9 = 9
27. Seychelles 5 = 5
28. Somalia 6 = 6
29. South-Africa 5 = 5
30. Swaziland 6 + 5 = 11
31. Tanzania 9 + 6 + 5= 20
32. Uganda 6 + 5 + 4= 15
33. Zambia 9 + 6 + 5= 20
34. Zimbabwe 6 + 5 = 11

IV: CPI 2015 - 2012 (Transparency International, 2016b)

Angola: 15 - 22 Benin: 37 - 36 Botswana: 63 - 65 Burkina Faso: 38 - 38 Burundi: 21 - 19 Cameroon: 27 - 26 Cape Verde: 55 - 60 Central African Republic: 24 - 26 Chad: 22 - 19 Comoros: 26 - 28 Congo (Brazzaville): 23 - 26 Congo (Democratic Republic): 22 - 21	Côte d'Ivoire: 32 - 29 Djibouti: 34 - 36 Equatorial Guinea: no data Eritrea: 18 - 25 Ethiopia: 33 - 33 Gabon: 34 - 35 The Gambia: 28 - 34 Ghana: 47 - 45 Guinea: 25 - 24 Guinea-Bissau: 17 - 25 Kenya: 25 - 27 Lesotho: 44 - 45 Liberia: 37 - 41	Madagascar: 28 - 32 Malawi: 31 - 37 Mali: 35 - 34 Mauritania: 31 - 31 Mauritius: 53 - 57 Mozambique: 31 - 31 Namibia: 53 - 48 Niger: 34 - 33 Nigeria: 26 - 27 Rwanda: 54 - 53 Sao Tome and Principe: 42 - 42 Senegal: 44 - 36	Seychelles: 55 - 52 Sierra Leone: 29 - 31 Somalia: 8 - 8 South Africa: 44 - 43 Sudan: 12 - 13 Swaziland: No data Tanzania: 30 - 35 Togo: 32 - 30 Uganda: 25 - 29 Zambia: 38 - 37 Zimbabwe: 21 - 20

Percentage CPI change 2012-2015

Angola: -31.8% Benin: +2.8% Botswana: -3.1% Burkina Faso: 0% Burundi: +10.5% Cameroon: +3.8% Cape Verde: -8.3%	Côte d'Ivoire: +10.3% Djibouti: -6.6% Equatorial Guinea: no data Eritrea: -28% Ethiopia: 0% Gabon: -3.9%	Madagascar: -12.5% Malawi: -16.2% Mali: +2.9% Mauritania: 0% Mauritius: -7.0% Mozambique: 0% Namibia: +10.4% Niger: +3.0%	Seychelles: +5.8% Sierra Leone: -6.5% Somalia: 0% South Africa: +2.3% Sudan: -7.7%

Central African Republic: -7.7% Chad: +15.8% Comoros: -7.1% Congo (Brazzaville): -11.5% Congo (Democratic Republic): +4.8%	The Gambia: -17.6% Ghana: +4.4% Guinea: +4.2% Guinea-Bissau: -32% Kenya: -7.4% Lesotho: -3.2% Liberia: -9.8%	Nigeria: -3.7% Rwanda: +1.9% Sao Tome and Principe: 0% Senegal: +22.2%	Swaziland: No data Tanzania: -14.3% Togo: +6.7% Uganda: -13.8% Zambia: +2.7% Zimbabwe: +5.0%

V: HDI 2015 - 2012 (UNDP, 2016b)

Angola: 0.532 - 0.524 Benin: 0.48 - 0.475 Botswana: 0.698 -0.691 Burkina Faso: 0.402 - 0.393 Burundi: 0.4 - 0.395 Cameroon: 0.512 - 0.501 Cape Verde: 0.646 - 0.639 Central African Republic: 0.35 - 0.373 Chad: 0.392 - 0.386 Comoros: 0.503 - 0.499 Congo (Brazzaville): 0.591 - 0.575 Congo (Democratic Republic): 0.433 - 0.423	Côte d'Ivoire: 0.462 - 0.452 Djibouti: 0.47 - 0.465 Equatorial Guinea: 0.587 - 0.584 Eritrea: 0.391 - 0.390 Ethiopia: 0.442 - 0.429 Gabon: 0.684 - 0.673 The Gambia: 0.441 - 0.440 Ghana: 0.579 - 0.572 Guinea: 0.441 - 0.409 Guinea-Bissau: 0.42 - 0.417 Kenya: 0.548 - 0.539 Lesotho: 0.497 - 0.484 Liberia: 0.43 - 0.419	Madagascar: 0.51 - 0.507 Malawi: 0.445 - 0.433 Mali: 0.419 -0.414 Mauritania: 0.506 - 0.498 Mauritius: 0.777 - 0.772 Mozambique: 0.416 - 0.408 Namibia: 0.628 - 0.620 Niger: 0.348 - 0.342 Nigeria: 0.514 - 0.505 Rwanda: 0.483 - 0.476 Sao Tome and Principe: 0.555 - 0.552 Senegal: 0.466 - 0.461	Seychelles: 0.772 - 0.761 Sierra Leone: 0.413 - 0.397 Somalia: No data South Africa: 0.666 - 0.659 Sudan: 0.479 - 0.476 Swaziland: 0.531 - 0.529 Tanzania: 0.521 - 0.510 Togo: 0.484 - 0.470 Uganda: 0.483 - 0.476 Zambia: 0.586 - 0.576 Zimbabwe: 0.509 - 0.491

Percentage HDI Change 2012-2015

Angola: +1.5% Benin: +1.1% Botswana: +1.0% Burkina Faso: +2.3% Burundi: +1.3% Cameroon: +2.2% Cape Verde: +1.1% Central African Republic: -6.2% Chad: +1.2% Comoros: +0.8% Congo (Brazzaville): +2.8% Congo (Democratic Republic): +2.4%	Côte d'Ivoire: +2.2% Djibouti: +1.1% Equatorial Guinea: +0.5% Eritrea: +0.3% Ethiopia: +3.0% Gabon: +1.6% The Gambia: +0.2% Ghana: +1.2% Guinea: +7.8% Guinea-Bissau: +0.7% Kenya: +1.7% Lesotho: +2.7% Liberia: +2.6%	Madagascar: +0.6% Malawi: +2.8% Mali: +1.2% Mauritania: +1.6% Mauritius: +0.6% Mozambique: +2.0% Namibia: +1.3% Niger: +1.8% Nigeria: +1.8% Rwanda: +1.5% Sao Tome and Principe: +0.5% Senegal: +1.1%	Seychelles: +1.4% Sierra Leone: +4.0% Somalia: No data South Africa: +1.1% Sudan: +0.6% Swaziland: 0.4% Tanzania: +2.2% Togo: +3.0% Uganda: +1.5% Zambia: +1.7% Zimbabwe: +3.7%

VI: Analysis of the project "Strengthening linkages between small actos and buyers in the Roots and Tubers sector in Africa".

Indicator	**sub-indicator**	**Score**
Countries where project runs		In which countries does the project run? Benin, Cameroon, Ghana, Côte d'Ivoire, Malawi, Rwanda, Uganda.
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • Yes
does the project create Indigenous knowledge? (dependent on sub-variables)	Are there North South Schemes? (independent)	Number of agricultural partnerships between SSA countries and developed countries or the UN European Union = 1 partner = 1pt
	Are there Cooperation activities with the developed world (many forms)? (independent)	Financial support of research projects on agriculture exchange of agricultural researchers between north south? • Yes Participation of universities? • No Research institutes in multinational schemes to promote international R&D? • No
The improvement of linkages (independent)		Does the project improve linkages? • Yes
Acting as mediator between foreign and local partners (independent)		Does the project support local partners and foreign partners to work together? • Yes

Technology Adoption and local improvement regarding agriculture (Dependent)		Does the project support technology adoption in agriculture? - modernised agriculture • Yes
Education		Does the project support education? • Yes
Kind of investment		Is the investment in the project a guaranteed amount of money or does the project have certain contracts for reaching goals? 6.319.000$ of direct investment
Score		6pt

Sources: FAO (2016d); FAO (2016a).

VII: Analysis of the project "Mainstreaming Nutrition in CAADP and Agriculture Policies and Programmes in Sub-Saharan Africa".

Indicators	**Sub-indicators**	**Score**
Countries where project runs		In which countries does the project run? CAADP countries have advantages, which countries is not clear.
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • Yes
does the project create Indigenous knowledge? (dependent on sub-variables)	Are there North South Schemes? (independent)	Number of agricultural partnerships between SSA countries and developed countries or the UN A4NH, ReSAKSS, IFPRI, AUC, NEPAD, NPCA = 6 partners = 3pt
	Are there Cooperation activities with the developed world (many forms)? (independent)	Financial support of research projects on agriculture exchange of agricultural researchers between north south? • Yes Participation of universities? • No Research institutes in multinational schemes to promote international R&D? • No
The improvement of linkages by financing of research bodies (independent)		does the project improve linkages? • Yes
Acting as mediator between foreign and local partners (independent)		does the project support local partners and foreign partners to work together? • Yes
Technology adoption and local improvement regarding agriculture (Dependent)		does the project support technology adoption in agriculture? - modernised agriculture • No
Education		does the project support education? • Yes

Kind of investment		Is the investment in the project a guaranteed amount of money or does the project have certain contracts for reaching goals? 2.000.001$ direct investment
Score		7

Sources: Allen, S. (2014, 21 oktober); FAO (2016a).

VIII: Analysis of the project "Supporting competitiveness and sustainable intensification of African cotton sectors through capacity development on Integrated Production and Pest Management".

Variable for project	**Sub-Variables**	**Indicators**
Countries where project runs		In which countries does the project run? Benin, Burkina Faso, Guinea, Mali, Mauritania, Niger, Senegal, Tanzania, Zambia
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • Yes
does the project create Indigenous knowledge? (dependent on sub-variables)	Are there North South Schemes? (independent)	Number of agricultural partnerships between SSA countries and developed countries or the UN 30 (most of them African and a view developed) = 4pt
	Are there Cooperation activities with the developed world (many forms)? (independent)	Financial support of research projects on agriculture exchange of agricultural researchers between north south? • Yes Participation of universities? • No Research institutes in multinational schemes to promote international R&D? • No
The improvement of linkages by financing of research bodies (independent)		does the project improve linkages?. • Yes
Acting as mediator between foreign and local partners (independent)		does the project support local partners and foreign partners to work together? • Yes
Technology adoption and local improvement regarding agriculture (Dependent)		does the project support technology adoption in agriculture? - modernised agriculture • Yes
Education		does the project support education? • Yes
Kind of investment		Is the investment in the project a guaranteed amount of money or does the project have certain contracts for reaching goals? 3.315.650$ direct fund
Score		9

Sources: FAO (2016a); FAO (2016b).

IX: Analysis of the project “Fisheries Sector Support Programme in Somalia”.

Variable for project	**Sub-Variables**	**Indicators**
Countries where project runs		In which countries does the project run? Somalia
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • Yes
does the project create Indigenous knowledge? (dependent on sub-variables)	Are there North South Schemes? (independent)	Number of agricultural partnerships between SSA countries and developed countries or the UN Norway, Japan, Switzerland, European Union = 4 = 2pt
	Are there Cooperation activities with the developed world (many forms)? (independent)	Financial support of research projects on agriculture exchange of agricultural researchers between north south? • Yes Participation of universities? • No Research institutes in multinational schemes to promote international R&D? • No
The improvement of linkages by financing of research bodies (independent)		does the project improve linkages? • Yes
Acting as mediator between foreign and local partners (independent)		does the project support local partners and foreign partners to work together? • Yes
Technology adoption and local improvement regarding agriculture (Dependent)		does the project support technology adoption in agriculture? - modernised agriculture • Yes
Education		does the project support education? • No
Kind of investment		Is the investment in the project a guaranteed amount of money or does the project have certain contracts for reaching goals? 13.966.480$ Direct funds
Score		6

Sources: FAO (2016a); FAO (2016c).

X: Analysis of the project “Support to Micro Seed Enterprise Initiative”.

Variable for project	**Sub-Variables**	**Indicators**
Countries where project runs		In which countries does the project run? Ethiopia
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • Yes

does the project create Indigenous knowledge? (dependent on sub-variables)	Are there North South Schemes? (independent)	Number of agricultural partnerships between SSA countries and developed countries or the UN 0 pt
	Are there Cooperation activities with the developed world (many forms)? (independent)	Financial support of research projects on agriculture exchange of agricultural researchers between north south? • Maybe (linkages between farmers and laboratories, which cannot be found) Participation of universities? • No Research institutes in multinational schemes to promote international R&D? • No
The improvement of linkages by financing of research bodies (independent)		does the project improve linkages? • Yes
Acting as mediator between foreign and local partners (independent)		does the project support local partners and foreign partners to work together? • Yes
Technology adoption and local improvement regarding agriculture (Dependent)		does the project support technology adoption in agriculture? - modernised agriculture • Yes
Education		does the project support education? • No
Kind of investment		Is the investment in the project a guaranteed amount of money or does the project have certain contracts for reaching goals? 1.500.000$ of direct funds
Score		3

Sources: FAO (2016a).

XI: Analysis of the project "FAO Technical Support to the COMESA-EAC-SADC Programme on Climate Change adaption and Mitigation in the Eastern and Southern Africa Region".

Variable for project	**Sub-Variables**	**Indicators**
Countries where project runs		In which countries does the project run? Eastern and Southern Africa (12 national Governments: Angola, Dem. Rep. Congo, Tanzania, Zambia, Malawi, Mozambique, Zimbabwe, Botswana, Namibia, Lesotho, Swaziland.)
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • Yes
does the project create Indigenous knowledge? (dependent on sub-variables)	Are there North South Schemes? (independent)	Number of agricultural partnerships between SSA countries and developed countries or the UN 5 = 2 pt
	Are there Cooperation activities with the developed	Financial support of research projects on agriculture exchange of agricultural researchers between north south?

	world (many forms)? (independent)	• Yes Participation of universities? • No Research institutes in multinational schemes to promote international R&D? • No
The improvement of linkages by financing of research bodies (independent)		does the project improve linkages? • Yes
Acting as mediator between foreign and local partners (independent)		does the project support local partners and foreign partners to work together? • Yes
Technology adoption and local improvement regarding agriculture (Dependent)		does the project support technology adoption in agriculture? - modernised agriculture • Yes
Education		does the project support education? • No
Kind of investment		Is the investment in the project a guaranteed amount of money or does the project have certain contracts for reaching goals? 4.568.000$ direct funds
Score		6

Sources: FAO (2016a); FAO (2016e).

XII: Analysis of the project "Promotion of commercialization of agriculture amon resettling population in Gulu and Lira districts of northern Uganda to restore livelihoods and reduce poverty".

Variable for project	**Sub-Variables**	**Indicators**
Countries where project runs		In which countries does the project run? Uganda
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • Yes
does the project create Indigenous knowledge? (dependent on sub-variables)	Are there North South Schemes? (independent)	Number of agricultural partnerships between SSA countries and developed countries or the UN 2 = 1pt
	Are there Cooperation activities with the developed world (many forms)? (independent)	Financial support of research projects on agriculture exchange of agricultural researchers between north south? • Yes Participation of universities? • No Research institutes in multinational schemes to promote international R&D? • No
The improvement of linkages by financing of research bodies (independent)		does the project improve linkages? • Yes

Acting as mediator between foreign and local partners (independent)		does the project support local partners and foreign partners to work together? • Yes
Technology adoption and local improvement regarding agriculture (Dependent)		does the project support technology adoption in agriculture? - modernised agriculture • Yes
Education		does the project support education? • No
Kind of investment		Is the investment in the project a guaranteed amount of money or does the project have certain contracts for reaching goals? 2 years direct investment, total amount of 3.807.443$
Score		5

Sources: FAO (2016a); UNDP, WFP, & WHO (2009).

XIII: Analysis of the project "Improved food security, livelihoods and resilience of vulnerable pastoral communities in the Greater Horn of Africa through the Pastoral Field School approach".

Variable for project	**Sub-Variables**	**Indicators**
Countries where project runs		In which countries does the project run? Ethiopia, Kenya, Uganda
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • Yes
does the project create Indigenous knowledge? (dependent on sub-variables)	Are there North South Schemes? (independent)	Number of agricultural partnerships between SSA countries and developed countries or the UN 1 = 1pt
	Are there Cooperation activities with the developed world (many forms)? (independent)	Financial support of research projects on agriculture exchange of agricultural researchers between north south? • No Participation of universities? • No Research institutes in multinational schemes to promote international R&D? • No
The improvement of linkages by financing of research bodies (independent)		does the project improve linkages? • Yes
Acting as mediator between foreign and local partners (independent)		does the project support local partners and foreign partners to work together? • No
Technology adoption and local improvement regarding agriculture (Dependent)		does the project support technology adoption in agriculture? - modernised agriculture • Yes

Education		does the project support education? • Yes
Kind of investment		Is the investment in the project a guaranteed amount of money or does the project have certain contracts for reaching goals? 2.154.112$ direct funding
Score		4

Sources: FAO (2016a); Hoeggel, F.U., Mbeyale, G. (2014).

XIV: Analysis of the project "SADC Regional Agriculture Policy (RAP): Support with the development of a SADC RAP Investment Plan (2016-2020) in articulation with National Agricultural Plans in the Region and under auspices of the CAADP".

Variable for project	**Sub-Variables**	**Indicators**
Countries where project runs		In which countries does the project run? Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • Yes
does the project create Indigenous knowledge? (dependent on sub-variables)	Are there North South Schemes? (independent)	Number of agricultural partnerships between SSA countries and developed countries or the UN 4 = 2pt
	Are there Cooperation activities with the developed world (many forms)? (independent)	Financial support of research projects on agriculture exchange of agricultural researchers between north south? • No Participation of universities? • No Research institutes in multinational schemes to promote international R&D? • No
The improvement of linkages by financing of research bodies (independent)		does the project improve linkages? • Yes
Acting as mediator between foreign and local partners (independent)		does the project support local partners and foreign partners to work together? • Yes
Technology adoption and local improvement regarding agriculture (Dependent)		does the project support technology adoption in agriculture? - modernised agriculture • Yes
Education		does the project support education? • No
Kind of investment		Is the investment in the project a guaranteed amount of money or does the project have certain contracts for reaching goals? 227.000$ direct funds

Score		5

Sources: FAO (2016a); SADC (2011).

XV: Analysis of the project "Strengthening Capacity of ECOWAS for effective Comprehensive Africa Agriculture Development Programme (CAADP) Implementation in West Africa".

Variable for project	**Sub-Variables**	**Indicators**
Countries where project runs		In which countries does the project run? Ghana
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • Yes
does the project create Indigenous knowledge? (dependent on sub-variables)	Are there North South Schemes? (independent)	Number of agricultural partnerships between SSA countries and developed countries or the UN 3 = 2pt
	Are there Cooperation activities with the developed world (many forms)? (independent)	Financial support of research projects on agriculture exchange of agricultural researchers between north south? • Yes Participation of universities? • No Research institutes in multinational schemes to promote international R&D? • Yes
The improvement of linkages by financing of research bodies (independent)		does the project improve linkages? • Yes
Acting as mediator between foreign and local partners (independent)		does the project support local partners and foreign partners to work together? • Yes
Technology adoption and local improvement regarding agriculture (Dependent)		does the project support technology adoption in agriculture? - modernised agriculture • Yes
Education		does the project support education? • No
Kind of investment		Is the investment in the project a guaranteed amount of money or does the project have certain contracts for reaching goals? 4.016.064$ direct funds
Score		7

Sources: FAO (2016a); Nepad (2009).

XVI: Analysis of the project "Increasing the contribution of non-timber forest products to food security in central Africa".

Variable for project	**Sub-Variables**	**Indicators**

Countries where project runs		In which countries does the project run? Equatorial Guinea, Chad, Rwanda, Burundi, Sao Tome & Principe
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • Yes
does the project create Indigenous knowledge? (dependent on sub-variables)	Are there North South Schemes? (independent)	Number of agricultural partnerships between SSA countries and developed countries or the UN CBFF = 1pt
	Are there Cooperation activities with the developed world (many forms)? (independent)	Financial support of research projects on agriculture exchange of agricultural researchers between north south? • Yes Participation of universities? • No Research institutes in multinational schemes to promote international R&D? • Yes
The improvement of linkages by financing of research bodies (independent)		does the project improve linkages? • Yes
Acting as mediator between foreign and local partners (independent)		does the project support local partners and foreign partners to work together? • Yes
Technology adoption and local improvement regarding agriculture (Dependent)		does the project support technology adoption in agriculture? - modernised agriculture • Yes
Education		does the project support education? • Yes
Kind of investment		Is the investment in the project a guaranteed amount of money or does the project have certain contracts for reaching goals? 3.589.587 direct funds
Score		7

Sources: FAO (2016a); African Development Bank (2012).

XVII: Projects that do not directly support agriculture:

Project: Strategic HIV/AIDS Response for Fisheries Communities in Africa.

Variable for project	**Sub-Variables**	**Indicators**
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • No

Sources: FAO (2016a).

Project: Strengthening of School Feeding Programmes in Africa.

Variable for project	Sub-Variables	Indicators
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • No

Sources: FAO (2016a).

Project: Strengthening Human Security in the Border Communities of Turkana, Kenya.

Variable for project	Sub-Variables	Indicators
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • No

Sources: FAO (2016a).

Project: Improved Community Drought Response and Resilience (ICDRR).

Variable for project	Sub-Variables	Indicators
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • No

Sources: FAO (2016a).

Project: Implementation of national forest monitoring and MRV system for REDD+ readiness in Ethiopia.

Variable for project	Sub-Variables	Indicators
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • No

Sources: FAO (2016a).

Project: Tackling malnutrition in vulnerable province of Ngozi-Burundi.

Variable for project	Sub-Variables	Indicators
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • No

Sources: FAO (2016a).

Project: Management of the Asian Fruit Fly, Bactrocera invadens (Diptera: Tephritidae) in the Southern African Development Community (SADC).

Variable for project	Sub-Variables	Indicators
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • No

Sources: FAO (2016a).

Project: Capacity building to prevent peste de petit ruminants (PPR) introduction into Malawi, Mozambique and Zambia.

Variable for project	Sub-Variables	Indicators
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • No

Sources: FAO (2016a).

Project: Development of trans-frontier conservation area linking forest reserves and protected area in Ghana and Côte d'Ivoire.

Variable for project	Sub-Variables	Indicators
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • No

Sources: FAO (2016a).

Project: Strengthening Regional Initiatives to End Hunger and Malnutrition in West Africa.

Variable for project	Sub-Variables	Indicators
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • No

Sources: FAO (2016a).

Project: Proposed Measurement, Notification and Verification (MNV) initiative for the Congo Basin: national monitoring and MNV systems with a regional approach for the countries of the Congo Basin.

Variable for project	Sub-Variables	Indicators
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • No

Sources: FAO (2016a).

Project: Support for ECCAS with implementation of the CAADP process in central Africa.

Variable for project	Sub-Variables	Indicators
Kind of Project		Does the project directly support agriculture? If no, no further analysis is needed. • No

Sources: FAO (2016a).

XVIII: SPSS analysis

Independent: Project Score - Dependent: GDP Growth

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ProjectScore[b]	.	Enter

a. Dependent Variable: GDPGrowth

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.066[a]	.004	-.018	4.20785

a. Predictors: (Constant), ProjectScore

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.445	1	3.445	.195	.661b
	Residual	779.063	44	17.706		
	Total	782.507	45			

a. Dependent Variable: GDPGrowth

b. Predictors: (Constant), ProjectScore

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.453	.996		3.466	.001
	ProjectScore	.049	.110	.066	.441	.661

a. Dependent Variable: GDPGrowth

Independent: Project Score - Dependent: FDI percentage

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ProjectScore[b]	.	Enter

a. Dependent Variable: FDIpercentage

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.019[a]	.000	-.022	3.27313

a. Predictors: (Constant), ProjectScore

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.164	1	.164	.015	.902[b]
	Residual	471.388	44	10.713		
	Total	471.552	45			

a. Dependent Variable: FDIpercentage

b. Predictors: (Constant), ProjectScore

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.083	.775		2.688	.010
	ProjectScore	.011	.086	.019	.124	.902

a. Dependent Variable: FDIpercentage

Independent: Project Score - Dependent: Export percentage

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ProjectScore[b]	.	Enter

a. Dependent Variable: Exportpercentage

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.480[a]	.230	.211	18.27803

a. Predictors: (Constant), ProjectScore

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3898.417	1	3898.417	11.669	.001[b]

	Residual	13029.366	39	334.086		
	Total	16927.783	40			

a. Dependent Variable: Exportpercentage

b. Predictors: (Constant), ProjectScore

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	10.508	4.554		2.307	.026
	ProjectScore	1.679	.491	.480	3.416	.001

a. Dependent Variable: Exportpercentage

Independent: Project Sore - Dependent: Patents

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ProjectScore[b]	.	Enter

a. Dependent Variable: Patents

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.052[a]	.003	-.019	289.349

a. Predictors: (Constant), ProjectScore

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10517.759	1	10517.759	.126	.725[b]
	Residual	3851242.158	46	83722.656		
	Total	3861759.917	47			

a. Dependent Variable: Patents

b. Predictors: (Constant), ProjectScore

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	63.085	66.392		.950	.347
	ProjectScore	-2.645	7.462	-.052	-.354	.725

a. Dependent Variable: Patents

Independent: Project Score - Dependent: Percentage with no education

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ProjectScore[b]	.	Enter

a. Dependent Variable: PercNoEduc

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.032[a]	.001	-.039	19.633

a. Predictors: (Constant), ProjectScore

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.723	1	9.723	.025	.875[b]
	Residual	9635.907	25	385.436		
	Total	9645.630	26			

a. Dependent Variable: PercNoEduc

b. Predictors: (Constant), ProjectScore

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	28.510	6.326		4.506	.000
	ProjectScore	-.100	.628	-.032	-.159	.875

a. Dependent Variable: PercNoEduc

Independent: Project Score - Dependent: GFSI growth 2012 – 2016

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ProjectScore[b]	.	Enter

a. Dependent Variable: GFSI4year

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.181[a]	.033	-.004	3.04075

a. Predictors: (Constant), ProjectScore

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.159	1	8.159	.882	.356[b]
	Residual	240.400	26	9.246		
	Total	248.559	27			

a. Dependent Variable: GFSI4year

b. Predictors: (Constant), ProjectScore

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.629	1.097		.573	.571
	ProjectScore	.099	.105	.181	.939	.356

a. Dependent Variable: GFSI4year

Independent: Project Score - Dependent: CPI

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ProjectScore[b]	.	Enter

a. Dependent Variable: CPI4year

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.225[a]	.050	.029	10.90102

a. Predictors: (Constant), ProjectScore

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	277.612	1	277.612	2.336	.134[b]
	Residual	5228.623	44	118.832		
	Total	5506.235	45			

a. Dependent Variable: CPI4year

b. Predictors: (Constant), ProjectScore

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-5.998	2.512		-2.388	.021
	ProjectScore	.432	.283	.225	1.528	.134

a. Dependent Variable: CPI4year

Independent: Project Score - Dependent: HDI

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ProjectScore[b]	.	Enter

a. Dependent Variable: HDI4year

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.209[a]	.044	.023	1.69478

a. Predictors: (Constant), ProjectScore

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.916	1	5.916	2.060	.158[b]
	Residual	129.252	45	2.872		
	Total	135.169	46			

a. Dependent Variable: HDI4year

b. Predictors: (Constant), ProjectScore

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	1.129	.391		2.885	.006
	ProjectScore	.063	.044	.209	1.435	.158

a. Dependent Variable: HDI4year