

European Master's Degree In Human Rights and Democratisation

Awarded Theses
of the Academic Year
2012/2013

"Are We Protecting Future Generations' Right to Food?
A Study of Intergenerational Obligations"

Thesis *by* De Man Annelie



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FOREWORD

The *European Master's Programme in Human Rights and Democratisation* (E.MA) is the first Master's course in human rights and democratisation launched and financed by the European Commission that later served as model for establishing other Regional Master's around the world. Since January 2013 these are all connected and managed by the *European Inter-University Centre for Human Rights and Democratisation* (EIUC) under the *Global Campus of Regional Master's Programme* (GC).

E.MA is a one-year master's course aimed at preparing professionals to respond to the requirements of daily work in international organisations, field operations, governmental and non-governmental bodies, and academia. The programme offers an action and policy-oriented approach to learning about human rights, democratisation and international relations from legal, political, historical, anthropological, and philosophical perspectives. This interdisciplinary nature and wide-ranging scope of E.MA reflect the benefits of true European inter-university cooperation in human rights education. It is an inter-disciplinary programme that reflects the indivisible links between human rights, democracy, peace and development.

During the first semester in Venice, students have the opportunity to meet in a multi-cultural environment and be taught by leading academics, experts and representatives of international and non-governmental organisations. During the second semester students relocate to one of the *participating universities* in the various EU member states to follow additional courses in an area of specialisation of their own choice and to write their thesis under the supervision of the E.MA Director or other academic staff. After successfully passing exams and completing a Master's thesis, students are awarded the European Master's Degree in Human Rights and Democratisation jointly conferred by a group of EIUC/E.MA universities.

Each year the E.MA Council of Directors selects five theses which stand out not only for their formal academic qualities but also for the originality of topic, innovative character of methodology and approach, and potential usefulness in raising awareness about neglected situations or issues and capacity for contributing to the promotion of the values underlying human rights and democracy.

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- AHMED, Fatma, *Unravelling the Puzzle of Piracy. A Somali Perspective*, Supervisor: Prof. Hans-Georg Ehrhart, University of Hamburg (Germany).
- BERNAERTS, Jonathan, *The Cologne Judgment: A Curiosity or the Start Sign for Condemning Circumcision of Male Children Without Their Consent as a Human Rights Violation?*, Supervisors: Prof. Hannes Tretter, Prof. Manfred Nowak, University of Vienna (Austria).
- DE MAN, Annelie, *Are We Protecting Future Generations' Right to Food? A Study of Intergenerational Obligations*, Supervisor: Prof. Jean Allain, Queen's University of Belfast (United Kingdom).
- HESSLING, Leonard, *Water and the Arab Uprisings – The Human Right to Water and Sanitation in Post-Transition Egypt*, Supervisor: Vincent Durac, University College Dublin (Ireland).
- ODOYO, Roselyn Awuor, *From Russia with Love: An Impact Assessment of Resolution A/HRC/21/L2 on Sexual Minorities in Africa*, Supervisor: Prof. Maria Teresa Beleza, New University Lisbon (Portugal).

This volume includes the thesis *Are We Protecting Future Generations' Right to Food? A Study of Intergenerational Obligations* by De Man, Annelie, and supervised by Prof. Jean Allain, Queen's University of Belfast (United Kingdom).

BIOGRAPHY

Annelie de Man completed her B.Com Law (Cum Laude) and LL.B degree at the University of the Free State, South Africa in 2005 and 2007, respectively. Ms de Man was admitted as an attorney of the High Court of South Africa in 2010, where after she worked as a law researcher at the Supreme Court of Appeal of South Africa. In 2011 Ms de Man completed her LL.M degree (Cum Laude) in Constitutional law

at the University of the Free State. Ms de Man completed the European Masters Degree in Human Rights and Democratisation in 2013, and after she did an internship at Human Rights Watch, Brussels. Currently, Ms de Man is employed at the Institute for Reconciliation and Social Justice at the University of the Free State, South Africa.

ABSTRACT

Currently, enough food is produced across the world to keep up with demand. However, the production of food is dependent on the availability of certain natural resources. The aim of the thesis is to establish whether we are potentially violating the right of future generations to adequate food. There are, at present, various human practices which have destroyed the quality and availability of these resources. The thesis will examine the principle of intergenerational equity as well as the right to adequate food in order to identify any obligations on the present generation to protect the interests of future generations. It will be demonstrated that we owe an obligation towards future generations to use environmental resources in a sustainable manner. This will be followed by an examination of various unsustainable human practices that have led to the depletion and degradation of the resources which are essential for food production. It will be demonstrated that as a result of these practices we have violated our duties towards future generations, thereby putting future food security at risk. The thesis will conclude with a discussion on how optimising food energy efficiency, scientific and technological advancement and small-scale agriculture can play in fulfilling our duties towards future generations.

Like past editions, the selected theses amply demonstrate the richness and diversity of the E.MA programme and the outstanding quality of the work performed by its students.

On behalf of the Governing Bodies of EIUC and E.MA and of all participating universities, we congratulate the author.

PROF. FLORENCE BENOÎT-ROHMER
EIUC Secretary General

PROF. RIA WOLLESWINKEL
E.MA Chairperson

ANNELIE DE MAN

ARE WE PROTECTING FUTURE GENERATIONS' RIGHT
TO FOOD? A STUDY OF INTERGENERATIONAL
OBLIGATIONS

CESCR	Committee on Economic, Social and Cultural Rights
CO ₂	Carbon dioxide
FAO	Food and Agricultural Organisation of the United Nations
FIAN	Food first Information and Action Network
GHG	Greenhouse gas
GMC	Genetically modified crops
GOFS	Government Office for Science
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICJ	International Court of Justice
RTAF	Right to adequate food
SSA	Small-scale agriculture
UDHR	Universal Declaration of Human Rights
WCED	World Commission on Environment and Development
WSFS	World Summit on Food Security

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INTRODUCTION

According to Article 1 of the Universal Declaration on the Eradication of Hunger and Malnutrition¹:

Every man, woman and child has the inalienable right to be free from hunger and malnutrition in order to develop fully and maintain their physical and mental faculties. Society today already possesses sufficient resources, organizational ability and technology and hence the competence to achieve this objective. Accordingly, the eradication of hunger is a common objective of all the countries of the international community, especially of the developed countries and others in a position to help.

Food is an essential element of life and is closely linked to the basic human values of dignity, freedom and respect². Currently, enough food is produced across the world to keep up with demand. However, the production of food is dependent on the availability of certain natural resources. Unfortunately, there are various human practices, especially regarding food production, which have destroyed the quality and availability of these resources. According to the United Kingdom Government Office for Science (GOFS), human activities have had and continue to have a substantial impact on the Earth's ecosystem and can play a major role in determining the environment that future generations will experience³. It has been established that the growing human population and its increased demands "have outrun the carrying capacity of the economy's natural support systems – its forests, fisheries,

¹ Universal Declaration on the Eradication of Hunger and Malnutrition (adopted on 16 November 1974).

² Valente & Franco, 2010, p. 437.

³ United Kingdom Government Office for Science, 2011, p. 13.

grasslands, aquifers and soils⁴.” This is in line with the notion of “tragedy of the commons” under which individuals are driven by their self-interest to continue to exploit common pool resources, even though they are aware that overexploitation will result in loss of productivity of these resources⁵.

The question that could be asked is: why do we care? If this generation has sufficient resources to meet our own food needs why do we also have to take into account the food needs of future generations? The first answer that comes to mind is that future generations will consist of our own children, their children, their children’s children and so forth. Most of us will want to give everything we can to our descendants and protect them from hunger and starvation. Unfortunately, this “need to protect” has so far not been enough to effectively address the depletion of environmental resources. This might be attributed to ignorance regarding our real footprint on the environment. Or it can also be attributed to a lack of will to protect the interests of those following us, keeping in mind that not all of us has or will have children whom they would want to protect. What is needed is a stronger sense of obligation towards future generations, maybe even a legally binding obligation to protect the interests of those succeeding us. In 1997 the International Court of Justice (ICJ) stated that:

Throughout the ages, mankind has, for economic and other reasons, constantly interfered with nature. In the past, this was often done without consideration of the effects upon the environment. Owing to new scientific insights and to a growing awareness of the risks for mankind – for present and future generations – of pursuit of such interventions at an unconsidered and unabated pace, new norms and standards have been developed, set forth in a great number of instruments during the last two decades. Such new norms have to be taken into consideration, and such new standards given proper weight, not only when States contemplate new activities but also when continuing with activities begun in the past. This need to reconcile economic development with protection of the environment is aptly expressed in the concept of sustainable development⁶.

⁴ Lester R. Brown, Earth Policy Institute, *Full Plant, Empty Plates: The New Geopolitics of Food Scarcity*, available at <http://www.earth-policy.org/books/fpep/fpepch2> (consulted on 9 July 2013).

⁵ Wood, 1995-1996, p. 309.

⁶ *Gabcíkovo-Nagymaros Project, Hungary v. Slovakia* (ICJ, 1997), available at <http://www.icj-cij.org/docket/index.php?p1=3&p2=3&k=8d&cse=92&code=hs&p3=4>, para. 140.

ARE WE PROTECTING FUTURE GENERATIONS' RIGHT TO FOOD?

This thesis will examine whether there rest any obligations on this generation to protect the needs of future generations, legal or otherwise. The aim is to establish whether we are potentially violating the right of future generations to adequate food.

The thesis will commence with a discussion on the principle of intergenerational equity. Under this principle there are two relationships that come into play: firstly, our relationship with other generations and, secondly, our relationship to the natural system⁷. Chapter 1 will look at each of these relationships and will examine what duties they place on each generation regarding those succeeding them. Chapter 2 will discuss the right to food, and the obligations that rest upon a state under this right towards future generations. Chapter 1 and 2 will include a discussion on the sustainable use of resources as an obligation on this generation under the principle of intergenerational equity and the right to adequate food, respectively. This chapter will also discuss how this concept connects with the principle of intergenerational equity and the right to adequate food. Chapter 3 will focus on the environmental resources necessary for food production. It will be examined how some of our unsustainable practices have affected these resources and how this impacts our duties owed to the next generation, as identified in Chapters 1 and 2. The chapter will also include a discussion on climate change, the effects it has on food production and how the measures implemented to mitigate or adapt to climate change can negatively impact food supply. Chapter 4 will discuss how scientific and technological advancements, optimising food energy efficiency and small-scale agriculture can be employed to aid us in fulfilling our duties towards future generations.

⁷ Brown Weiss, 1990, p. 199.

1.

THE PRINCIPLE OF INTERGENERATIONAL EQUITY

The term “future generations” refer to “those that [sic] will come into existence after all those living now have ceased to exist⁸. ” Some writings also include today’s children when referring to future generations. In determining whether we are protecting the right to food of these generations, it should first be established whether they posses any rights which must be protected. It further falls to be established whether there rests any corollary obligations upon the present generation. This chapter will focus on the principle of intergenerational equity and the relationship between different generations. Under the principle of intergenerational equity there rest certain obligations upon the present generation with regard to the environment and natural resources. It is based on these obligations that it can be argued that we owe a duty to future generations to protect the environmental resource base which forms the foundation of each generation’s ability to feed themselves.

The chapter will commence by discussing how the concept of obligations towards future generations are included in other areas of law, religion, philosophy and politics. This will be followed by an examination of the principles of intergenerational equity in Part 1.2. Part 1.3 will present arguments against the principle of intergenerational equity, followed by a discussion of the legal recognition of the principle in Part 1.4.

⁸ Weston, 2007-2008, pp. 383-384.

ARE WE PROTECTING FUTURE GENERATIONS' RIGHT TO FOOD?

1.1. THE NOTION OF OBLIGATIONS TOWARDS FUTURE GENERATIONS

Various religious and cultural traditions around the world, including political views, refer to the idea that the present generation owes an obligation to future generations⁹. Under Islamic law, for example, Muslims are seen as “stewards and trustees of the natural world with duties towards both current and future generations¹⁰.” The notion of “collective human ownership of the natural world” and “environmental stewardship obligations to future generations” can also be found in Judaism, Christianity, African customary law and Asian philosophical and religious traditions. Under Marxism the present generation is seen as mere users of land and is under a duty to pass it on in a good condition¹¹.

In addition, the duty owed by present to future generations, to preserve the dignity and quality of our planet, is said to be an emerging norm of customary international law. It also forms part of the treaty-based custom of the “common heritage of mankind¹².” Under human rights law it is argued that future generations have the human right to inherit the environment in no worse condition than how we received it¹³.

It is widely accepted that the present generation has, at the very least, a moral obligation to ensure that we pass on a global environment to future generations which is not in a worse condition than the way in which we received it¹⁴. Unfortunately, it is not enough to rely on this moral obligation alone. If one looks at the present and past practices of our society it is clear that our own selfish needs far outweigh the needs of others, whether they are from the present or future generation. Morality alone will not be enough to protect the interests of future generations¹⁵. It is here that reliance on the principle of intergenerational equity comes in as it proposes equity amongst generations.

⁹ Collins, 2007, p. 96.

¹⁰ Ibidem, p. 94.

¹¹ Ibidem, pp. 94-96; Barresi, 1997-1998, p. 63.

¹² D'Amato, 1990, p. 190.

¹³ Ibidem, p. 195.

¹⁴ Weston, 2007-2008, p. 376.

¹⁵ Brown Weiss, 1990, p. 207.

1.2. THE PRINCIPLE OF INTERGENERATIONAL EQUITY

The negative effects of our actions on the environment will not be seen today or tomorrow, but only years from now. It will be the next generation, and those succeeding them, which will have to bear the burdens of our unsustainable practices. To make matters worse they will have no remedies available to them to hold this generation accountable for its actions¹⁶. The aim of the principle of intergenerational equity is to extend fairness to future generations and to place a duty on the present generation to preserve the environment for those to come¹⁷. The principle of intergenerational equity is based on three notions: a) that humans are dependent on the natural resources of the Earth and are therefore inseparable from environmental conditions; b) human beings have the potential to alter the environment; and c) all generations are equal in their claim to the Earth's natural resources¹⁸. According to Professor Joerg Chet Tremmel, intergenerational justice will exist "when the accumulated capital, which the next generation inherits, is at least as high as what the present generation inherited." Part of this accumulated capital is "natural capital," that is "[t]he stock of environmental assets important for supporting human life, for the generation of well-being, and for amenity and beauty¹⁹." Peter Brown, an environmental philosopher, argues that all people, of present and future generations, possess three types of rights: a) bodily integrity; b) moral, political and religious choice; and c) subsistence rights. He further argues that it is the responsibility of present generations to guarantee these rights to the generations succeeding them²⁰.

Intergenerational can be seen as the "relations between all those currently living, and generations yet unborn, indefinitely into the future²¹." As a basis for the principle of intergenerational equity, society is seen as a partnership amongst generations²². The planet and its resources are seen as a trust with an obligation on the present

¹⁶ Jumper, 2007-2008, p. 182.

¹⁷ Alam & Karim, 2010-2011, p. 359; Collins, 2007, p. 99.

¹⁸ Anton & Shelton, 2011, pp. 91-92.

¹⁹ Weston, 2007-2008, p. 392.

²⁰ Ibidem, p. 395.

²¹ Collins, 2007, p. 102.

²² Brown Weiss, 1990, p. 199.

generation, as trustees of the trust, to maintain the trust resources²³. At the same time the present generation is also a beneficiary of the trust and has the right to access and use natural resources²⁴.

John Rawls also referred to this idea of intergenerational equity in his notion of an “original position²⁵. ” Under the “veil of uncertainty,” where parties are unaware of their position in time, Rawls asks what rights or principles parties will adopt to govern their relationships. He argues that these parties will inevitably adopt rules that will give each person the right to fully exercise his rights in a way that is compatible with the exercise of rights by others²⁶. This supports the argument that no generation is superior to another and therefore, each generation is entitled to receive the planet in the same condition as that received by the previous generation²⁷. Therefore, the basis for intergenerational equity is justice, justice for all generations²⁸.

According to Professor Edith Brown Weiss there are four requirements for any theory of intergenerational equity: a) there should be equality amongst generations; b) it should be value-neutral and must guarantee future generations the opportunity to achieve their goals, without

²³ Anton & Shelton, 2011, p. 92.

²⁴ Wood, 1995-1996, p. 299.

²⁵ According to the *Stanford Encyclopedia of Philosophy*, “[t]he original position is a central feature of John Rawls's social contract account of justice, ‘justice as fairness,’ set forth in *A Theory of Justice* (TJ). It is designed to be a fair and impartial point of view that is to be adopted in our reasoning about fundamental principles of justice. In taking up this point of view, we are to imagine ourselves in the position of free and equal persons who jointly agree upon and commit themselves to principles of social and political justice. The main distinguishing feature of the original position is ‘the veil of ignorance’: to insure impartiality of judgment, the parties are deprived of all knowledge of their personal characteristics and social and historical circumstances. They do know of certain fundamental interests they all have, plus general facts about psychology, economics, biology, and other social and natural sciences. The parties in the original position are presented with a list of the main conceptions of justice drawn from the tradition of social and political philosophy, and are assigned the task of choosing from among these alternatives the conception of justice that best advances their interests in establishing conditions that enable them to effectively pursue their final ends and fundamental interests. Rawls contends that the most rational choice for the parties in the original position is the two principles of justice. The first principle guarantees the equal basic rights and liberties needed to secure the fundamental interests of free and equal citizens and to pursue a wide range of conceptions of the good. The second principle provides fair equality of educational and employment opportunities enabling all to fairly compete for powers and prerogatives of office; and it secures for all a guaranteed minimum of the all-purpose means (including income and wealth) that individuals need to pursue their interests and to maintain their self-respect as free and equal persons.” Available at <http://plato.stanford.edu/entries/original-position/> (consulted on 10 May 2013).

²⁶ Wood, 1995-1996, pp. 298-299.

²⁷ Brown Weiss, 1992-1993, p. 21.

²⁸ Collins, 2007, pp. 100-101.

compromising their values; c) the principles of intergenerational equity should be “reasonably clear” in how it is to be applied to foreseeable situations; and d) it should be acceptable to different cultural traditions and economic and political systems²⁹.

Under the principle of intergenerational equity, three obligations can be identified: a) conservation of options; b) conservation of quality; and c) conservation of access³⁰. The duty to conserve options for future generations refers to the duty to conserve biological and cultural diversity. This duty also requires limitations on the use of non-renewable resources which can not be substituted³¹. The duty to conserve environmental quality refers to the general duty to pass on the planet in no worse condition than how we received it³². The duty to conserve access requires that all members of the present generations should have equitable rights of access to resources, whilst preserving the access of future generations³³. Although these obligations fall on every member of the present generation, it is the state’s duty to ensure that these obligations are fulfilled through the adoption of relevant policies at the national and international level³⁴.

1.3. ARGUMENTS AGAINST THE DOCTRINE OF INTERGENERATIONAL EQUITY

The urgency of poverty and the present harm that it is causing raises the argument that we should focus our planetary resources and attention on satisfying the immediate needs of millions of people, and not be restricted by the interest of those who do not yet exist³⁵. However, it is a reality that some resources will be depleted by 2030, which will affect the food security of this generation, especially the future food security of today’s children. One of the benefits of following the principle of intergenerational equity is not only protecting the resource base of the Earth for future generations, but also for us and our children. Furthermore, the principle of intergenerational equity is rational in what it requires from the present

²⁹ Ibidem, p. 101.

³⁰ Anton & Shelton, 2011, p. 92; Brown Weiss, 1990, pp. 201-202.

³¹ Van der Zwaag, 1993, p. 50.

³² Ibidem.

³³ Brown Weiss, 1990, p. 202.

³⁴ Collins, 2007, p. 105; Gundling, 1990, p. 212.

³⁵ Collins, 2007, p. 97.

generation. It aims to strike a balance between the use of resources to meet the needs of the present and the conservation of “adequate natural resources” to meet the needs of the future³⁶.

Further arguments have been raised against the principle of intergenerational equity. One argument holds that future generations are incapable of having rights of any kind as they do not yet exist. This argument does not take account of the fact that a person's legal interests can exist, independent of that person's actual lifetime³⁷. There are various examples under domestic law which make provision for “future-commonly unborn-interests³⁸.” For example, trustees of private and public trusts have a fiduciary duty to protect the trust corpus for future beneficiaries, which may or may not have already been born³⁹. In addition, in domestic courts it is common practice to appoint representatives to act on behalf of fetuses⁴⁰. It is through lawfully appointed proxies that future interest can move from moral obligations on present generations toward legally recognised rights of future generations⁴¹. The fact that the rights-holders are incapable of enforcing the rights themselves, does not affect the existence of their rights⁴².

Another argument holds that future generations cannot hold rights because they are without identity. However, intergenerational rights are held by generations as a group in relation to other generations which might come before or after it⁴³.

A fourth argument is based on the notion that any actions that we take to preserve the environment for the future is capable of changing the identity of those yet to be born. This has been referred to as the Parfit paradox which states that:

[O]ur intervention in the environment will make a sufficient impact to assure that different sperm cells will probably fertilize the egg cells in all procreations that take place subsequent to our environmental intervention. Different people will be born from those who would have been born if we had not intervened in the environment⁴⁴.

³⁶ Ibidem, p. 107.

³⁷ Allen, 1993-1994, p. 729.

³⁸ Weston, 2007-2008, p. 378.

³⁹ Ibidem.

⁴⁰ Allen, 1993-1994, p. 730.

⁴¹ Weston, 2007-2008, p. 406.

⁴² Brown Weiss, 1990, p. 205.

⁴³ Ibidem, p. 203.

⁴⁴ D'Amato, 1990, p. 191.

Therefore, the argument holds that it is better to be born into a world with a degraded environment than not to be born at all⁴⁵. To this Mary Anne Warren has argued “our duty to preserve the environment is a duty to the generation that does come into existence, regardless of whether it is the same generation that would have existed had we done nothing⁴⁶. ” In any event, the decision to do nothing is also a choice with its own implications⁴⁷.

A fifth argument holds that we cannot protect the interests of future generations as we are not in a position to determine what they want⁴⁸. This argument clearly does not take into account the basic human needs of any generation – clean air, water and the ability to produce food⁴⁹.

Another important argument against the doctrine of intergenerational equity is based on the “long-time horizon” – how far into the future does the present generation’s obligations extend? How much should the present generation sacrifice to protect generations a thousand years from now⁵⁰? Many agree that some limit should be placed on how many generations we take into account. Some have proposed following the Iroquois Nation⁵¹ maxim: “In our every deliberation, we must consider the impact of our decisions on the next seven generations⁵². ” Another time frame that can be followed is that proposed by Elise Boulding:

I propose [...] thinking in a time-span which I call the “two hundred year present.” [...] [It] begins one hundred years ago today, on the day of the birth of those among us who are centenarians, celebrating their one hundredth birthday today. The other boundary of this present moment is the hundredth birthday of the babies being born today. It is a continuously moving moment, always reaching out one hundred years in either direction from the day we are in. We are linked with both boundaries of this moment by the people among us whose lives began or will end at one of those boundaries, *three and a half generations each way in time*. It is our space, one we can move around in

⁴⁵ Ibidem.

⁴⁶ Collins, 2007, pp. 109-110.

⁴⁷ As quoted in ibidem, p. 109.

⁴⁸ Allen, 1993-1994, p. 729.

⁴⁹ Ibidem, p. 731.

⁵⁰ Collins, 2007, pp. 112-113.

⁵¹ “[A] linguistic stock of North American Indians composed of the Iroquois confederation” according to Marianopolis College, *The Quebec History Encyclopaedia – Iroquoian Nations*, at <http://faculty.marianopolis.edu/c.belanger/quebechistory/encyclopedia/IroquoisNation.htm> (consulted on 24 April 2013).

⁵² Weston, 2007-2008, p. 386; Collins, 2007, p. 113.

directly in our lives, and indirectly by touching the lives of the linkage people, young and old, around us⁵³.

Following the time frame proposed by Boulding has the advantage of eliminating the vagueness of generational identity. Furthermore, it reminds us of what we have inherited from the past and moves us to take an interest in what we pass on to future generations. Under this proposed time frame remote future generations will not be prejudiced "as the outer boundary of the present is continuously moving"⁵⁴. On the other hand, Brown Weiss argues that no theoretical basis exist for limiting intergenerational rights to immediately successive generations⁵⁵. She theorises that there is no need for limitation if every generation fulfils their obligation to hand over the planet in the way it was received⁵⁶. Lynda Collins further argues that any decision on where to draw the line should be context-specific. She argues that Weiss's indefinite approach will be applicable in situations where there is a risk of catastrophic future harm, for example, loss of biological diversity, nuclear and hazardous waste and ozone depletion⁵⁷.

Although many arguments have been raised against the principle of intergenerational equity, various counter-arguments can also be raised. As will be shown in the next section, the recognition of the principle of intergenerational equity is increasing, notwithstanding the arguments raised in this section.

1.4. LEGAL RECOGNITION OF OBLIGATIONS TOWARDS FUTURE GENERATIONS UNDER INTERNATIONAL LAW

The 1972 Stockholm Declaration on the Human Environment⁵⁸ is one of the first international instruments, albeit soft-law instrument, to recognise the importance of protecting the interests of future generations. It also recognises the obligation on present generations to

⁵³ As quoted in Weston, 2007-2008, pp. 386-387.

⁵⁴ Ibidem, p. 387.

⁵⁵ Brown Weiss, 1990, p. 202.

⁵⁶ Collins, 2007, p. 106.

⁵⁷ Ibidem, p. 113; Brown Weiss, 1990, p. 202.

⁵⁸ Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration) (adopted on 16 June 1972).

pass on a sustainable planet⁵⁹. A number of principles contained in the Declaration refer to the protection of the environment for the benefit of future generations⁶⁰. These include Principle 1 which hold that “[m]an [...] bears a solemn responsibility to protect and improve the environment for present and future generations.” And Principle 2 requires that “[t]he natural resources of the earth, including the air, water, land, flora and fauna [...] must be safeguarded for the benefit of present and future generations [...]⁶¹.”

The Preamble of the Universal Declaration of Human Rights (UDHR) recognises “the equal and inalienable rights of all members of the human family⁶².” According to Professor Brown Weiss this reference to “all members of the human family” has a temporal dimension which brings all generations under the scope of the Declaration. She further argues that the reference to equal and inalienable rights recognises the equality between generations⁶³. Other international instruments, such as the 1972 World Cultural and Natural Heritage Convention, the 1973 Convention on International Trade in Endangered Species and the 1982 United Nations World Charter for Nature also express concern over the preservation of the environment for the benefit of future generations⁶⁴. Under environmental law, the Aarhus Convention recognises “that every person has the right to live in an environment adequate to his or her health and well-being, and the duty, both individually and in association with others, to protect and improve the environment for the benefit of present and future generations⁶⁵.” The principle of inter-generational equity was also confirmed in Article 3 of the 1992 United Nations Framework Convention on Climate Change:

In their actions to achieve the objective of the Convention and to implement its provisions, the Parties shall be guided, *inter alia*, by the following:

1. The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with

⁵⁹ Allen, 1993-1994, p. 719; Just, 1996-1997, p. 612.

⁶⁰ Alam & Karim, 2010-2011, p. 350.

⁶¹ Also see Principles 3, 5, 6 and 11 of the Stockholm Declaration.

⁶² Universal Declaration of Human Rights (adopted on 10 December 1948).

⁶³ Brown Weiss, 1990, pp. 200-201.

⁶⁴ Just, 1996-1997, pp. 613-614; Weston, 2007-2008, pp. 389-390.

⁶⁵ Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (adopted on 25 June 1998 and entered into force on 30 October 2001), p. 2.

their common but differentiated responsibilities and respective capabilities⁶⁶.

On 12 November 1997, the United Nations Educational, Scientific and Cultural Organisation adopted the Declaration on the Responsibilities of the Present Generations towards Future Generations. Article 1 provides for inter- and intragenerational equity by placing the responsibility on present generations to ensure “the needs and interests of both present and future generations.” Although the key elements of the Declaration correspond to the principle of intergenerational equity, the Declaration talks about present responsibility rather than future rights⁶⁷.

Regarding international expert reports, the World Commission on Environment and Development (WCED) was the first to give intergenerational justice concrete meaning in its 1987 report, commonly referred to as the “Brundtland Report.” The report states that for development to be sustainable it must ensure that “it meets the needs of the present without compromising the ability of future generations to meet their own needs⁶⁸.” The report included a summary of proposed legal principles for environmental protection and sustainable development. Principle 2 refers to intergenerational equity and holds that: “States shall conserve and use the environment and natural resources for the benefit of present and future generations⁶⁹.” In 1995 the Legal Experts Report for the United Nations Commission on Sustainable Development identified intergenerational equity as one of the principles of international environmental law. The following year, the United Nations Environment Programme Legal Experts Report confirmed that the protection of future generations forms part of the principle of equity in international environmental law⁷⁰.

In the ICJ, Judge Weeramantry first discussed equitable sharing of resources and intergenerational equity in the case of *Denmark v. Norway*⁷¹. He elaborated on the topic in the 1995 *Nuclear Tests* case

⁶⁶ United Nations Framework Convention on Climate Change (adopted on 9 May 1992 and entered into force on 21 March 1994).

⁶⁷ Collins, 2007, p. 126.

⁶⁸ World Commission on Environment and Development, 1987, “From one Earth to One World”, para. 27.

⁶⁹ Ibidem, Annex 1.

⁷⁰ Brown Weiss, 1997-1998, p. 96.

⁷¹ See *Maritime Delimitation in the Area between Greenland and Jan Mayen, Denmark v. Norway* (ICJ, 1993), separate opinion of Judge Weeramantry, available at <http://www.icj-cij.org/docket/index.php?p1=3&p2=3&k=e0&case=78&code=gjm&p3=4>.

where he recognised the principle of intergenerational equity as “an important and rapidly developing principle of contemporary environmental law⁷². ” It is important to point out that in his dissenting opinion Judge Weeramantry held that:

In a matter of which it is duly seised, this Court must regard itself as a trustee of [the] rights [of future generations] in the sense that a domestic court is a trustee of the interests of an infant unable to speak for itself [...]. New Zealand’s complaint that its rights are affected does not relate only to the rights of people presently in existence. The rights of the people of New Zealand include the rights of unborn posterity. Those are rights which a nation is entitled, and indeed obliged, to protect⁷³.

The following year, in his dissenting opinion to the *Advisory Opinion on the Legality of the Threat of Use of Nuclear Weapons*, he further held that:

[T]he rights of future generations have passed the stage when they were merely an embryonic right struggling for recognition. They have woven themselves into international law through major treaties, through juristic opinion and through general principles of law recognized by civilized nations⁷⁴.

In this case the ICJ again recognised the interests of future generations and that the present generation has an obligation to consider these interests when applying international law⁷⁵. The Court also acknowledged that the environment “represents the living space, the quality of life and the very health of human beings, including generations unborn⁷⁶. ” The Court further confirmed that the obligation on states to respect the environment is now part of international environmental law⁷⁷. This was confirmed in 1997 in the case of *Hungary v. Slovakia*, in which Judge Weeramantry reaffirmed the principle of trusteeship of the

⁷² Request for an Examination of the Situation in Accordance with Paragraph 63 of the Court’s Judgment of 20 December 1974 in the Nuclear Tests (New Zealand v. France) (ICJ, 1995), available at <http://www.icj-cij.org/docket/index.php?p1=3&p2=3&k=cd&case=97&code=nzfr&p3=3>, p. 341.

⁷³ Ibidem; Collins, 2007, p. 128.

⁷⁴ Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons (ICJ, 1996), dissenting opinion of Judge Weeramantry, available at <http://www.icj-cij.org/docket/index.php?p1=3&p2=4&k=e1&case=95&code=unan&p3=4>, p. 455.

⁷⁵ Brown Weiss, 1997-1998, p. 94.

⁷⁶ Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons (ICJ, 1996), para. 29; Brown Weiss, 1997-1998, p. 94.

⁷⁷ Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons (ICJ, 1996), para. 29; Brown Weiss, 1997-1998, p. 94.

Earth's resources as well as the principle of intergenerational rights⁷⁸.

Furthermore, the constitutions of various countries, for example, Iran, Namibia and Vanuatu recognise the environmental interests of future generations⁷⁹. Moreover, a number of other countries recognise the people's right to a safe and habitable environment, for example, the Philippines and South Africa⁸⁰. Article 20a of the German Constitution also refers to the protection of natural resources as part of the responsibilities of the state towards future generations⁸¹. Israel has gone further and introduced the Commission for Future Generations in 2001. The mandate of the Commission is to prevent the implementation of laws which could adversely affect the "needs and rights of future generations"⁸².

Regarding domestic jurisprudence, the case of *Minors Oposa v. Secretary of the Department of Environment and Natural Resources (DENR)*⁸³, is of significant importance. In this case a group of Philippine children requested an order prohibiting the logging of the nation's rainforest. The children argued that if the deforestation were to continue it would cause irreparable harm and would violate their right to a balanced and healthful ecology, as provided for in the Philippine Constitution⁸⁴. They further alleged that they did not only represent themselves but also generations yet unborn⁸⁵. The Supreme Court of the Philippines found that the children were able to bring action for themselves, as well as for future generation based on the concept of intergenerational responsibility with relation to the right to a balanced and healthful ecology⁸⁶. This case was significant advancement in

⁷⁸ Collins, 2007, p. 129. See *Gabčíkovo-Nagymaros Project, Hungary v. Slovakia* (ICJ, 1997), available at <http://www.icj-cij.org/docket/index.php?p1=3&p2=3&k=8d&case=92&ccode=h&s&p3=4>.

⁷⁹ Constitution of the Islamic Republic of Iran, 24 October 1979, available at <http://www.refworld.org/docid/3ae6b56710.html>; Article 50 (consulted on 24 April 2013); Constitution of the Republic of Namibia (amended 1998), 21 March 1990, available at <http://www.refworld.org/docid/47175fd361.html>; Article 95(l) (consulted on 24 April 2013); Constitution of the Republic of Vanuatu, 30 July 1980, available at <http://www.refworld.org/docid/3ae6b53c8.html>; Article 7 (consulted on 24 April 2013).

⁸⁰ Just, 1996-1997, p. 614.

⁸¹ Constitution of the Federal Republic of Germany, 23 May 1949, available at http://www.servat.unibe.ch/icl/gm00000_.html (consulted on 10 May 2013).

⁸² Collins, 2007, p. 137.

⁸³ *Minors Oposa v. Secretary of the Department of Environment and Natural Resources (DENR)*, 33 ILM 173 (Supreme Court of the Philippines, 1994).

⁸⁴ Allen, 1993-1994, p. 713.

⁸⁵ *Minors Oposa v. Secretary of the Department of Environment and Natural Resources (DENR)*, 33 ILM 173 (Supreme Court of the Philippines, 1994), p. 177.

⁸⁶ Just, 1996-1997, p. 619.

environmental law as it was the first time that intergenerational standing was recognised by a Court⁸⁷. The Court held that:

Nature means the created world in its entirety. Such rhythm and harmony indispensably include, *inter alia*, the judicious disposition, utilization, management, renewal and conservation of the country's forest, mineral, land, waters, fisheries, wildlife, off-shore areas and other natural resources to the end that their exploration, development and utilization be equitably accessible to the present as well as future generations. Needless to say, every generation has a responsibility to the next to preserve that rhythm and harmony for the full enjoyment of a balanced and healthful ecology. Put a little differently, the minors' assertion of their right to a sound environment constitutes, at the same time, the performance of their obligation to ensure the protection of that right for the generations to come⁸⁸.

It is evident from the above that the inclusion of the principle of intergenerational equity in various international and national instruments and jurisprudence is evidence of "the emergence of a principle of customary international law providing that the present generation owes a duty to preserve an environment in which future generations' have the ability to meet their needs⁸⁹."

1.5. CONCLUSION

It is only from the hard work of our ancestors that many of us are in the fortunate positions that we are today. As it is not possible to pay this debt backwards, it has to be carried forward⁹⁰. The notion of obligations towards future generations is contained in various religious and cultural traditions around the world, including political views.

Although there are many arguments raised against recognising legally binding rights of future generations, it has been accepted by the ICJ that we have the obligation to, at the very least, take account of the interests of future generations. Moreover, the principle of intergenerational equity is recognised as an emerging principle of international environmental law. Under this principle, the present

⁸⁷ Ibidem, p. 621.

⁸⁸ *Minors Oposa v. Secretary of the Department of Environment and Natural Resources (DENR)*, 33 ILM 173 (Supreme Court of the Philippines, 1994), p. 185.

⁸⁹ Collins, 2007, p. 138.

⁹⁰ Anton & Shelton, 2011, p. 92.

ARE WE PROTECTING FUTURE GENERATIONS' RIGHT TO FOOD?

generation holds the planet's resources in trust for future generations. As trustees we are under an obligation to protect the corpus of the trust. Therefore, there rests an obligation on the present generation to pass on the planet in no worse condition than how we received it. Under the principle of intergenerational equity three further obligations, owed by the present to the future generation can be identified, namely the duty to conserve options, the duty to conserve quality, and the duty to conserve access. The fulfillment of these obligations requires the sustainable use of natural resources. This will in turn have the benefit of ensuring the sustainability of the food supply of future generations. This is in accordance with the sustainability requirement of the right to adequate food which states that food should be accessible for both present and future generations. Chapter 2 will focus on the right to adequate food and how this right, just like the principle of intergenerational equity, places certain environmental obligations upon the present generation. It is argued that these obligations can be employed to protect the food interests of future generations.

2.

THE RIGHT TO ADEQUATE FOOD

The previous chapter established that the present generations owe an obligation to the future generations to pass on the planet in no worse condition than how we received it. There is also an obligation on this generation to take into account the interests of those succeeding us when applying international law. The aim of this chapter will be on the right to adequate food (RTAF) and the obligations upon states under this right. It will be argued that this right places certain legal obligations on states with regard to future generations. This includes the obligation of sustainable use of resources, which was also identified in Chapter 1. Furthermore, it will be demonstrated that in order to meet the obligations under this right, states are required to maintain the environment and protect natural resources. It is only when a state fulfills this requirement that it will effectively be protecting the right to food of not only the present generation, but also those to come.

The chapter will commence with a discussion of the right to food as a human right and the benefits of following a rights-based approach to end hunger. Part 2.2 will explore the legal recognition of the right to food, whilst Part 2.3 will examine the content of the RTAF. This will be followed by a discussion of the sustainability requirement under the RTAF. Part 2.5 will set out the obligations upon states and other actors with regard to the right to food.

2.1. THE RIGHT TO FOOD AS A HUMAN RIGHT

In his 1941 State of the Union address, United States President, Franklin D. Roosevelt, referred to four fundamental freedoms that everyone around the world should enjoy. These are: freedom of speech

and expression, freedom of worship, freedom from want and freedom from fear. The aim was to develop an international legal order in which freedom from want would form the cornerstone⁹¹. Freedom from want is now widely recognised as a human right and was one of the main influences for the inclusion of the right to food and other economic and social rights in the modern international human rights system⁹².

Included in the idea of freedom from want is the entitlement to be free from hunger. In order to guarantee this freedom the international community acknowledged the human right to food. Looking at freedom from hunger through a human rights lens has the benefit of enabling the application of different principles of human rights. These include the principles of universality, indivisibility and interrelatedness of all human rights. More importantly, it also ensures the application of the principles of equality, non-discrimination, empowerment, participation, accountability and the rule of law. These are important requirements which can guide national and international policy decisions towards a food system that can guarantee the dignity of all and provide a healthy, diversified and culturally adequate diet⁹³. According to the 2009 report of the Special Rapporteur on the Right to Food, Olivier de Schutter, efforts to combat hunger and malnutrition which is based on the right to food has the benefit of identifying the most vulnerable through systems mapping food vulnerability and insecurity. This approach will also guarantee accountability and recourse mechanisms for victims in the case of violations or threats of violations of the right to food. Most importantly, however, it prioritises the right to food over trade and investment policies⁹⁴.

2.2. INTERNATIONAL RECOGNITION OF THE RIGHT TO FOOD

The UDHR is one of the first international human rights instruments to recognise the right to food. Article 25(1) states that “(e)veryone has the right to a standard of living adequate for the health and well-being of himself and of his family, *including food*, clothing, housing and medical

⁹¹ Eide, Oshang & Eide, 1991, p. 416.

⁹² Ibidem, pp. 423-424.

⁹³ Valente & Franco, 2010, p. 439.

⁹⁴ A/HRC/12/31, 21 July 2009, paras. 10-12.

care [...]” (my emphasis). Article 11 of the International Covenant on Economic, Social and Cultural Rights (ICESCR)⁹⁵, which is legally binding on state parties, reiterates this right:

(1) The States Parties to the present Covenant recognize the right of everyone to an adequate standard of living for himself and his family, including adequate food, clothing and housing, and to the continuous improvement of living conditions. The States Parties will take appropriate steps to ensure the realization of this right, recognizing to this effect the essential importance of international co-operation based on free consent.

(2) The States Parties to the present Covenant, recognizing the fundamental right of everyone to be free from hunger, shall take, individually and through international co-operation, the measures, including specific programs, which are needed:

(a) to improve methods of production, conservation and distribution of food by making full use of technical and scientific knowledge, by disseminating knowledge of the principles of nutrition and by developing or reforming agrarian systems in such a way as to achieve the most efficient development and utilization of natural resources;

(b) Taking into account the problems of both food-importing and food-exporting countries, to ensure an equitable distribution of world food supplies in relation to need.

Various other human rights instruments also provide for the right to food, for example, the Convention on the Rights of the Child (Articles 24(2)(c) and 27(3))⁹⁶, the Convention on the Elimination of All Forms of Discrimination against Women (Article 12(2))⁹⁷, and the Convention on the Rights of Persons with Disabilities (Articles 25(f) and 28(1))⁹⁸.

The right to food has also been incorporated into regional human rights instruments. Article 15 of the Protocol to the African Charter on Human and Peoples’ Rights on the Rights of Women in Africa⁹⁹ recognises the right to food security for all women in Africa. Although

⁹⁵ International Covenant on Economic, Social and Cultural Rights (adopted on 16 December 1966 and entered into force on 3 January 1976).

⁹⁶ Convention on the Rights of the Child (adopted on 20 November 1989 and entered into force on 2 September 1990).

⁹⁷ Convention on the Elimination of All Forms of Discrimination Against Women (adopted on 18 December 1979 and entered into force on 3 September 1981).

⁹⁸ Convention on the Rights of Persons with Disabilities (adopted on 30 March 2007 and entered into force on 3 May 2008).

⁹⁹ Protocol to the African Charter on Human and Peoples’ Rights on the Rights of Women in Africa (adopted on 11 July 2003 and entered into force on 25 November 2005).

the African Charter on Human and Peoples' Rights¹⁰⁰ does not explicitly refer to the right to food, the African Commission has held that the right to food can be implied from the provisions of the Charter through the interpretation of other provisions such as the provisions on the right to life, the right to health and the right to development¹⁰¹. Article 12 of the Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights¹⁰², provides for the right to food under the Inter-American system.

It is clear that the right to food is a widely recognised human right. Accordingly, the obligations that this right entail is incumbent on all states party to the abovementioned conventions with regard to everyone under their jurisdiction.

Moreover, it can also be argued that there exists a duty to guarantee the right to food under customary international law as set out in the UDHR. It is argued that the provisions of the UDHR is indicative of state practice of United Nations member states, in addition to being an authoritative interpretation of the Charter of the United Nations¹⁰³ to which all member states are bound. Furthermore, continuous reference is made to the UDHR as having binding legal effect¹⁰⁴. Article 55 of the Charter reads as follows:

With a view to the creation of conditions of stability and well-being which are necessary for peaceful and friendly relations among nations [...] the United Nations shall promote:

a. higher standards of living, full employment, and conditions of economic and social progress and development [...].

Others have criticised the above approach and argue that not all the provisions contained in the UDHR have achieved customary law status¹⁰⁵. However, in addition to the treaties already mentioned above, there are various other international instruments that are evidence of

¹⁰⁰ African Charter on Human and Peoples' Rights (adopted on 27 June 1981 and entered into force on 21 October 1986).

¹⁰¹ *Social and Economic Rights Action Centre (SERAC) v. Nigeria*, (2001) AHRLR (African Commission on Human and Peoples' Rights, 2001), paras. 64-66.

¹⁰² Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights (adopted on 17 November 1988 and entered into force on 16 November 1999).

¹⁰³ Charter of the United Nations (adopted on 26 June 1945 and entered into force on 24 October 1945).

¹⁰⁴ Narula, 2005-2006, p. 780.

¹⁰⁵ Ibidem, p. 781.

state practice and which recognise the right to food. These include the Geneva Conventions, various United Nations resolutions, and declarations, especially multi-state declarations, for example the Food Aid Convention concluded in 1967 by a number of countries including, Australia, Japan, Norway, the United States and the European Community and its member states. The right to food is also included in the domestic legislation and national constitutions of various countries¹⁰⁶.

The clearest example of the right to be free from hunger as part of customary law and acceptance by the international community is its inclusion in the Millennium Development Goals. At the Millennium Summit in 2000 the United Nations adopted eight international development goals to which all world leaders committed themselves. Millennium Development Goal 1 aims to eradicate extreme hunger and poverty by 2015.

Based on the arguments presented above it can be concluded that the right to food, as it forms part of the freedom from hunger, can be seen as part of customary international law¹⁰⁷. The majority of writers agree that the right to food exists as a treaty right tied to a customary right to be free from hunger, of which the obligations are applicable to all states¹⁰⁸.

2.3. THE CONTENT OF THE RIGHT TO ADEQUATE FOOD

According to De Schutter, the right to food “protects the rights of all human beings to feed themselves in dignity, either by producing their own food or by purchasing it¹⁰⁹.” In the 1999 General Comment on Article 11 of the ICESCR, which is considered non-binding soft-law, the Committee on Economic, Social and Cultural Rights (CESCR) sets out the normative content of the right to food. It is agreed that the General Comments carry “authoritative and persuasive weight among states and international organizations alike¹¹⁰.” The General Comment on Article 11 reads as follows:

¹⁰⁶ Ibidem, pp. 781-791.

¹⁰⁷ Buckingham, 1994, p. 293.

¹⁰⁸ Ibidem, p. 290.

¹⁰⁹ Olivier de Schutter, *Right to Food*, available at <http://www.srfood.org/index.php/en/right-to-food> (consulted on 11 March 2013).

¹¹⁰ Dumas, 2010-2011, p. 119.

The right to adequate food is realized when every man, woman and child, alone or in community with others, has physical and economic access at all times to adequate food or means for its procurement¹¹¹.

Some see the right to food as a multi-leveled concept which contains two separate norms, namely, the right to be free from hunger and the RTAF¹¹². On the other hand, some have argued that there are in fact three levels in the realisation of the right to food. First, freedom from hunger constitutes the minimum norm which should be realised immediately for all. Second, the right to food, which takes account of both the quality and quantity of food, can be set as an intermediary norm. Finally, the RTAF, which includes the requirement of culturally satisfactory food, constitutes the full norm¹¹³.

In its General Comment the CESCR also refers to the notion of “adequate food” which entails that every person has a right to food “which is adequate for his health and well-being and not merely for its bare survival¹¹⁴.” The term “adequate food” refers to a balanced variety of food that contains all the essential vitamins and minerals required for good health¹¹⁵. According to the CESCR the concept of “adequate food” relates to a number of factors which must be borne in mind when deciding whether food, which is accessible, is also appropriate under the circumstances for the purposes of Article 11¹¹⁶. What is “adequate” will also be determined by the cultural norms and religious practices that exist under the circumstances¹¹⁷.

The General Comment on the RTAF specifies the core content of the right. According to the General Comment food should be available in a quantity and a quality that is sufficient to satisfy the dietary needs of individuals. The available food should also be free from adverse substances and acceptable within a specific culture¹¹⁸. The requirement of availability refers not only to the possibility of feeding oneself from productive land or natural resources but also to “well functioning distribution, processing and market systems that can move food from the

¹¹¹ E/C.12/1999/5, 12 May 1999, para. 6.

¹¹² Buckingham, 1994, p. 292.

¹¹³ Ibidem, p. 293.

¹¹⁴ Ibidem, p. 291.

¹¹⁵ Droll, 2011, p. 33.

¹¹⁶ E/C.12/1999/5, 12 May 1999, para. 7.

¹¹⁷ Droll, 2011, p. 33.

¹¹⁸ E/C.12/1999/5, 12 May 1999, para. 8.

site of production to where it is needed in accordance with demand¹¹⁹.”

Food must also be accessible in ways that are sustainable and which do not restrict the enjoyment of any other human right¹²⁰. Food can be accessed in various ways which includes: purchasing, bartering or production¹²¹. The requirement of accessibility contains two elements: economic and physical accessibility. Economic accessibility entails that a household’s costs to attain adequate food for an adequate diet should not impede the ability of that household to satisfy other basic needs. Physical accessibility, on the other hand, requires that everyone, including physically vulnerable individuals, should have access to adequate food¹²².

2.4. SUSTAINABILITY REQUIREMENT UNDER THE RTAF

According to the Office of the High Commissioner for Human Rights and the previous Special Rapporteur on the Right to Food, Jean Ziegler, an additional requirement of the right to food is that of sustainability. This requires that “food should be accessible for both present and future generations¹²³.” This was confirmed in the General Comment on Article 11 which holds that “[t]he notion of *sustainability* is intrinsically linked to the notion of adequate food or food *security*¹²⁴.” Sustainability is founded on the idea that human activities are grounded in the environment and its resources¹²⁵. As was stated by Professor Brown Weiss “[s]ustainability requires that we look at the earth and its resources not only as an investment opportunity, but as a trust passed to us by our ancestors for our benefit, but also to be passed on to our descendants for their use¹²⁶.” Sustainability implies “the use of resources at rates that do not exceed the capacity of the earth to replace

¹¹⁹ E/C.12/1999/5, 12 May 1999, para. 12.

¹²⁰ Eide, Oshang & Eide, 1991, p. 419.

¹²¹ Ibidem.

¹²² E/C.12/1999/5, 12 May 1999, para. 13.

¹²³ Office of the High Commissioner for Human Rights, Toolkit on the Right to Food, available at <http://www.ohchr.org/EN/Issues/ESCR/Pages/Food.aspx> (consulted on 25 April 2013); Jean Ziegler, *What Is the Right to Food*, available at <http://www.righttofood.org/work-of-jean-ziegler-at-the-un/what-is-the-right-to-food/> (consulted on 24 March 2013).

¹²⁴ E/C.12/1999/5, 12 May 1999, para. 7.

¹²⁵ Gherasim & Tănase, 2012, p. 447.

¹²⁶ Brown Weiss, 1992-1993, pp. 19-20.

them¹²⁷.” The sustainability requirement also refers to the preservation of the traditional food base of communities which is often gathered from surrounding forests or lands and constitutes a main part of that particular community’s diet¹²⁸.

The requirement of sustainability is also a requirement under the concept of food security which forms an inherent part of the RTAF. The most accepted definition of food security was given by the World Food Summit in 1996. According to this definition:

Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life¹²⁹.

Therefore, the RTAF, as well as the concept of food security, requires that all people, present and future generations, have physical access to food. In order to meet this requirement both present and future generations should have access to a resources base which is sufficient to meet their food needs.

In 2011, the United Kingdom GOFS identified six drivers of sustainability which can significantly affect the rate at which we use natural resources¹³⁰.

2.4.1. *Global Population Increases*

In 1798, Thomas Malthus theorised that “food production would never stay ahead of population growth because it would be constrained by fixed assets such as land that can only be expanded slowly, while human population tends to grow exponentially¹³¹.” He further stated that “the power of population is so superior to the power of the earth to produce subsistence for man, that premature death must in some shape or other visit the human race¹³².”

If you access any real time population counter you will be amazed by how fast the population is growing¹³³. When the world first started

¹²⁷ United Kingdom Government Office for Science, 2011, p. 31.

¹²⁸ Eide, Oshang & Eide, 1991, p. 457.

¹²⁹ Food and Agricultural Organisation of the United Nations, 2006, p. 1.

¹³⁰ United Kingdom Government Office for Science, 2011, pp. 14-16.

¹³¹ Paarlberg, 2010, p. 8.

¹³² Ibidem.

¹³³ See, for example, www.worldometers.info.

producing a surplus of food there was only 2.5 billion people in the world; today we are already more than seven billion¹³⁴. So far food production has been able to keep up with the growing population, but with approximately 200,000 people being added to the dinner table every day, it will not be long until current levels of production will be insufficient¹³⁵. It is speculated that by 2050 the population will grow to an estimated 8.9 billion people. Although it is expected that growth rates will fall in the coming years, the United Nations Department of Economic and Social Affairs estimates that the population will still increase by an average of 57 million a year between 2000 and 2050¹³⁶. To feed this growing population the World Summit on Food Security (WSFS) estimated in 2009 that food production will have to increase by 70 per cent¹³⁷. Others estimate that an increase of 50-100 per cent is necessary by 2030¹³⁸. Although the population in Europe is stabilising, growth rates in most developing countries in Africa and West Asia is increasing¹³⁹. The rise in population growth will lead to a rise in demand for food. This will significantly increase the pressure on land, water and other natural resources¹⁴⁰.

2.4.2. Changes in the Size and Nature of Per Capita Demand

In addition to growth in population, increases in incomes also lead to increases in per capita food consumption¹⁴¹. Higher incomes also lead to a demand for higher-value foods, such as meat, milk and eggs which require more resources to produce than grain¹⁴². World meat consumption increased from 50 million tons in 1950 to 280 million tons in 2010¹⁴³. There are a number of detrimental consequences as result of a rise in meat consumption. The most notable of which is the additional pressures placed on land resources. Large areas of arable cropland will have to be used to produce animal feed, instead of cereal which could

¹³⁴ Brown, 2012, p. 4.

¹³⁵ United Nations Environmental Programme, 2009, p. 15.

¹³⁶ ST/ESA/SER.A/236, 2004, p. 4.

¹³⁷ Declaration of the World Summit on Food Security, WSFS2009/2, 2009, para. 4.

¹³⁸ Lawrence, Lyons & Wallington, 2011, p. 1.

¹³⁹ Schwegler, Tuncler & Peter, 2008, p. 10.

¹⁴⁰ Brown, 2012, p. 9.

¹⁴¹ United Nations Environmental Programme, 2009, pp. 6 and 15.

¹⁴² Lawrence, Lyons & Wallington, 2011, p. 84; Paarlberg, 2010, p. 13.

¹⁴³ Brown, 2012, p. 25.

have been used for direct consumption at a lower cost. It is estimated that 35 per cent of the annual grain harvest and nearly the entire soybean harvest is currently being used as animal feed¹⁴⁴. Further land is also required for livestock grazing. In Latin America, 70 per cent of forested land in the Amazon is now used as pastures. Not only do pastures take up available cropland, but 70 per cent of grazing land in dry areas is now classified as degraded as a result of overgrazing, compaction and erosion¹⁴⁵. Furthermore, the livestock sector also contributes to climate change as 18 per cent of total greenhouse gas (GHG) emissions can be attributed to the livestock sector¹⁴⁶.

2.4.3. Future Governance of the Food System at Both National and International Levels

There are several factors regarding global and national governance which has an impact on the food system. These include the globalisation of markets, the growth of food superpowers and market interventions by governments¹⁴⁷. Each of these factors can play a role in determining demand and, therefore, the rate at which natural resources are used.

2.4.4. Climate Change

The gradual warming of the climate poses a major threat to food production. Some of the negative consequences of climate change include: an increase in the frequency and severity of extreme weather events, a decrease in available water, rising sea levels which cause flooding of coastal areas and increased incidences of diseases¹⁴⁸. As a result crop yields are decreasing and even the productivity of fisheries is declining¹⁴⁹.

2.4.5. Competition for Key Resources

Several resources, which are essential for food production, are

¹⁴⁴ Ibidem, p. 32.

¹⁴⁵ United Nations Environmental Programme, 2009, p. 25.

¹⁴⁶ Ibidem.

¹⁴⁷ United Kingdom Government Office for Science, 2011, pp. 14-15.

¹⁴⁸ Gonzalez, 2010-2011, p. 493; Knodel, 2012, pp. 128-129; Atapattu, 2008-2009, p. 40.

¹⁴⁹ Gonzalez, 2010-2011, p. 493.

coming under increased pressure. It is estimated that by 2050 the required cropland for food production will be reduced by 8-20 per cent due to the production of biofuels and other non-food items¹⁵⁰. The production of biofuels linked the price of food more closely to the price of oil. As the price of oil rises, so does the demand for grain to convert into ethanol¹⁵¹. This has the unfortunate effect of pitting wealthy car owners against the world's poorest people¹⁵². There is also an increased demand for other resources such as water and energy due to a growth in population, increased demands from consumers, industrialisation and urbanisation¹⁵³.

2.4.6. Changes in Values and Ethical Stances of Consumers

This will play an influential role in policy decisions as well as individual consumption patterns, which in turn will influence food security and the governance of food systems. Consumers are likely to change their demands as concerns over animal welfare, fair trade and environmental impacts increase¹⁵⁴. Although many have already decided to follow a vegetarian or vegan lifestyle, it is unlikely that the majority of the population will change their dietary preferences. As was already demonstrated above, the growing demand for meat places increased pressure on environmental resources.

These six drivers can play a significant role in determining the rate at which the present generation uses the planet's natural resources. When this rate of resource use is affected in such a way that it exceeds the rate at which resources are replenished, states run the risk of violating the RTAF. This includes their obligations towards future generations. Chapter 3 will look at various environmental resources and will demonstrate how the six drivers mentioned above, as well as other unsustainable human practices, have affected the rate of use of these resources. The aim is to determine whether states are fulfilling their sustainability obligations under the RTAF.

¹⁵⁰ United Nations Environmental Programme, 2009, p. 6.

¹⁵¹ Brown, 2012, p. 9.

¹⁵² Ibidem.

¹⁵³ United Kingdom Government Office for Science, 2011, p. 15.

¹⁵⁴ Ibidem, p. 16.

2.5. OBLIGATIONS UNDER THE RIGHT TO FOOD

The different treaty obligations of states were clearly identified by the CESCR in its General Comment on Article 11. It held that the principal obligation under the RTAF is to take steps to progressively achieve the full realisation of the right to food. It also places a minimum obligation on states to ensure that every individual within its jurisdiction has access to a minimum amount of essential food which is sufficient, nutritionally adequate and safe¹⁵⁵. The General Comment further sets out three levels of specific obligations for all state parties¹⁵⁶. First, the obligation to respect existing access to adequate food and not to take any measures which might prevent such access. This includes respecting the freedom of human beings, either as individuals or as a collective, to use necessary resources to satisfy their needs and to exercise permanent sovereignty over their own natural resources to fulfil the needs of that collective, without interference by the state¹⁵⁷. Second, the obligation to protect individuals against deprivation of their access to adequate food by enterprises or other individuals. This requires states to prevent any activities which have a negative effect on the food security of an individual¹⁵⁸. The final obligation is the duty to fulfil which can be divided into two separate obligations. First, the duty to facilitate, which requires a state to engage in activities which aims to strengthen an individual's or a community's access to and utilisation of resources to ensure their food security. Second, the duty to provide, as a last resort, to those individuals which are unable to provide for themselves for reasons beyond their control. This can be done by directly providing food or providing the resources to acquire food, such as social security¹⁵⁹.

It is argued that for states to fulfil these obligations they must maintain the environment in a condition that is suitable for the continued fulfilment of the RTAF¹⁶⁰. When this obligation is linked with the sustainability requirement, it is clear that there is an obligation on states to ensure that natural resources are used in a sustainable manner. This is to ensure that these resources are also available to those

¹⁵⁵ E/C.12/1999/5, 12 May 1999, para. 14.

¹⁵⁶ Ibidem, para. 15.

¹⁵⁷ Eide, Oshang & Eide, 1991, p. 432.

¹⁵⁸ Buckingham, 1994, p. 294.

¹⁵⁹ Eide, Oshang & Eide, 1991, p. 433.

¹⁶⁰ Dumas, 2010-2011, p. 124.

generations succeeding ours, in order to ensure their physical access to food. The same obligation was also established in Chapter 1 under the principle of intergenerational equity. Under the RTAF this obligation falls primarily on states but under the principle of intergenerational equity is up to every member of society to ensure that the obligation is fulfilled. However, it is up to the state to provide an environment in which the responsibilities of these different actors can be carried out¹⁶¹.

In addition, even though the primary responsibility to ensure the right to food rests with national governments, it is every state's responsibility not to act in a way which could lead to human rights violations in other countries¹⁶². This includes the obligation not to cause environmental harm in other countries which could potentially violate the RTAF of the people living in that country¹⁶³. It is evident from the above that there is a legal obligation on states to ensure the sustainable use of resources in their own jurisdiction and to refrain from unsustainable activities in other countries.

2.6. CONCLUSION

Article 11 of the ICESCR, as well as various other international legal instruments recognise the human right to food. The content of the right to food can be summarised as follows:

The right to have regular, permanent and unrestricted access, either directly or by means of financial purchases, to quantitatively and qualitatively adequate and sufficient food corresponding to the cultural traditions of the people to which the consumer belongs, and which ensure a physical and mental, individual and collective, fulfilling and dignified life free of fear¹⁶⁴.

This chapter established that the RTAF places various obligations on states, both as a treaty-right and as part of customary international law. According to the General Comment on Article 11 three different obligations can be identified, namely to respect, to protect and to fulfil the RTAF. The obligation to fulfil can further be divided into two duties,

¹⁶¹ E/C.12/1999/5, 12 May 1999, para. 20.

¹⁶² A/HRC/7/5, 10 January 2008, para. 21.

¹⁶³ Dumas, 2010-2011, p. 123.

¹⁶⁴ Oliver de Schutter, *Right to Food*, available at <http://www.srfood.org/index.php/en/right-to-food> (consulted on 11 March 2013).

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namely, the duty to facilitate and the duty to provide. All of these duties require the maintenance of the environment in order to ensure the full realisation of the RTAF.

In addition to this environmental obligation a further requirement under the RTAF and food security is sustainability. This means that states are under an obligation to ensure that food is accessible for both present and future generations. To meet its obligation towards future generations states will have to ensure that the resource base that we pass on will be sufficient to meet the food needs of the future generations. This in turn can only be achieved through the sustainable use of natural resources. Chapter 3 will look at different environmental resources essential for food production, namely, land, water, biodiversity and fisheries. It will examine how these resources are affected by our actions, as well as the six drivers of sustainability mentioned in Part 3.4 of this chapter. The aim is to determine whether the present generation is fulfilling its obligation under the RTAF and the principle of intergenerational equity to use the Earth's natural resources in a sustainable manner.

3.

CLIMATE CHANGE AND ENVIRONMENTAL RESOURCES

Agricultural productivity depends on a certain set of services provided by the ecosystem¹⁶⁵. These include nutritious soil, water, suitable climate and weather conditions and certain insects which are beneficial for food production. There is a strong link that exists between environmental conditions and food production. Therefore, any changes in the availability of these elements will have a dramatic impact on the functioning of the ecosystem as well as the sustainability of agriculture¹⁶⁶. In the previous chapters it was established that there rests an obligation on this generation to use the natural resources passed on to us by our ancestors in a sustainable manner. However, certain unsustainable human practices have led to the depletion and degradation of environmental resources. This chapter will explore some of these unsustainable practices and the effect it has had, and will continue to have, on specific environmental resources which are essential for food production. It will be demonstrated how these practices are in violation of our duties under the RTAF and the principle of intergenerational equity.

The chapter will commence with a discussion of the term “sustainable use of resources” and its recognition by the international community. Part 3.2 will look at the phenomenon of climate change, including how human activities contribute to the warming of the climate and the effect that climate change has had on our planetary resources. Part 3.2 will also include a discussion of agrofuels in order to demonstrate how efforts to mitigate and adapt to the effects of climate change can also negatively

¹⁶⁵ A/HRC/12/31, 21 July 2009, para. 18.

¹⁶⁶ United Nations Environmental Programme, 2009, p. 34.

impact the environment. The following sections will focus on different environmental resources, namely land, water, biodiversity and fisheries. Each section will discuss how our unsustainable practices have led to the depletion and degradation of these resources. Included will also be a discussion of how future generations will be affected by the declining availability of these resources. In conclusion, Part 3.7 will refer back to the obligations discussed under the principle of intergenerational equity and the right to food, respectively. This section will demonstrate how we have failed in our obligations towards future generations.

3.1. SUSTAINABLE USE OF NATURAL RESOURCES

Chapters 1 and 2 established that we are under an obligation to use resources in a sustainable manner. The importance of the protection of our resource base was confirmed in the 2000 United Nations Millennium Declaration¹⁶⁷:

We must spare no effort to free all of humanity, and above all our children and grandchildren, from the threat of living on a planet irredeemably spoilt by human activities, and whose resources would no longer be sufficient for their needs¹⁶⁸.

There are various international and regional agreements which require the sustainable use of natural resources¹⁶⁹. The 1992 Biodiversity Convention¹⁷⁰ defines in Article 2 “sustainable use” as “the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.” The Convention has 193 state parties. The Preamble of the 1968 African Convention on the Conservation of Nature and Natural Resources¹⁷¹ requires that natural resources be used according

¹⁶⁷ Adopted under United Nations General Assembly Resolution 55/2, UN Doc. A/Res/55/2, 18 September 2000.

¹⁶⁸ Ibidem, para. 21.

¹⁶⁹ Sands et al., 2012, p. 211.

¹⁷⁰ Convention on Biological Diversity (adopted on 5 June 1992 and entered into force on 29 December 1993).

¹⁷¹ African Convention on the Conservation of Nature and Natural Resources (adopted on 15 September 1968 and entered into force on 9 October 1969).

to the “carrying capacity” of the environment for the “future welfare of mankind.”

The Brundtland Report, mentioned in Chapter 1, sets out various requirements regarding the conservation and preservation of natural resources. According to the report resources should be used at a rate which takes into account the limits of natural growth and regeneration and also the system-wide effects of exploitation. Non-renewable resources should be used in a way which takes account of the importance of that resource, whether technologies are available to minimise use, and the availability of substitutes now and in the future. The report also requires the conservation of plant and animal species which cannot be renewed once extinct. In addition, the negative impacts on the quality of natural elements, such as air and water should be minimised in order to sustain the overall integrity of the ecosystem¹⁷².

Under the principle of intergenerational equity, Professor Brown Weiss have proposed five duties with regard to the use of natural resources. Firstly, she confirms that both renewable and non-renewable resources should be conserved through sustainable development. Secondly, the duty to guarantee equitable use which contains a negative and positive obligation. On the negative side everyone should refrain from “infringing on the access rights of other beneficiaries” and on the positive side, to “assist those who would otherwise be too poor to have reasonable access and use.” As a third obligation she proposes the duty to avoid adverse environmental impacts. This entails the obligation to prevent and mitigate damage which includes procedural environmental duties such as environmental assessments to consider long-term impacts. She also argues for a duty to “prevent disasters, minimize damage, and provide emergency assistance.” The final obligation, according to Brown Weiss, entails the duty to “compensate for damage to the environment¹⁷³ .”

Whether it is based on a moral obligation or theories relating to the welfare of humanity, it is recognised that the living generation have an obligation to maintain the planet and to ensure that all people can share in its benefits¹⁷⁴. For future generations to meet their food needs, they will need a resources base comparable to our own. In fact, as

¹⁷² World Commission on Environment and Development, 1987, Chapter 2, paras. 11-14.

¹⁷³ Collins, 2007, pp. 104-105.

¹⁷⁴ Brown Weiss, 1990, p. 207.

populations are most likely to increase they will need to inherit a planet which is in a better condition than how we received it. Our current practices regarding food production raise three areas of concern for future generations: a) depletion of resources; b) degradation in quality of resources; and c) limited access to use and benefits of resources¹⁷⁵. The rest of this chapter will focus on how our current food practices impact on the planet's natural resources and to what extent this have an effect on our obligations towards future generations.

3.2. CLIMATE CHANGE

Scientists agree that one of the main causes of climate change is the “greenhouse effect”; that is “warming that results when the atmosphere traps heat radiating from Earth toward space¹⁷⁶.” The emission of various gases, for example carbon dioxide (CO₂) and nitrous oxide contributes to this effect by preventing heat from escaping the atmosphere. Since the beginning of the industrial revolution the atmospheric CO₂ concentration has tripled due to the large-scale burning of fossil fuel¹⁷⁷. It has been predicted that, even if aggressive mitigation procedures are implemented, global temperatures will rise by at least two degrees Centigrade above pre-industrial levels over the next century¹⁷⁸. Currently, the concentration of CO₂ in the atmosphere is higher than ever. In May 2013 the atmospheric CO₂ concentration has passed the milestone level of 400 parts per million¹⁷⁹.

The present means of production, consumption and trade of food have made a substantial contribution towards global warming¹⁸⁰. Agriculture contributes an estimated 12-14 per cent of global GHG emissions. In addition, agriculture contributes approximately 47 per

¹⁷⁵ Collins, 2007, p. 102.

¹⁷⁶ National Aeronautics and Space Administration, *Global Climate Change: Causes*, available at <http://climate.nasa.gov/causes> (consulted on 26 March 2013).

¹⁷⁷ Ibidem; Brown, 2012, p. 11.

¹⁷⁸ Gonzalez, 2010-2011, p. 511.

¹⁷⁹ Damian Carrington, “Global Carbon Dioxide in Atmosphere Passes Milestone Level”, *The Guardian*, 10 May 2013, available at <http://www.guardian.co.uk/environment/2013/may/10/carbon-dioxide-highest-level-greenhouse-gas> (consulted on 25 June 2013).

¹⁸⁰ La Via Campesina, Policy documents, 5th Conference, 2009, available at <http://viacampesina.org/en/index.php/publications-mainmenu-30/866-la-via-campesina-policy-documents>, p. 68.

cent of total methane and 58 per cent of nitrous oxide emissions¹⁸¹. Moreover, deforestation and the conversion of native vegetation into cropland contribute an additional 17.4 per cent of GHG emissions. In addition, the manufacturing of agricultural inputs as well as the processing, packaging and transport of food products result in indirect emissions of GHG¹⁸². The production of livestock is also a major contributor to agricultural emissions through enteric fermentation and manure¹⁸³.

3.2.1. Effects of Climate Change on Food Production

Even though a rise in temperature is nothing new, the speed with which temperatures are currently rising is unprecedented. This has the potential of overwhelming the capacity of natural systems to adapt to changes in climatic conditions¹⁸⁴. As was stated at the Rio+20 conference “climate change affects all countries and undermines the ability of all countries, in particular, developing countries, to achieve sustainable development and the [Millennium Development Goals] and threaten the viability and survival of nations¹⁸⁵. ” According to the widely accepted rule of thumb each one-degree-Celsius rise in temperature above the optimum, during the growing season, will result in a 10 per cent decline in grain yields¹⁸⁶. In 2008 the Intergovernmental Panel on Climate Change compiled its Fourth Assessment Report. According to the report, some countries in the African region will experience a 50 per cent decrease in yields from rain-fed agriculture by 2020. The report also predicts that the yields of important crops and livestock productivity in Latin-America will also decrease¹⁸⁷. However, as mentioned earlier, the effects of climate change on crop yields will vary from region to region. On the one hand it is estimated that countries in Central South Asia will experience a 30 per cent loss in crop yields, whilst North America and Russia can expect large gains¹⁸⁸.

¹⁸¹ United Kingdom Government Office for Science, 2011, p. 28.

¹⁸² Gonzalez, 2010-2011, p. 512.

¹⁸³ United Kingdom Government Office for Science, 2011, p. 28.

¹⁸⁴ Wood, 1995-1996, p. 297.

¹⁸⁵ A/CONF.216/16, 2012, para. 25.

¹⁸⁶ Brown, 2012, p. 11.

¹⁸⁷ Cook, 2010, p. 2.

¹⁸⁸ Dumas, 2010-2011, pp. 113-114.

Global warming has already had and will continue to have a number of repercussions. Firstly, the rise in temperature causes polar glaciers to melt, which in turn causes sea levels to rise¹⁸⁹. It is estimated that sea levels will rise between two to nine millimeters annually in the years to come¹⁹⁰. At present, mountain glaciers are melting in the Tibetan Plateau, Himalayas, Andes, the Alps and the Rocky Mountains¹⁹¹. Cropland is threatened as low-lying coastal areas are flooded due to rising sea levels¹⁹². It is predicted that flooding of coastal areas will increase tenfold by 2080 and will affect 100 million people annually¹⁹³. A rise in sea levels by only three feet would be enough to submerge a significant part of the Mekong Deltas which produces half of Viet Nam's rice¹⁹⁴. Loss of land due to rising sea levels will severely compromise a nation's ability to produce its own food¹⁹⁵. In addition, saltwater intrusion due to rising sea levels has cost the inhabitants of the Carteret Islands of Papua New Guinea their staple food crop, taro. Inhabitants of these islands are forced to abandon their traditional lands and livelihoods in order to migrate to new territories, putting their food security at risk¹⁹⁶. It is expected that these islands will be completely underwater by 2015¹⁹⁷.

Melting glaciers will also decrease the availability of fresh water¹⁹⁸. Mountain glaciers play a crucial role in sustaining river flow during the dry seasons, thereby providing essential irrigation for crops¹⁹⁹. If these rivers dry up it will have a major impact on the food security of millions of people. For example, in China the Yangtze River, which is fed by glaciers on the Tibetan Plateau, irrigates rice fields which are the source of food and income for 586 million people²⁰⁰.

Climate change will also alter weather patterns which will lead to an increase in the occurrence of hurricanes, storms and cyclones²⁰¹.

¹⁸⁹ Atapattu, 2008-2009, p. 40.

¹⁹⁰ Knodel, 2012, p. 132.

¹⁹¹ Facts and Details, Tibet, the Himalayas, Meeting Glaciers and Global Warming, available at <http://factsanddetails.com/world.php?itemid=2116&catid=52&subcatid=328> (consulted on 9 July 2013).

¹⁹² Knodel, 2012, p. 132; Atapattu, 2008-2009, p. 42.

¹⁹³ Knox, 2009-2010, p. 165.

¹⁹⁴ Brown, 2012, p. 89.

¹⁹⁵ Knodel, 2012, pp. 132-133.

¹⁹⁶ Ibidem, p. 134.

¹⁹⁷ Ibidem, pp. 128-129.

¹⁹⁸ Dumas, 2010-2011, p. 114.

¹⁹⁹ Brown, 2012, p. 86.

²⁰⁰ Ibidem.

²⁰¹ Atapattu, 2008-2009, p. 40.

Climate change leads to changes in temperatures and rainfall patterns and increases the frequency and severity of droughts and floods²⁰². Rising CO₂ levels could also lead to an irreversible decrease in dry season rainfalls²⁰³. This also leads to a decline in the amount of available water essential for food production²⁰⁴. In addition, as is the case in the Sahel, higher temperatures have shortened the growing season, thereby reducing crop yields²⁰⁵. High temperatures can also interfere with pollination and reduce photosynthesis. Pollination is essential for the reproduction of corn. Pollens must fall onto the silk strands that emerge from each ear of corn. It must then travel from the silk strands to the attached kernel site where fertilisation will take place. High temperatures dry out these silk strands before fertilisation can take place, interrupting the process²⁰⁶. Scientists estimate that pollination of rice crops will fall from 100 per cent at 93 degrees Fahrenheit to nearly 0 per cent at 104 degrees Fahrenheit; this will lead to crop failure²⁰⁷.

Furthermore, ecosystems and biodiversity essential for food production are also in danger²⁰⁸. Climate change, combined with industrial exploitation, threatens plant, animal and marine life²⁰⁹. On the other hand, the extent, type and frequency of pest infestations, including invasive alien species, will increase²¹⁰. Changing climatic conditions can provide better breeding grounds for migratory plant pest. For example, an increase in winter rains in the Sahel has increased the occurrence of the desert locust which thrives in rainy conditions²¹¹. Moreover, the distribution and occurrence of diseases will also increase, for example Bluetongue which is now moving into more temperate zones in the north of Europe²¹².

Local knowledge on production and agricultural management, which has been developed over generations, is becoming less useful in the face of changing climate conditions. Farmers are forced to adapt their usual

²⁰² Gonzalez, 2010-2011, p. 511; La Via Campesina, Policy documents, 5th Conference, 2009, p. 68.

²⁰³ Brown, 2012, p. 89.

²⁰⁴ Atapattu, 2008-2009, p. 50.

²⁰⁵ Knox, 2009-2010, p. 164.

²⁰⁶ Brown, 2012, p. 84.

²⁰⁷ Ibidem.

²⁰⁸ Gonzalez, 2010-2011, p. 512.

²⁰⁹ La Via Campesina, Policy documents, 5th Conference, 2009, pp. 68-69.

²¹⁰ United Nations Environmental Programme, 2009, p. 43.

²¹¹ Brown, 2012, p. 54.

²¹² Ibidem.

seeds and production systems and, consequently, become dependent on external inputs and techniques²¹³.

All of the abovementioned ramifications will lead to a significant decrease in yields, as well as a reduction in the productivity of the world's fisheries²¹⁴. Overall it is estimated that by 2080 total agricultural output will decline by 28 per cent in Africa, 24 per cent in Latin-America and 19 per cent in Asia²¹⁵. Even though it is industrialised countries that are the greatest contributors to climate change, it is poor countries that are the most vulnerable to the effects thereof because of the dominance of agriculture in their economies²¹⁶. It is projected that Sub-Saharan Africa, currently the most food insecure region in the world, will bear the heaviest burdens climate change²¹⁷.

Climate change has put the food security of future generations in serious jeopardy. The impact of climate change on environmental resources will drastically diminish the food production capacity of those yet to come. The 1992 United Nations Framework Convention on Climate Change expresses the need for safeguarding food production²¹⁸. Article 2 holds as follows:

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

Faced by the dangers of climate change, governments across the world have realised that it is essential to lower the use of fossil fuels and reduce the current levels of GHG emissions. Unfortunately, it is not only climate change, but also the measures put in place to mitigate the effects thereof which can threaten the enjoyment of human rights. The production of agrofuels is a clear example of how mitigation and

²¹³ La Via Campesina, Policy documents, 5th Conference, 2009, p. 69.

²¹⁴ Ibidem; Gonzalez, 2010-2011, p. 493.

²¹⁵ Gonzalez, 2010-2011, pp. 511-512.

²¹⁶ La Via Campesina, Policy documents, 5th Conference, 2009, p. 10; United Nations Environmental Programme, 2009, p. 44.

²¹⁷ United Nations Environmental Programme, 2009, p. 45.

²¹⁸ Cook, 2010, p. 10.

adaption measures can contribute to the violation of human rights, one of which is the RTAF.

3.2.2. Agrofuels

In order to reduce their dependency on oil, governments are trying to increase the amount of global energy consumption which comes from renewable resources. This has led to the growing demand for agrofuels; that is fuels produced from plants, agriculture and forestry²¹⁹. Writers use the terms “biofuels” and “agrofuels” interchangeably, but using the term “agrofuels” highlights “how the interests of the agro-industrial monopolies will dominate over the interests of the world’s poor and hungry, especially in the developing world²²⁰.”

Bioethanol can be derived from sugar cane, maize or wheat, whilst biodiesel can be produced using palm oil, rapeseed, soybeans and jatropha (“a group of succulent plants that can grow in dry conditions and poor soils, while producing up to 40 per cent oil”)²²¹. It is important to note that other than jatropha, all the other crops listed are also food products and “form the basic staple foods of millions of people in the poorest regions of the world, including in Africa, where food security is already in serious peril²²².”

The popularity of agrofuels is increasing. However, there has been an on-going debate regarding the benefits of agrofuels and its impact on food security across the globe. Grain produced for agrofuels increased from 41 million tons in 2005 to 127 million tons in 2011. This constitutes nearly a third of the United States total grain harvest; which could have fed almost 400 million people²²³. In his 2007 report to the General Assembly, the Special Rapporteur on the Right to Food stated that “[t]he sudden, ill-conceived, rush to convert food – such as maize, wheat, sugar and palm oil – into fuels is a recipe for disaster²²⁴.” The production of agrofuels has had and will continue to have a number of negative impacts on food security²²⁵. Energy policies encouraging

²¹⁹ La Via Campesina, Policy documents, 5th Conference, 2009, p. 71.

²²⁰ A/62/289, 22 August 2007, para. 25.

²²¹ Lawrence, Lyons & Wallington, 2011, p. 225.

²²² A/62/289, 22 August 2007, para. 27. See also Lawrence, Lyons & Wallington, 2011, p. 225.

²²³ Brown, 2012, p. 38.

²²⁴ A/62/289, 22 August 2007, p. 2.

²²⁵ La Via Campesina, Policy documents, 5th Conference, 2009, pp. 78-79.

the production of agrofuels has lead to large-scale land acquisitions. This usually entails clearing new areas, like forests, for cropland or using existing cropland²²⁶. This means that land which could have been used for the production of food is now dedicated to producing agrofuels. In Brazil alone 2.7 million hectares of land are now used for agrofuel production²²⁷. This causes a substantial decline in the amount of food available for either human consumption or as animal feed. In addition, it is estimated that to fill one car's tank with agrofuel it needs approximately 200 kg of maize, which could feed one person for one year²²⁸. When looking at agrofuels from this perspective it raises questions regarding the true worth of agrofuel production.

The production of agrofuels has also intricately linked the price of food with the price of oil. This creates volatility in the market and has led to massive price increases. According to the World Bank, 75 per cent of the 2007-2008 price increases can be attributed to the production of and demand for agrofuels. The International Food Policy Research Institute estimates the contribution at around 30 per cent²²⁹. Whatever the number it still represents a substantial impact on already high food prices. Furthermore, it is estimated that by 2016 food prices will increase by a further 20-50 per cent as a result of agrofuels²³⁰. The International Food Policy Research Institute estimates that the price of maize will increase by 41 per cent by 2020 and predict an even bigger increase in the price of vegetable oil crops. These huge and sudden increases can result in 1.2 billion people suffering from hunger by 2025²³¹.

Furthermore, the argument that agrofuels will reduce the dependency on fossil fuels has also been proved wrong. In fact, production of agrofuels relies on fossil fuel-based production methods, namely, the use of fertilisers and pesticides as well as machinery for planting and harvesting²³². A further consequence of the production of agrofuels is the use of a monoculture form of production based on agro-toxins which will only add to global warming, destroy biodiversity and

²²⁶ Brown, 2012, pp. 104-105.

²²⁷ United Nations Environmental Programme, 2009, p. 37.

²²⁸ A/62/289, 22 August 2007, para. 21.

²²⁹ Lawrence, Lyons & Wallington, 2011, p. 231.

²³⁰ United Nations Environmental Programme, 2009, p. 38.

²³¹ A/HRC/7/5, 10 January 2008, para. 56.

²³² Lawrence, Lyons & Wallington, 2011, p. 227.

contaminate groundwater²³³. The increase in use of agro-toxins as well as the non-rotation of crops will also reduce soil fertility²³⁴. In addition, the conversion of rainforests, savannahs and grasslands into cropland for the production of agrofuels will create a “biofuel carbon debt” as a result of the release of 17 to 420 times more CO₂ than the amount of emissions “saved” as a result of agrofuel use²³⁵. The conversion of natural habitats will also result in an irreversible loss of biodiversity, the impact of which will be explained later in this chapter²³⁶.

Moreover, the production of agrofuels could lead to the dispossession of land of small farmers. As the value of agrofuel production increases, indigenous small farmers who do not possess a formal title to their lands are expelled by foreign investors and local elites. Even farmers who hold a formal title can be coerced into selling their lands²³⁷. According to the Food first Information and Action Network (FIAN), this will also deprive them of their direct access to food and increase their and their family’s dependency on the market. This leaves them vulnerable to crises and shocks and puts their food security in jeopardy²³⁸. According to FIAN “jatropha cultivation promotes the transfer of land without regard for land rights and appropriate compensation payments, destroying the livelihood of farmers, hindering grazing opportunities for livestock farmers, and is a further negative factor in the competition for scarce land and water resources²³⁹.”

Furthermore, agrofuel production relies on intensive water use. For the production of one litre of ethanol, four litres of water is needed. That makes agrofuel production 70-400 times more dependent on water than any other energy source²⁴⁰. Taking into account all these considerations it is clear that the production of agrofuels is not as beneficial as initially

²³³ La Via Campesina, Policy documents, 5th Conference, 2009, p. 79.

²³⁴ Lawrence, Lyons & Wallington, 2011, p. 229.

²³⁵ United Nations Environmental Programme, 2009, p. 37; Lawrence, Lyons & Wallington, 2011, p. 229.

²³⁶ Lawrence, Lyons & Wallington, 2011, p. 229.

²³⁷ Gonzalez, 2010, p. 473.

²³⁸ Food first Information and Action Network, *Right to Food Quarterly*, vol. 3, no.1, May 2008, available at http://www.fian.org/fileadmin/media/publications/Publications_Periodicals/RtF_Quarterly_2008_1.pdf, p. 2.

²³⁹ Food first Information and Action Network, *Right to Food Quarterly*, vol. 4, no. 1, August 2009, available at <http://www.fian.org/library/publication/detail/right-to-food-quarterly-vol4-no1-2009/>, p. 5.

²⁴⁰ Lawrence, Lyons & Wallington, 2011, pp. 230-231.

intended, but rather has significant social and environmental impacts²⁴¹. It not only threatens the future food production of small farmers but also “the attainment of food sovereignty for the world population²⁴².”

It is clear that climate change has the ability to cause irreparable harm to the natural resources essential for food production. Without these resources there is no way that we can keep up with current levels of production, much less provide for the ever growing future population. However, many governments have declared their commitment to act against climate change. For example, the United Kingdom has set a legally binding target of 34 per cent reduction of GHG emissions by 2020 and at least 80 per cent by 2050²⁴³. If these targets are to be achieved we will be a great deal closer to ensuring food security, not just for ourselves but for future generations as well. However, actions speak louder than words and whether governments will, or are in fact able to, keep to their promises remains to be seen. In fact, it is argued that these targets will not be achieved without a major change in the current food system; all the way from production through to consumption²⁴⁴. For now, the production of agrofuels can be seen as a starting point in our fight against climate change. However, the current system of production is having devastating effects on our climate and putting the food security of future generations at risk.

3.3. LAND

3.3.1. Limited Access to Land

Access to sufficient land is of vital importance for food production. Without a place to grow crops or raise cattle there can be no production. Up until the mid 20th century grain harvest could easily be increased by expanding cultivated land. Unfortunately, access to arable land for food production is decreasing due to a variety of factors. Firstly, land is not only used for food production, but also for housing, transportation,

²⁴¹ Brot für die Welt, Internationaal Maatschappelijk Verantwoord Ondernemen, “The World Food Crises and the Right to Food”, *Right to Food and Nutrition Watch*, 2008, available at http://www.rtn-watch.org/fileadmin/media/rtn-watch.org/ENGLISH/pdf/Watch_2008/WATCH_2008_English.pdf, p. 12.

²⁴² Ibidem.

²⁴³ United Kingdom Government Office for Science, 2011, p. 29.

²⁴⁴ Ibidem.

carbon and water sinks, etc.²⁴⁵ As a result, various different industries are fighting amongst themselves for the use of land. In addition, the production of non-food items such as agrofuel and cotton is increasing. It is estimated that by 2050 available cropland will be reduced by 8-20 per cent as a result of the conversion of cropland for non-food production²⁴⁶. Increasing cropland can also be made difficult by political, socio-economic and environmental limitations²⁴⁷. Moreover, due to the rising temperatures associated with climate change, more and more land is lost due to flooding of coastal production areas²⁴⁸.

Another reason for the lack of arable land is large-scale land acquisitions in developing countries by wealthier states or transnational corporations, commonly referred to as “land grabs.” It is estimated that 20-45 million hectares of land have been the subject of land grabs²⁴⁹. This is particularly common in developing countries in Sub-Saharan Africa²⁵⁰. One reason for these types of acquisitions is to obtain land for the large-scale production of agrofuels²⁵¹. As mentioned earlier, this has the effect of displacing traditional farmers and pastoralists from the land that they depend on for their livelihood, in return for the production of a non-food product. This threatens the food security of local communities²⁵². In addition, large-scale industrial agriculture has various detrimental effects on environmental resources, including biodiversity, water resources, carbon sinks and the land itself. This is usually attributed to the aggressive use of chemicals and pesticides in order to increase grain yields²⁵³.

Although it is argued that these acquisitions will benefit the developing country, this has not been the case. As all inputs are being imported and all harvests exported, nothing is contributed to the local economy or food supply²⁵⁴. In addition, farmers are not compensated for their loss of land²⁵⁵.

²⁴⁵ Lawrence, Lyons & Wallington, 2011, p. 281.

²⁴⁶ United Nations Environmental Programme, 2009, p. 33.

²⁴⁷ Ibidem, p. 35.

²⁴⁸ World Commission on Environment and Development, 1987, Chapter 5, para. 20.

²⁴⁹ Borras et al., 2011, p. 209.

²⁵⁰ Abebe, 2012, p. 875.

²⁵¹ Ibidem.

²⁵² Brown, 2012, pp. 106-107.

²⁵³ Abebe, 2012, p. 881.

²⁵⁴ Brown, 2012, p. 111.

²⁵⁵ Abebe, 2012, p. 880.

If these practices continue less and less arable land will be available to future generations. Moreover, while access to arable land is decreasing, the demand for food is increasing. It is predicted that by 2030 an additional 120 million hectare land could be needed to support the future demand in food production. However, due to our current actions this will not be the case²⁵⁶.

3.3.2. Land Degradation

Unsustainable land practices have resulted in a worldwide loss of two billion hectares of agricultural land due to degradation. Cropland productivity is declining by 0.2 per cent each year²⁵⁷. Land is classified as degraded when “the economic and biological productivity of land is lost²⁵⁸.” Although soil erosion is a natural process, it creates a problem when top soil is being lost at a pace faster than the speed of new soil forming²⁵⁹. Certain unsustainable human activities can be seen as contributing to this problem. Firstly, as a result of lack of access to land, farmers are forced to overuse their lands²⁶⁰. Secondly, as the population grows, so does the demand for meat. Accordingly, the number of livestock also increases. In Africa, the population grew from 294 million in 1961 to one billion in 2010. At the same time livestock increased from 352 million to 894 million²⁶¹. Unfortunately, this growth cannot be sustained by the available grasslands. In addition, higher livestock densities result in overgrazing, which reduces the long-term productivity of grazing lands²⁶². As the loss of vegetation increases so does the risk of soil erosion. Eventually, the grassland will turn into desert, as is currently happening in Africa, the Middle East, Central Asia and Northern China²⁶³. Furthermore, the improper and overuse of

²⁵⁶ United Nations Environmental Programme, 2009, p. 35.

²⁵⁷ Ibidem, p. 40.

²⁵⁸ Eureta Rosenberg, Enviropeadia, *Land Degradation*, available at http://www.enviropeadia.com/topic/default.php?topic_id=147 (consulted on 30 May 2013).

²⁵⁹ The Department of Biodiversity and Conservation Biology, University of the Western Cape, South Africa, Soil Erosion, available at <http://www.botany.uwc.ac.za/envfacts/facts/erosion.htm> (consulted on 30 May 2013); Brown, 2012, p. 46.

²⁶⁰ World Commission on Environment and Development, 1987, Chapter 5, para. 24.

²⁶¹ Lester R. Brown, Earth Policy Institute, *Full Plant, Empty Plates: The New Geopolitics of Food Scarcity*, available at <http://www.earth-policy.org/books/fpep/fpepch2> (consulted on 9 July 2013).

²⁶² United Nations Environmental Programme, 2009, pp. 40 and 42.

²⁶³ Brown, 2012, p. 17.

chemical fertilisers and pesticides to increase yields, contribute to the degradation of land²⁶⁴.

Unsustainable land use practices, coupled with the effects of climate change, lead to more land being lost due to desertification. Although the United Nations adopted the Convention to Combat Desertification²⁶⁵ in 1994, desertification is still a major problem in the drylands of South America, Asia and Africa²⁶⁶. In Nigeria the population has increased fourfold since 1961; this has led to similar substantial increase in livestock, which exceeds the sustainability of available grasslands. Currently, Nigeria is losing approximately 868,000 acres of rangeland and cropland every year due to desertification²⁶⁷.

As a result of growing populations and a decline in the access to arable land, many are turning to forests to expand their agricultural production. In some countries there are even government policies in place which encourage the conversion of forests into croplands²⁶⁸. However, forests play a crucial role in the ecosystem. It provides habitats necessary for the preservation of biodiversity, acts as carbon sinks, contributes to climate stability and maintains the quality of soil, thereby preventing land degradation²⁶⁹. Even though deforestation has the benefit of increasing productive cropland, a balance needs to be struck between the need to expand agricultural lands and the benefits associated with the preservation of forests²⁷⁰.

Land degradation will have a substantial impact on the ability of the present and future generation to produce food. Total grain harvests in many countries, including Lesotho, Mongolia and North Korea, has dropped by nearly half due to soil erosion²⁷¹. It is estimated that if the current rate of nutrient depletion continues, 950,000 square kilometres of land in Sub-Saharan Africa is in danger of becoming irreversibly degraded²⁷². In some parts of Sub-Saharan African crop-

²⁶⁴ Regional Resource Centre for Asia and the Pacific, *Land Degradation*, available at [www.rrcap.ait.asia/pub/soe/bangladesh_land.pdf](http://rrcap.ait.asia/pub/soe/bangladesh_land.pdf) (consulted on 30 May 2013), p. 26.

²⁶⁵ Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (adopted on 14 October 1994 and entered into force on 26 September 1996).

²⁶⁶ World Commission on Environment and Development, 1987, Chapter 5, paras. 33 and 35.

²⁶⁷ Brown, 2012, pp. 51-52.

²⁶⁸ World Commission on Environment and Development, 1987, Chapter 5, para. 30.

²⁶⁹ Sands, 2012, p. 495.

²⁷⁰ World Commission on Environment and Development, 1987, Chapter 5, para. 69.

²⁷¹ Brown, 2012, pp. 55-56.

²⁷² United Nations Environmental Programme, 2009, p. 40.

land productivity has already declined by 40 per cent, whilst the population has doubled over just two decades²⁷³. In 1986, the Food and Agricultural Organisation of the United Nations (FAO) estimated that rain-fed cropland in developing countries, in Africa, Asia and Latin-America would shrink by 544 million hectare due to soil erosion²⁷⁴. In developing countries, millions of people are dependent on land for their food needs, either as farmers or pastoral herders. In 2008, it was estimated that 46 per cent of the population and 500 million hectares of land in Africa are affected by land degradation which includes two thirds of productive agricultural land²⁷⁵.

Even though enough cropland is currently available to keep up with the demand for food, as was demonstrated above, this will not be the situation for long. The demand for food products is growing, whilst available arable cropland is decreasing. Moreover, the effects of climate change and continued land degradation further diminishes the land available to future generations to meet their food needs.

3.4. WATER

Water plays a crucial role in our everyday lives. The availability of water is not only essential for health and sanitation, but also for food production. Adults drink nearly four liters of water each day, in one way or another, but it takes about 2,000 liters to produce the food we consume each day²⁷⁶. In addition, about 40 per cent of the world's crop yields are dependent on irrigation²⁷⁷. However, water is being used at unsustainable rates. River streams are drying up, groundwater tables are falling, lakes are shrinking and water-based ecosystems are fast becoming degraded²⁷⁸. There are two major threats to water resources: a) an increased demand for water; and b) a decline in water quality as a result of pollution²⁷⁹.

Competition for water resources is increasing due to population

²⁷³ Ibidem, p. 42.

²⁷⁴ World Commission on Environment and Development, 1987, Chapter 5, para. 21.

²⁷⁵ A/HRC/7/5, 10 January 2008, para. 50.

²⁷⁶ Brown, 2012, p. 57.

²⁷⁷ United Nations Environmental Programme, 2009, p. 53.

²⁷⁸ Anton & Shelton, 2011, pp. 464-465.

²⁷⁹ Sands et al., 2012, p. 304.

growth, urbanisation, industrial development and agriculture²⁸⁰. The demand for and use of fresh water is currently at unsustainable levels. It is estimated that between 5-25 per cent of global fresh water use exceeds the long-term accessibility of supplies²⁸¹. Population increases has caused water use to triple between 1959 and 2009²⁸². This increase in domestic and industrial water use is putting substantial pressure on the water available for food production²⁸³. As the demand for water increases, so does the value of water rights. Many farmers, whose lands are close to cities, are selling their irrigation rights²⁸⁴. This results in large areas of unused productive cropland that are now unable to contribute to present and future food production.

Aquifers are also used as a source of water. An aquifer can be described as an “underground layer of rock or soil that contains water²⁸⁵.” Aquifers are replenished through rainfall which infiltrates the land surface²⁸⁶. In many countries aquifers are nearly depleted and irrigation wells are drying up²⁸⁷. These include China, India and the United States: the three largest grain producers in the world. It is estimated that between 15 and 35 per cent of irrigation withdrawals are above sustainable levels²⁸⁸. In January 2008 Saudi Arabia announced that the country’s aquifers are nearly depleted and that it will accordingly be phasing out wheat production. As a result the country will be forced to be totally dependent on imports²⁸⁹. This serves as an example of unsustainable water usage which can affect food production.

Water overuse is not the only problem. Water pollution is also increasing as a result of the excessive use of fertilisers and pesticides. This causes run-off of nitrogen and phosphates which pollute water resources²⁹⁰. Other sources of pollution include “excess nutrients from

²⁸⁰ World Health Organisation, *Water Scarcity*, available at http://who.int/features/factfiles/water/water_facts/en/index1.html (consulted on 1 June 2013).

²⁸¹ Anton & Shelton, 2011, p. 6.

²⁸² Sands et al., 2012, p. 304.

²⁸³ United Nations Environmental Programme, 2009, p. 53.

²⁸⁴ Brown, 2012, p. 70.

²⁸⁵ Summit to the Sea, *What Is an Aquifer?*, available at <http://coastgis.marsci.uga.edu/summit/aquifers.htm> (consulted on 1 June 2013).

²⁸⁶ Alabama State Water Program, *Frequently Asked Questions – How Are Aquifers Replenished?*, available at http://www.aces.edu/waterquality/faq/faq_results.php3?rowid=1690 (consulted on 1 June 2013).

²⁸⁷ Brown, 2012, p. 10.

²⁸⁸ Anton & Shelton, 2011, p. 6.

²⁸⁹ Brown, 2012, p. 60.

²⁹⁰ World Commission on Environment and Development, 1987, Chapter 5, para. 25.

sewage and soil erosion; pathogens from sewage; and heavy metals and synthetic organic compounds from industry, mining and agriculture²⁹¹.”

In addition, climate change has already had a significant impact on the availability of water and will continue to do so. This puts future food production and therefore food security at serious risk. It is estimated that between 75 and 250 million people in Africa will face water shortages by 2020 due to climate change²⁹². However, in some developing countries, like Ethiopia and Nigeria, available water resources exist. Unfortunately, they remain unused due to a lack of financial resources to invest in irrigation²⁹³.

All of the above threats to and demands on water resources have the effect of creating an “unsustainable ecological debt” which future generations will have to bear²⁹⁴. China, for example, faces “catastrophic consequences for future generations” unless water use and supply can be brought back into balance²⁹⁵. Globally, 1.4 billion people depend on river basins where water use exceeds recharge rates²⁹⁶. Unfortunately, it does not seem as if the problem of water scarcity will be resolved anytime soon as not even one country has so far been able to effectively address the fall in its water tables²⁹⁷.

3.5. BIODIVERSITY

Biodiversity refers to “the variety of life in an area, including the number of different species, the genetic wealth within each species, the interrelationships between them, and the natural areas where they occur²⁹⁸.” Agrobiodiversity forms a vital subset of biodiversity. It can be defined as:

The variety and variability of animals, plants and micro-organisms that are used directly or indirectly for food and agriculture, including crops, livestock,

²⁹¹ Sands et al., 2012, p. 305.

²⁹² Ibidem, p. 304.

²⁹³ A/HRC/19/75, 24 February 2012, para. 35.

²⁹⁴ Anton & Shelton, 2011, p. 464.

²⁹⁵ Brown, 2012, p. 65.

²⁹⁶ Anton & Shelton, 2011, p. 464.

²⁹⁷ Brown, 2012, p. 71.

²⁹⁸ The Department of Biodiversity and Conservation Biology, University of the Western Cape, South Africa, *Biodiversity in South Africa*, available at <http://www.botany.uwc.ac.za/envfacts/facts/biosas.htm> (consulted on 30 May 2013).

forestry and fisheries. It comprises the diversity of genetic resources (varieties, breeds) and species used for food, fodder, fibre, fuel and pharmaceuticals. It also includes the diversity of non-harvested species that support production (soil micro-organisms, predators, pollinators), and those in the wider environment that support agro-ecosystems (agricultural, pastoral, forest and aquatic) as well as the diversity of the agro-ecosystems²⁹⁹.

Biodiversity is essential to food production. Not only does it provide biological resources which could be used as food, it also provides essential ecosystem services³⁰⁰. In addition, agrobiodiversity performs various essential functions. It reduces the pressure of agriculture on fragile areas and forests, whilst making farming systems more sustainable. It also contributes to pest and disease management, as well as natural soil fertility. More importantly, it increases productivity and food security³⁰¹. However, in 2009 the International Union for Conservation of Nature Red List estimated that 36 per cent of 47,677 species assessed were threatened with extinction³⁰².

There are various unsustainable human practices which have contributed to the loss of biodiversity. Changes in land-use have led to an increase in habitat loss. This happens when areas with high biodiversity, such as rain forests, are converted into cropland. The result is not only a loss of biodiversity, but also the destruction of natural habitats and ecosystem services³⁰³. Furthermore, over 4,000 plant and animal species and their natural habitats are threatened due to the intensification of agriculture, through irrigation and the application of fertilisers and pesticides³⁰⁴.

Secondly, the introduction of exotic species and genetically modified organisms can threaten wildlife and biodiversity. When alien species

²⁹⁹ Economic and Social Development Department, Food and Agricultural Organisation of the United Nations, *What Is Agrobiodiversity*, available at <http://www.fao.org/docrep/007/y5609e/y5609e01.htm> (consulted on 30 May 2013).

³⁰⁰ Sands et al., 2012, p. 450.

³⁰¹ Economic and Social Development Department, Food and Agricultural Organisation, *What Is Agrobiodiversity*, available at <http://www.fao.org/docrep/007/y5609e/y5609e01.htm> (consulted on 30 May 2013).

³⁰² Sands et al., 2012, p. 450.

³⁰³ Directorate-General for Environment, European Commission, *Study on Understanding the Causes of Biodiversity Loss and the Policy Assessment Framework*, available at http://ec.europa.eu/environment/enveco/biodiversity/pdf/causes_biodiv_loss.pdf (consulted on 31 May 2013), pp. 36-37.

³⁰⁴ GRID-Arendal, *Impacts on Biodiversity and Ecosystems from Conventional Expansion and Food Production*, available at <http://www.grida.no/publications/rr/food-crisis/page/3569.aspx> (consulted on 31 May 2013).

are introduced into a new environment this can upset the ecological equilibrium which existed in that natural environment, making it harder for traditional species to adapt³⁰⁵. Thirdly, pollution as a result of human activity can cause irreversible damage to plant and animal species³⁰⁶.

Climate change is also a big contributor to biodiversity loss. Species have evolved to live under certain temperatures. When these temperatures change certain species struggle to adapt to the new temperatures. The existence of other species is threatened when the species it depends on to live cannot adapt to the new temperatures. It is estimated that climate change alone will threaten one quarter of all species on land with extinction by the year 2050³⁰⁷. Furthermore, overexploitation of resources, such as over-hunting and over-fishing, can lead to the exhaustion of essential natural resources, such as is the case with sardines, cod and tuna, to name a few³⁰⁸.

The industrialisation and globalisation of food production has also lead to a significant loss of plant biodiversity³⁰⁹. According to the FAO, the world lost 75 per cent of its crop diversity in the last century as farmers opted to use genetically uniform high-yielding crops, instead of local and traditional varieties, in order to increase production³¹⁰. It is important to note that different crop varieties may contain different resistant genes against pests and diseases. Traditionally, small-scale farmers will cultivate a mixture of crops in order to increase the yield sustainability and protect against infestation of the entire crop³¹¹. The dangers of using uniform crops were already witnessed during the Irish potato famine of the 1840s. During that time the whole of Ireland made use of a single genetic uniform potato crop. When a fungus known as "phytophthora infestans" made its way into the crops it caused

³⁰⁵ Eniscuola, *Loss of Biodiversity – Causes of the Loss of Biodiversity*, available at <http://www.eniscuola.net/en/life/contenuti/biodiversity/left/loss-of-biodiversity/causes-of-the-loss-of-biodiversity/> (consulted on 30 May 2013).

³⁰⁶ Eco-question, *What Are the Main Causes of Biodiversity Loss*, available at <http://www.eco-question.com/what-are-the-main-causes-of-biodiversity-loss> (consulted on 30 May 2013).

³⁰⁷ Centre for Health and the Global Environment, Harvard School of Public Health, Climate change and biodiversity loss, available at <http://chge.med.harvard.edu/topic/climate-change-and-biodiversity-loss> (consulted on 31 May 2013).

³⁰⁸ Eniscuola, *Loss of Biodiversity – Causes of the Loss of Biodiversity*, available at <http://www.eniscuola.net/en/life/contenuti/biodiversity/left/loss-of-biodiversity/causes-of-the-loss-of-biodiversity/> (consulted on 30 May 2013).

³⁰⁹ Gonzalez, 2010-2011, p. 493.

³¹⁰ Ibidem, p. 496.

³¹¹ United Nations Environmental Programme, 2009, p. 57.

widespread disaster as none of the crops planted were resistant to this particular fungus. If different varieties of potato crops were planted, some of which could have been resistant to the infestation, this terrible disaster could have been avoided³¹².

In addition, the use of uniform crops does not only affect agrobiodiversity but also the knowledge and skill required to cultivate these crops. For years farmers have used their knowledge and skill to breed crops which can withstand environmental risks particular to that region³¹³. By only using uniform crops this knowledge and skills get lost from generation to generation.

Moreover, the use of imported crops instead of local varieties can have a detrimental effect on the surrounding biodiversity. Traditional crops, combined with local knowledge developed over generations, are able to withstand the risks of pests, diseases and weather conditions, to which they have been exposed to for years. As a result they need less chemical inputs, which not only destroys the targeted pests and diseases, but also beneficial organisms which are essential for the sustainability of the ecosystem³¹⁴. These beneficial organisms play an important part in regulating the soil ecosystem and ensuring soil fertility by, for example, decomposition of litter³¹⁵.

Where traditional crops are unable to withstand environmental threats, farmers and plant breeders have turned to wild relatives. Plant breeders have relied on the fresh germplasm of wild varieties to produce crops with the necessary traits capable of withstanding environmental risks³¹⁶. However, wild relatives are becoming less available as a result of the loss and degradation of natural habitats and the industrialisation of agriculture³¹⁷. Wild plants and animals are being lost at a rate of 100-1,000 times more than the average in the past. The last time the rate of extinction was this high was 65 million years ago; when dinosaurs became extinct³¹⁸. However, five countries, Armenia, Bolivia, Madagascar, Sri Lanka and Uzbekistan, have banded together with international agencies such as the FAO to improve the conservation of crop wild

³¹² Gonzalez, 2010-2011, p. 497.

³¹³ Ibidem, pp. 498 and 500.

³¹⁴ Ibidem, pp. 497 and 499.

³¹⁵ United Nations Environmental Programme, 2009, p. 66.

³¹⁶ Gonzalez, 2010, p. 468.

³¹⁷ Gonzalez, 2010-2011, p. 499.

³¹⁸ Ibidem, p. 500.

relatives³¹⁹. This is an important step forward, but the cooperation of more countries is essential for their work to be effective.

Genetic banks also play in an important role in preserving genetic resources. They serve as a safe storage space of varieties of crops for later use by farmers, plant breeders and researchers³²⁰. Organisations, like Bioversity International, are also playing a vital role in conserving biodiversity. Through a regeneration project in the Americas they aim to regenerate nearly 100 collections of 21 major crops held by organisations and genebanks throughout the world, in order to keep them from deteriorating³²¹. In addition, their Seeds for Needs programme involves pre-selecting crop varieties that are likely to perform well under the effects of climate change. Part of the programme also entails providing communities with these seeds in order to lower the vulnerability of their crops to the effects of climate change³²².

Although these and various other organisations are working hard to preserve plant and animal life, this will not be enough without a major change in our actions which affect biodiversity. If we continue with our unsustainable and harmful practices the loss of biodiversity will have a substantial impact on the food security of future generations.

3.6. FISHERIES

Over a period of two decades (1980-2000) fish production increased seven times, from 5 to 36 million tonnes. Currently, fisheries supply about 10 per cent of the calorie intake around the world³²³. However, the growth rate in captured fisheries has been declining since the mid-2000s³²⁴. In 2009 the UNEP predicted a substantial decline in fisheries over the next 10 years³²⁵. Five major threats to the marine environment

³¹⁹ United Nations Environmental Programme, 2009, p. 74.

³²⁰ Bioversity International, Genebanks, available at <http://www.bioversityinternational.org/research/conservation/genebanks.html> (consulted on 6 April 2013).

³²¹ Bioversity International, Regenerating Andean Crop Collections, available at http://www.bioversityinternational.org/announcements/archived/regenerating_andean_crop_collections.html (consulted on 6 April 2013).

³²² Bioversity International, Seeds for Needs, available at http://www.bioversityinternational.org/research/sustainable_agriculture/seeds_for_needs.html (consulted on 6 June 2013).

³²³ United Nations Environmental Programme, 2009, p. 23.

³²⁴ Sands et al., 2012, p. 343.

³²⁵ United Nations Environmental Programme, 2009, p. 58.

have been identified, namely: a) overfishing; b) habitat loss; c) pollution; d) introduction of invasive species; and e) climate change³²⁶.

To meet current demands the exploitation of captured fisheries is currently at an unsustainable level. It is estimated that nearly one quarter of commercial fish stocks are overharvested³²⁷. In addition to this, fishing practices like bottom trawling are destroying habitats and ecosystems. Bottom trawling is an industrial fishing method where a large net is dragged across the seabed. The net scoops up everything in its path, including endangered fish and vulnerable deep sea corals. The bottom trawl itself can also destroy large areas of seafloor habitats³²⁸. Deep sea fishes and habitats are especially vulnerable as they cannot repopulate as fast as those living closer to the surface³²⁹.

Pollution is also a major problem. Eutrophication, which is caused by high nutrient run-off from agricultural land, where large amounts of fertilisers are used, into the seas and rivers, poses a significant threat to fisheries³³⁰. Eutrophication is defined as:

The process by which a body of water acquires a high concentration of nutrients, especially phosphates and nitrates. These typically promote excessive growth of algae. As the algae die and decompose, high levels of organic matter and the decomposing organisms deplete the water of available oxygen, causing the death of other organisms, such as fish. Eutrophication is a natural, slowing process for a water body, but human activity greatly speeds up the process³³¹.

In addition, increased coastal developments and populations contribute to the degradation of our oceans³³².

Although the introduction of exotic species into the oceans can increase food production, it can also have a detrimental effect on existing fish stocks. The accidental and intentional introduction of invasive

³²⁶ Sands et al., 2012, pp. 342-343.

³²⁷ Anton & Shelton, 2011, p. 6.

³²⁸ Marine Conservation Institute, *Destructive Fishing*, available at <http://www.marine-conservation.org/what-we-do/program-areas/how-we-fish/destructive-fishing/> (consulted on 1 June 2013).

³²⁹ Marine Conservation Institute, *Sustainability of Deep Sea Fisheries*, available at <http://www.marine-conservation.org/what-we-do/program-areas/how-we-fish/sustainability-deep-sea-fisheries/> (consulted on 1 June 2013).

³³⁰ United Nations Environmental Programme, 2009, p. 65.

³³¹ United States Geology Survey, *Eutrophication*, available at <http://toxics.usgs.gov/definitions/eutrophication.html> (consulted on 1 June 2013).

³³² United Nations Environmental Programme, 2009, p. 58.

species is recognised in one of the leading threats to native aquatic biodiversity³³³. Invasive species can push out their native counterparts, cause habitat loss as well as “ecological chaos³³⁴.”

Furthermore, climate change will have a significant impact on our oceans. In particular, dense-shelf water cascading will be affected, which is essential for cleaning polluted water and carrying nutrients to deeper parts of the ocean³³⁵.

However, one of the biggest impacts already seen today is a loss in productivity³³⁶. Declining fish stocks will have a significant impact on current and future food security. Poor coastal populations in Western Africa and South-East Asia are dependent on fisheries as a source of energy and protein, as well as employment opportunities³³⁷. In answer to declining fish stocks many have turned to aquaculture (fish farming). Although it is one of the ecosystem services that have been enhanced in the past 50 years, it has its own negative consequences³³⁸. Aquaculture is promoted on the promise that it will improve food security and the livelihoods of the poor, whilst limiting the exploitation of wild fish stocks. However, as many farmed fish are living off fishmeal, overexploitation of fishstocks has not gone down as much as expected. In addition, aquacultural practices usually have a negative impact on local fishing community's access to food, such as was the case in Senegal and Argentina when the European Union where granted fishing rights for endangered and locally used species³³⁹.

In 1982 the United Nations Convention on the Law of the Sea³⁴⁰ was adopted and sets out the principles and duties of ocean conservation. Unfortunately, it failed to provide adequate guidance regarding the conservation of marine species and ecosystems³⁴¹. Although regulations

³³³ Food and Agricultural Organisation of the United Nations, *Precautionary Approach to the Introduction and Transfer of Aquatic Species*, 1995, available at <http://www.fao.org/docrep/003/w1238e/w1238e08.htm> (consulted on 1 June 2013).

³³⁴ The Nature Conservancy, The Threat of Invasive Species: Disrupting the Natural Balance, available at <http://www.nature.org/ourinitiatives/habitats/forests/explore/the-threat-of-invasive-species.xml> (consulted on 1 June 2013).

³³⁵ United Nations Environmental Programme, 2009, p. 58.

³³⁶ Sands et al., 2012, p. 343.

³³⁷ United Nations Environmental Programme, 2009, p. 24; World Commission on Environment and Development, 1987, Chapter 5, para. 76.

³³⁸ Anton & Shelton, 2011, p. 6.

³³⁹ A/HRC/19/75, 24 February 2012, para. 19.

³⁴⁰ Convention on the Law of the Sea (adopted on 10 December 1982 and entered into force on 16 November 1994).

³⁴¹ Sands et al., 2012, p. 344.

at the national and international level are in place, the vastness of the oceans makes monitoring and control difficult and expensive. In addition, there is little incentive for harvesters to desist from overexploitation and causing damage to natural habitats³⁴². Unfortunately, the oceanic ecosystem has already been significantly damaged which poses a substantial threat to future food security.

3.7. DUTIES UNDER THE PRINCIPLE OF INTERGENERATIONAL EQUITY AND THE RTAF

As was already demonstrated in Chapter 1, under the principle of intergenerational equity each generation acts as trustees over the environmental resources of the Earth. It is our duty to protect these resources and pass them on to our ancestors in no worse condition than how we received them. This requires the present generation to impose certain duties on themselves to protect the interests of those succeeding us³⁴³.

Moreover, as was established in Chapter 2 the RTAF places a duty on states to ensure that food is accessible for both present and future generations. In order to fulfill this duty states have to ensure that the resource base we pass on to the future generation will be sufficient to meet their food production needs. As demand is projected to increase, those to come will need a planetary resource base in a better condition, or at the very least comparable to our own to meet their needs.

Accordingly, the principle of intergenerational equity and the RTAF require the sustainable use of environmental resources. However, as was demonstrated in this chapter, there is an abundance of human activities which has the opposite effect.

Our current means of production, transportation and agriculture, not to mention our day-to-day habits, have made a significant contribution to global warming. Unfortunately, it will be future generations that will be most affected by the effects of climate change in the years to come³⁴⁴. These effects, as well as the negative impacts of mitigation and adaption efforts under a climate change regime, include: a) a loss of arable land due to flooding and drought; b) a decrease in the availability of fresh

³⁴² United Kingdom Government Office for Science, 2011, p. 20.

³⁴³ Wood, 1995-1996, p. 298.

³⁴⁴ Atapattu, 2008-2009, p. 41.

water; and c) a loss in biodiversity, including marine biodiversity. As a result, our contribution to climate change can violate the principle of intergenerational equity and the duty to avoid adverse environmental impacts as proposed by Brown Weiss³⁴⁵. Moreover, food production is highly dependent on climatic and environmental conditions. This creates an inherently direct relationship between climate change and the RTAF³⁴⁶. If predictions are correct, climate change will limit the ability of agriculture to produce enough food to feed the global population. Therefore, the failure by a state to address climate change and take measures to mitigate the effects thereof can be seen as a violation of the state's obligation to protect the RTAF of its population³⁴⁷. If this failure continues it will also threaten the food security of future generations and can result in a failure of a state's duty to ensure that future generations also have access to adequate food.

Furthermore, access to sufficient arable land by future generations to meet their food production needs is also at risk. As a result of an increase in competition over land, the production of non-food products and the practice of "land grabs," less and less arable land will be inherited by those succeeding us. In addition, productive land is becoming more degraded every day due to unsustainable land use practices such as overgrazing and the increased use of fertilisers. In his report to the Economic and Social Council of the United Nations, the previous Special Rapporteur on the Right to Food, Asbjørn Eide, states that sustainability "implies that the physical [...] environment in which food is procured must be [...] protected from erosion or distortion [...]"³⁴⁸. Clearly our actions that have contributed to the degradation of land is in contradiction to the sustainability requirement under the RTAF.

Our water resources are also becoming depleted due to an increased demand for water. In addition, there are various human practices which contribute to the pollution of water making this valuable resource even scarcer for future generations. Pollution also destroys biodiversity which, as mentioned above, provide essential ecosystem services in the food production process. Human practices, like deforestation which threatens the habitats of plants and animals, the introduction of

³⁴⁵ Wood, 1995-1996, p. 295; Brown Weiss, 1990, p. 207.

³⁴⁶ Dumas, 2010-2011, p. 109.

³⁴⁷ Ibidem.

³⁴⁸ Ibidem, p. 122.

invasive species and genetically modified organisms and the practice of monoculture in industrial agriculture have significantly lowered levels of biodiversity. With regard to marine resources, destructive fishing practices, like overfishing and bottom trawling, have caused the near depletion of some fish stocks, for example tuna, cod and sardines, as well as habitat destruction. In addition, pollution caused by human activities, the introduction of invasive species and climate change also threatens the oceanic ecosystem.

Although many efforts have been undertaken to conserve natural resources, the figures presented in the previous sections paint an unsuccessful picture. We have already caused significant damage to environmental resources. It is clear that if we continue with our unsustainable practices we will pass on a depleted resource base to future generations which will be insufficient to meet their food needs. This is clearly in contradiction to our duties as trustees under the principle of intergenerational equity to pass on the planet in no worse conditions than how we received it. The unsustainable practices mentioned above are also in violation of states' obligation under the RTAF to ensure a sustainable food supply.

3.8. CONCLUSION

Through our unsustainable agricultural practices we have caused serious environmental degradation to our natural resources³⁴⁹. Loss of available land, water scarcity, soil erosion, and species infestation of pathogens, weeds and insects combined with the effects of climate change may reduce current yields by an estimated 5-25 per cent by 2050³⁵⁰. The only way to guarantee future food security is to protect the resource base of food production. That means that necessary resources should be sustained, enhanced and where depleted, restored³⁵¹. According to the FAO Voluntary Guidelines for the implementation of the right to food, states are under an obligation

to protect ecological sustainability and the carrying capacity of ecosystems to

³⁴⁹ United Nations Environmental Programme, 2009, p. 33.

³⁵⁰ Ibidem.

³⁵¹ World Commission on Environment and Development, 1987, Chapter 5, para 43.

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ensure the possibility for increased, sustainable food production for present and future generations, prevent water pollution, protect the fertility of the soil, and promote the sustainable management of fisheries and forestry³⁵².

This chapter demonstrated how our unsustainable practices have depleted the resource base that we will carry over to our descendants. This is a violation of our duties under the principle of intergenerational equity and states' obligations under the RTAF. Although we have already caused significant damage to the planet's resource, it might still be possible to reverse some of the harm done. The next chapter will focus on how scientific and technological advancements, food energy efficient practices, and small-scale agriculture can be employed to fulfill our duties towards future generations.

³⁵² Food and Agricultural Organisation of the United Nations, *Voluntary Guidelines to Support the Progressive Realization of the Right to Adequate Food in the Context of National Food Security*, 2008, available at <file:///C:/Documents%20and%20Settings/uvp/Desktop/EMA%20THESIS/Voluntary%20Guidelines.pdf>, p. 19.

4.

FULFILLING OUR OBLIGATIONS

As was established in the previous chapter, our current unsustainable practices have depleted and degraded our environmental resources. This will have a significant impact on future generations' access to food, which is a violation of a state's duty under the RTAF. In addition, if we do not do something to rectify the situation, we will pass on a planet in a worse condition than how we received it. This is in contradiction to our obligations as trustees of the planet under the principle of intergenerational equity.

This chapter will explore the ways in which we can restore environmental resources, or at the very least, minimise the damage that we are inflicting. Part 4.1 will discuss how optimising food energy efficiency and reducing food waste can contribute to fulfilling our obligations towards those succeeding us. Part 4.2 will focus on scientific and technological advancements and discuss how new innovations can reduce the pressure that food production places on our planetary resources. This will be followed, in Part 4.3, with a discussion on small-scale agriculture (SSA) and the benefits that this type of agriculture holds for conservation and preservation of the natural resources needed in food production. Part 4.4 will discuss food sovereignty as a way to promote SSA and ensure food security for all. The chapter will conclude with a discussion on the legal obligations that can be developed under the RTAF and the principle of intergenerational equity to protect the interests of future generations.

4.1. FOOD ENERGY EFFICIENCY

In its 2009 report on the *Environmental Food Crises*, the UNEP

proposed the idea that food security can be increased by optimising food energy efficiency. This was supported by the United Kingdom GOFS, in its 2011 report on the *Future of Food and Farming*, which stated that in order to feed the estimated nine billion people by 2050, in a sustainable and equitable manner, it is essential to address the loss of waste along the food chain³⁵³. Food energy efficiency can be defined as “our ability to minimize the loss of energy in food from harvest potential through processing to actual consumption and recycling³⁵⁴.” Food waste is defined as

edible material intended for human consumption that is discarded, lost, degraded or consumed by pests as food travels from harvest to consumer or, as some put it, “from field to fork.” This definition includes food that is fit for human consumption but intentionally used as animal feed, and spans the entire food supply chain³⁵⁵.

It is often overlooked how much energy is consumed throughout the food supply chain. The food supply chain includes the production, processing, distribution, consumption and disposal of food³⁵⁶. It is estimated that in the United States 10 units of fossil energy are expended to produce one unit of food energy³⁵⁷. Optimising food energy efficiency and decreasing waste will decrease the pressures placed on environmental resources as a result of food production. Several methods have been proposed to improve food energy efficiency along the food supply chain. One of the proposed methods involve reducing per capita meat consumption as the production of meat is much more energy intensive than the production of any other foods³⁵⁸. In addition, a decline in meat production would mean less cereal being used as animal feed, which could then be used for human consumption³⁵⁹. Even a change to the consumption of chicken rather than meat, would increase food energy efficiency as the production of chicken is less energy demanding than

³⁵³ United Kingdom Government Office for Science, 2011, p. 18.

³⁵⁴ United Nations Environmental Programme, 2009, p. 7.

³⁵⁵ United Kingdom Government Office for Science, 2011, p. 18.

³⁵⁶ The Centre for Health and the Global Environment, *Lesson 4 – What Is the Food Supply Chain*, available at http://chge.med.harvard.edu/sites/default/files/lesson-plan-files/lesson_4.pdf (consulted on 5 June 2013).

³⁵⁷ Michael E. Webber, Scientific American, *How to Make the Food System More Energy Efficient*, 29 December 2011, available at <http://www.scientificamerican.com/article.cfm?id=more-food-less-energy> (consulted on 3 June 2013).

³⁵⁸ Ibidem, p. 2.

³⁵⁹ United Nations Environmental Programme, 2009, p. 26.

that of meat production³⁶⁰. Crop rotation can also be employed to enhance the soil nutritional status, thereby lowering the use of inorganic nitrogen³⁶¹. Another method proposed involves carefully balancing the energy used in the transportation of food over long distances against energy intensive local food production. Some argue that the energy used in the transportation of lamb to the United Kingdom which were raised in New-Zealand, where they are able to graze on rain-fed grass, is less than the energy that would be consumed if the sheep were raised locally using energy-intensive inputs, such as fertilisers and irrigation³⁶². Another way of improving energy efficiency is by converting agricultural waste products into power. Examples of biomass which can be used as energy sources include animal waste, crop residue, by-products from food processing and organic waste from households and restaurants³⁶³.

Furthermore, to effectively minimise the pressure on environmental resources it is essential to reduce the amount of wasted food³⁶⁴. Only 43 per cent of the cereal produced across the world is eventually consumed by humans. This is due to harvest and post-harvest distribution losses and the use of cereal in animal feed. In addition, 30 million tonnes of fish is currently discarded at sea. This corresponds to the amount of fish needed to sustain the growth in aquaculture³⁶⁵. It is estimated that nearly a third of all food produced are lost or wasted along the food supply chain³⁶⁶. Unfortunately, it is not only food we waste, but also the energy and the water that goes into producing that food³⁶⁷.

One way of reducing these losses is by finding alternatives to the use of cereal in animal feed, such as recycled organic waste, fish discards

³⁶⁰ Ibidem.

³⁶¹ Food and Agricultural Organisation of the United Nations, *Policy Brief: The Case for Energy-smart Food Systems*, 2011, available at www.fao.org/docrep/014/i2456e/i2456e00.pdf, p. 8.

³⁶² Michael E. Webber, Scientific American, *How to Make the Food System More Energy Efficient*, 29 December 2011, p. 2; Food and Agricultural Organisation of the United Nations, *Policy Brief: The Case for Energy-smart Food Systems*, 2011, p. 9.

³⁶³ Food and Agricultural Organisation of the United Nations, *Policy Brief: The Case for Energy-smart Food Systems*, 2011, p. 7.

³⁶⁴ United Kingdom Government Office for Science, 2011, p. 36.

³⁶⁵ United Nations Environmental Programme, 2009, p. 19.

³⁶⁶ Food and Agricultural Organisation of the United Nations, *Policy Brief: The Case for Energy-smart Food Systems*, 2011, p. 10.

³⁶⁷ Antonio Pasolini, The Energy Collective, *Food Production and Energy Usage, Efficiency*, 27 February 2013, available at <http://theenergycollective.com/energyrefuge/192081/food-gives-us-energy-it-takes-lot-energy-produce-it> (consulted on 3 June 2013).

or fibrous plants, like straws, leaves and nutshells³⁶⁸. Another way of reducing waste is getting consumers to reduce their wasted foods through campaigns which highlight the benefits of reducing waste³⁶⁹. Together the UNEP and the FAO have launched a campaign to reduce food waste by consumers and retailers. The campaign, called the Think. Eat.Save initiative, targets wasteful practices and was also the theme of World Environment Day on 5 June 2013³⁷⁰.

It is of the utmost importance that we find and implement methods that reduce the pressure of food production on the environment, in order to restore the ecosystem that is the foundation of the ability of each generation to feed themselves³⁷¹.

4.2. SCIENTIFIC AND TECHNOLOGICAL ADVANCEMENTS

Over the past decades agricultural yields were significantly increased due to the application of new scientific and technological innovations³⁷². Food analysts believe that science, combined with human endeavour, can triumph over the fixed laws of nature³⁷³. Science and technology have the ability to play a significant role in guaranteeing food security and sustainable agriculture by transforming the economic, social and environmental inputs that are needed to improve food security³⁷⁴. According to a report by the African Union:

The acquisition and use of science and technology is critical in raising food production and extending productive opportunities outside the traditional land resources and in ensuring food availability, affordability and stability of access³⁷⁵.

Moreover, new developments are necessary to effectively address the problems caused by climate change³⁷⁶. What are needed are advance-

³⁶⁸ United Nations Environmental Programme, 2009, pp. 8 and 27.

³⁶⁹ United Kingdom Government Office for Science, 2011, p. 19.

³⁷⁰ Antonio Pasolini, The Energy Collective, *Food Production and Energy Usage, Efficiency*, 27 February 2013.

³⁷¹ United Nations Environmental Programme, 2009, p. 29.

³⁷² Paarlberg, 2010, p. 45.

³⁷³ Lawrence, Lyons & Wallington, 2011, p. 271.

³⁷⁴ United Nations Global Compact, 2012, p. 24.

³⁷⁵ African Union, 2006, p. xvii.

³⁷⁶ United Kingdom Government Office for Science, 2011, p. 34.

ments which could not only slow down climate change, but also enable food production to adapt to the adverse effects of climate change. Some innovations already in place include breeding which improves nitrogen use by plants, breeding of cattle which reduces GHG emissions etc.³⁷⁷ Another method, called “precision farming,” enables farmers to tend to their crops to the inch, thereby reducing wasted space, time and fuel³⁷⁸. By reducing the use of fertilisers through more precise application, farmers lower the production of inorganic fertilisers and the large amount of energy consumption associated with the production of these products³⁷⁹.

Thanks to scientific and technological advancements there are also new agricultural methods available which can increase food energy efficiency, as discussed in Part 4.1 of this chapter. One of these advancements is drip irrigation which is much more effective than traditional centre pivot sprinklers as it ensures “more crop per drop³⁸⁰.” No-till agriculture is another promising advancement as “[i]t reduces the disturbance of soils by using special planting equipment that places seeds into untilled soil through narrow surface slots rather than the blunt approach of turning the soil³⁸¹.” This has the benefit of reducing fuel consumption and soil erosion and improving soil water retention³⁸².

However, not all change is good and some innovations can lead to environmental degradation, contribute to poverty and inequality and even exacerbate food insecurity³⁸³. For most small-scale farmers new technologies are, in addition to being too costly, difficult to obtain in developing countries³⁸⁴. Even if they are able to get hold of the technology, these farmers often do not get the training needed to implement the technology successfully. In addition, maintenance costs are very high often leading to the abandonment of equipment when

³⁷⁷ United Kingdom Government Office for Science, 2011, pp. 29-30.

³⁷⁸ Michael E. Webber, Scientific American, *How to Make the Food System More Energy Efficient*, 29 December 2011.

³⁷⁹ Food and Agricultural Organisation of the United Nations, *Policy Brief: The Case for Energy-smart Food Systems*, 2011, p. 9.

³⁸⁰ Michael E. Webber, Scientific American, *How to Make the Food System More Energy Efficient*, 29 December 2011.

³⁸¹ Ibidem.

³⁸² Food and Agricultural Organisation of the United Nations, *Policy Brief: The Case for Energy-smart Food Systems*, 2011, p. 8.

³⁸³ Gonzalez, 2010-2011, p. 505.

³⁸⁴ United Nations Global Compact, 2012, p. 24.

they break down³⁸⁵. Under the current agricultural biotechnology system, research and development is mostly aimed at the industrial agriculture cash-cropping systems³⁸⁶. Usually, new innovations will only benefit those that already have access to ample resources to effectively implement the new technologies³⁸⁷. This was clearly demonstrated by the Green Revolution that occurred during the 1940s to the 1970s.

4.2.1. The Green Revolution

The Green Revolution introduced a new and more productive method of farming. It entailed the use of a combination package made up of specific seed, fertiliser and pesticide³⁸⁸. Although the “package” was capable of substantially increasing yields, this could only be achieved through capital investments in irrigation and the application of synthetic agrochemicals³⁸⁹. This was unaffordable for the average small farmer which ultimately lost out to larger, more entrepreneurial farmers³⁹⁰. In addition, countries with poor soil, unreliable rainfall and uneven topography, like the more remote areas of Asia, Latin-America as well as Sub-Saharan Africa were unable to benefit from the Green Revolution³⁹¹. Moreover, agricultural practices under the Green Revolution had a number of negative impacts on the environment. The Green Revolution relied on new varieties of rice, wheat and maize, which was able to produce higher yields. Although this was initially effective, it replaced traditional crops, thereby reducing biodiversity³⁹². Further consequences of the Green Revolution included: a) heightened vulnerability of crops to pests and diseases; b) soil infertility; c) increased irrigation which depleted aquifers; d) loss of ecosystem biodiversity; and e) a decrease in the genetic base of the world’s food supply³⁹³. After the Green Revolution, the world turned to genetically modified crops (GMC) to enhance agricultural productivity.

³⁸⁵ Ibidem.

³⁸⁶ Fazzino, 2003-2004, p. 442.

³⁸⁷ World Commission on Environment and Development, 1987, Chapter 5, para. 81.

³⁸⁸ Lawrence, Lyons & Wallington, 2011, p. 10.

³⁸⁹ Gonzalez, 2011, p. 79.

³⁹⁰ Lawrence, Lyons & Wallington, 2011, p. 10; Gonzalez, 2010-2011, p. 505.

³⁹¹ World Commission on Environment and Development, 1987, Chapter 5, para. 81.

³⁹² Gonzalez, 2010, pp. 467-468.

³⁹³ Gonzalez, 2010-2011, pp. 505-506; Gonzalez, 2010, pp. 467-468.

4.2.2. *Genetically Modified Crops*

The introduction of GMC has led to significant advances in agricultural practices, but also considerable controversy³⁹⁴. It was proposed that GMC will improve food security, whilst reducing the need to cultivate new land³⁹⁵. It was also promised that all this could be done without harm to the environment as GMC use less pesticides and herbicides. Proponents of GMC also promised easing the “hunger gap” that some farmers experience between the time of planting and harvesting, as genetically modified maize varieties take less time to grow³⁹⁶.

However, GMC has had various negative impacts on food security and the environment. According to the FAO, 85 per cent of all plantings of transgenic crops are soybean, maize and cotton. Little research and development has been conducted on crops that are produced in the poorest countries, namely sorghum, millet, pigeon pea, chickpea and groundnut³⁹⁷. It has been argued that although GMC was designed to reduce input and costs, the aim of GMC was not “to feed the world or increase food quality³⁹⁸.” According to the Special Rapporteur on the Right to Food, Jean Ziegler, the main goal of GMC was to create vertical integration between seed, pesticides and production in order to increase corporate profits for companies like Mosanto, who controls nearly 90 per cent of the GMC market³⁹⁹.

Moreover, instead of reducing hunger, GMC threaten food security by increasing rural inequality. Transnational corporations, which seek to maximise their profits, market their genetically modified products to large-scale affluent farmers and ignoring the needs of small resource poor farmers in developing countries. This has the effect of driving small-scale producers out of the markets and denying them their production-based entitlements. Moreover, the use of GMC has reduced the need for manual labour, thereby removing employment opportunities⁴⁰⁰.

³⁹⁴ United Nations Global Compact, 2012, p. 24.

³⁹⁵ Gonzalez, 2004-2005, p. 451.

³⁹⁶ Gardner, 2002, p. 84.

³⁹⁷ A/HRC/7/5, 10 January 2008, para. 44.

³⁹⁸ Ibidem.

³⁹⁹ A/HRC/19/75, 24 February 2012, para. 36; A/HRC/7/5, 10 January 2008, para. 44.

⁴⁰⁰ Gonzalez, 2004-2005, pp. 451-453.

GMC also poses various risks to environmental resources. Firstly, agrobiodiversity has already been lost as a result of the production of only a limited number of high-input monocultures. As discussed in the previous chapter, this creates various dangers which include lowering the resilience of agro-ecosystems. Secondly, the transfer of genes from GMC to other wild relatives through cross-pollination poses a particular risk. The transfer of genes from herbicide-tolerant crops can lead to herbicide-resistant weeds. Genetic contamination also threatens traditional genetic diversity which is essential to preserve the integrity of the global food supply. Thirdly, GMC can become herbs themselves when the previous season's GMC seeds are left on the field and germinate with the next season's crops. This will in turn require farmers to use different, and in some cases more, herbicide and insecticide. Fourthly, although crops can be modified to target certain pests it can also eliminate other beneficial insects in the process⁴⁰¹.

For GMC to be truly beneficial, all future research should be aimed at reducing food insecurity and not just making more profit for already affluent farmers. Future research should: a) take account of the socio-economic circumstances surrounding food security; b) be tested to avoid potential environmental risks; and c) include poor farmers in establishing research goals. In addition, the newly modified seeds should be inexpensive and not subject to patenting, so that all can have access to its benefits⁴⁰².

As arable land, and other environmental resources, are becoming scarcer and demand is increasing, the only way to increase food production is through higher yields. This was confirmed by the WSFS which declared that:

We recognize that increasing agricultural productivity is the main means to meet the increasing demand for food given the constraints on expanding land and water used for food production. We will seek to mobilize the resources needed to increase productivity, including the review, approval and adoption of biotechnology and other new technologies and innovations that are safe, effective and environmentally sustainable⁴⁰³.

Therefore, to guarantee future food security and keep up with

⁴⁰¹ Ibidem, pp. 453-455.

⁴⁰² Ibidem, pp. 455-456.

⁴⁰³ Declaration of the World Summit on Food Security, WSFS2009/2, 2009, para. 26.

increasing demand, the key is sustainable intensification which can be achieved through scientific and technological advancements⁴⁰⁴. However, to guarantee food security for all, scientific and technological advancements should benefit all people, equally. In addition, all new innovations should be ecologically sustainable in order not to endanger the means of future generations to meet their own needs⁴⁰⁵. The WSFS has stressed the importance of all farmers in all countries having access to environmentally sound technologies⁴⁰⁶. International cooperation and the sharing of knowledge are of vital importance to make scientific and technological advancements beneficial for all. This includes restricting private companies from obtaining proprietary rights to improved seed varieties⁴⁰⁷. What is needed is “[p]redictable, science-based regulatory systems that balance the need for technological innovation with the important goals of biosafety and sustainable development [...]”⁴⁰⁸.

Governments and private companies have started investing more in technological innovations which can be applied effectively in remote areas, are affordable and are not harmful to the sustainability of the ecosystem⁴⁰⁹. Geoffrey Lawrence and his co-authors believe that a mix of state support, capital and science, underpinned by welfare, could increase production⁴¹⁰. However, research and development takes time. It is essential that we continue investing in new knowledge in the present which could aid us in meeting the future food demand.

4.3. SMALL-SCALE AGRICULTURE

In his comments on the reform of the Common Agricultural Policy in 2011, the Special Rapporteur on the Right to Food, Olivier de Schutter, highlighted the importance of small-scale farmers. He stated that:

The question of global food security cannot be reduced simply to a problem of supply or production. What matters is not only how much is produced, but also who produces, for whom, at which prices, and according to which share of

⁴⁰⁴ United Kingdom Government Office for Science, 2011, p. 31.

⁴⁰⁵ Declaration of the World Summit on Food Security, WSFS2009/2, 2009, para. 26.

⁴⁰⁶ Ibidem, para. 27.

⁴⁰⁷ World Commission on Environment and Development, 1987, Chapter 5, para. 84.

⁴⁰⁸ Bobo, 2007, p. 939.

⁴⁰⁹ United Nations Global Compact, 2012, p. 24.

⁴¹⁰ Lawrence, Lyons & Wallington, 2011, p. 271.

the value along the supply chain linking the producer to the consumer. It is these questions that are most relevant from the perspective of the right to adequate food. The right to food requires that each individual, alone or together with others, has the means either to produce food to satisfy his or her needs or has a purchasing power sufficient to procure food from the markets. It is a matter of appropriate distribution, social justice and human rights, and not simply a matter of food availability. If increases in food production rise in tandem with further marginalization of small-scale farmers in developing countries, the battle against hunger and malnutrition will be lost⁴¹¹.

Even though SSA does not produce the same yields per hectare as industrial farming, it does provide food and livelihoods for millions of families across the world⁴¹². According to a 2012 report by the Human Rights Council Advisory Committee, 50 per cent of the world's hungry live on small areas of land where they produce crops, either for their own household consumption or for sale on the markets⁴¹³. According to the non-governmental organisation, La Via Campesina, a strong defender of peasant-based agriculture, the only way to feed the population in the future, whilst also protecting the environment and our natural resources, is through small-scale and peasant-based agriculture⁴¹⁴. This was also recognised at the Rio+20 conference where it was stated

that farmers, including small-scale farmers and fishers, pastoralists and foresters, can make important contributions to sustainable development through production activities that are environmentally sound, enhance food security and the livelihood of the poor, and invigorate production and sustained economic growth⁴¹⁵.

4.3.1. Benefits of SSA

According to La Via Campesina, SSA holds various benefits. Small-scale farmers make use of agricultural practices improved over generations, which has the minimum impact on environmental resources⁴¹⁶. For example, traditional and small-scale farmers everywhere have been practicing agroforestry for generations. Agroforestry is an

⁴¹¹ De Schutter, 2011, p. 1.

⁴¹² Lawrence, Lyons & Wallington, 2011, p. 93.

⁴¹³ A/HRC/19/75, 24 February 2012, para. 11.

⁴¹⁴ La Via Campesina, Policy documents, 5th Conference, 2009, p. 182.

⁴¹⁵ A/CONF.216/16, 2012, para. 52.

⁴¹⁶ La Via Campesina, Policy documents, 5th Conference, 2009, p. 182.

integrated approach whereby farmers combine tree crops with food crops on the same set of land. If crops are chosen carefully they can reinforce each other and produce more food and fuel than if they were grown separately⁴¹⁷. When traditional knowledge and experience are mixed with modern technology it can be adapted to protect the “natural environment, biodiversity, economic viability and social sustainability⁴¹⁸.” Sustainable family farming agriculture, as a form of peasant-based agriculture, also uses local resources and technologies whilst balancing nature, social and economic development as well as the cultural identity of a family or community⁴¹⁹. SSA focuses on using and maintaining natural assets, such as soil, biodiversity and knowledge, rather than relying on pesticides and fertilisers⁴²⁰. As individuals and communities are able to control how their lands are used, they are able to preserve the fertility of the soil for future generations. This also makes individuals and communities more autonomous, which is in line with the principle of food sovereignty which will be discussed in Part 4.4 of this chapter⁴²¹.

Furthermore, SSA makes use of various crops during production, in contrast to the practice of monoculture cropping used by industrial agriculture. Small farmers play an essential role in guaranteeing world food security through their use and preservation of agro-biodiversity⁴²². Different plant varieties under their care are also used by plant breeders to develop crops that can withstand environmental shocks⁴²³.

Moreover, culturally appropriate food is produced close to the area of consumption. UNITERRE, a Swiss peasant-based organisation, calculated that it takes five litres of oil to import one kilo of asparagus from Mexico, whilst it will only take 0.3 litres to transport locally produced asparagus to the consumer⁴²⁴. SSA eliminates industrial processing and reduces transportation time and costs which in turn reduces GHG emissions, fossil fuel consumption and food losses.

In addition, SSA provides employment opportunities and forms a

⁴¹⁷ World Commission on Environment and Development, 1987, Chapter 5, para. 74.

⁴¹⁸ La Via Campesina, Policy documents, 5th Conference, 2009, p. 186.

⁴¹⁹ Ibidem, p. 182.

⁴²⁰ Ibidem, p. 184.

⁴²¹ Ibidem.

⁴²² Gonzalez, 2010-2011, p. 499.

⁴²³ Ibidem.

⁴²⁴ La Via Campesina, Policy documents, 5th Conference, 2009, p. 70.

strong economic pillar in the local community. It can ensure to everyone in the community a dignified life by providing sufficient income to access other services, such as health care and education⁴²⁵. By focusing on small-scale farming and shifting production to food-deficit countries, sustainable livelihoods can be secured⁴²⁶. This will in turn benefit other areas of the economy as higher incomes increase the demand for locally-traded good and services, thereby creating a market for the secondary and tertiary sector to expand⁴²⁷.

In addition, SSA can play a key role in the mitigation of climate change as it: a) uses less energy; b) stores more CO₂ in soil organic matter; and c) reduces nitrogen emissions through the use of organic agriculture or plants that are capable of capturing nitrogen directly from the air⁴²⁸. A further benefit of agro-ecological forms of SSA is increased knowledge sharing amongst farmers. Through this process the best solutions can be found to fit changing circumstances as a result of climate change⁴²⁹.

4.3.2. Threats to SSA

Liberalised markets expose peasants and small farmers to extremely low prices for agricultural products, which leads to poor incomes which can ultimately force them off their lands⁴³⁰. Moreover, “land grabs” by transnational corporations for industrial agriculture are particularly prevalent⁴³¹. In addition, international organisations, like the World Bank, continue to implement models of agricultural development which promotes rural-out migration⁴³². This can lead to the displacement of farmers to remote and marginal areas where they are not able to produce food; either for their own consumption or to sell on the market for income⁴³³. In Guatemala, the majority of fertile lands form part of huge industrialised plantations, whilst peasant farmers are forced to make a living in the mountainous areas⁴³⁴. Where no other land is

⁴²⁵ Ibidem, pp. 186-187.

⁴²⁶ World Commission on Environment and Development, 1987, Chapter 5, para. 40.

⁴²⁷ De Schutter, 2011, p. 2.

⁴²⁸ La Via Campesina, Policy documents, 5th Conference, 2009, p. 188.

⁴²⁹ A/HRC/12/31, 21 July 2009, para. 18.

⁴³⁰ La Via Campesina, Policy documents, 5th Conference, 2009, p. 188.

⁴³¹ Ibidem, p. 183.

⁴³² Lawrence, Lyons & Wallington, 2011, p. 4.

⁴³³ La Via Campesina, Policy documents, 5th Conference, 2009, p. 183.

⁴³⁴ A/HRC/19/75, 24 February 2012, para. 12.

available, households and communities are forced away from their lands into cities, where they have to live in slums. This significantly reduces food sovereignty and food security by cutting off their direct access to food⁴³⁵. International public policy over the last few years has also had a significant negative impact on SSA. For example, increased subsidies to farmers in developed countries, lead to “dumping” of their products in developing countries in the Global South due to overproduction. These products are then sold at a price lower than that of the local producer; putting their livelihoods in jeopardy⁴³⁶.

In 2008 it was estimated that in Indonesia five million farmers have been forced of their land due to the development of industrial agriculture. In Brazil, the number was also estimated at five million, whilst Columbia stood at four million⁴³⁷. Although industrial agriculture might produce higher yields per hectare, it has several negative consequences. As it uses a vast amount of fossil fuels, it contributes significantly to climate change, whilst unsustainable practices can aggravate soil erosion and increase desertification. In addition, it destroys water reserves through pollution and excessive irrigation and increases deforestation and the consequent loss of natural habitat and biodiversity. Furthermore, industrial agriculture involves monoculture farming which increases the occurrence of dangerous pests. In addition, the increased use of insecticide, fungicide, and herbicide leads to the production of unsafe and unhealthy foods⁴³⁸. Furthermore, industrial livestock production generates a tremendous amount of waste which is not reused and can cause environmental pollution⁴³⁹.

However, by investing in the development of SSA, the pressure on industrial agriculture can be reduced, which enables them to use more sustainable agricultural practices⁴⁴⁰. Unfortunately, small-scale farmers in areas like Central Asia and Africa, are in a particular disadvantaged position compared to large industrial farmers. They lack access to markets, irrigation water, infrastructure and investments and have to

⁴³⁵ Lawrence, Lyons & Wallington, 2011, p. 4.

⁴³⁶ Valente & Franco, 2010, p. 446.

⁴³⁷ Brot für die Welt, Internationaal Maatschappelijk Verantwoord Ondernemen, “The World Food Crises and the Right to Food”, *Right to Food and Nutrition Watch*, 2008, p. 12.

⁴³⁸ La Via Campesina, Policy documents, 5th Conference, 2009, pp. 189 and 190.

⁴³⁹ Lawrence, Lyons & Wallington, 2011, p. 11.

⁴⁴⁰ World Commission on Environment and Development, 1987, Chapter 5, para. 42.

depend on only a few multi-national suppliers⁴⁴¹. In addition, as was discussed in Part 4.2 of this chapter, small-scale famers do not have the same access to scientific and technological advancements, as larger, more entrepreneurial, farms. These together with other factors, such as conflicts and corruption, can significantly depress SSA⁴⁴².

4.3.3. Efforts to Support SSA

However, in 2009, the Special Rapporteur on the Right to Food reported that, as a result of the global food crises, governments and international agencies have refocused their attention on agriculture. On 15 April 2009, the Agricultural Investment Fund for Africa was established by the African Development Bank, the International Fund for Agricultural Development and the Alliance for a Green Revolution in Africa. Supported by the French Development Agency, the Fund aims to collect €500 million for the benefit of agro-industries and farmers cooperatives in Africa⁴⁴³.

An example of the significant effect that SSA with sufficient support can have can be seen in India's dairy production. In 1965, Dr Verghese Kurien formed the National Diary Development Board, an umbrella organisation for dairy cooperatives. The aim of the cooperative was to market the milk from the few cows owned by each family in a village. This established the necessary link between the growing demand for dairy products and millions of village families who only had a "small marketable surplus" each⁴⁴⁴. Since 1970, milk production in India increased nearly six-fold, from 21 million to 117 million tons⁴⁴⁵. Even more significant is the fact that cows are only fed crop residues, like wheat straw, rice straw and corn stalks or grass gathered by the farmers. This means a thriving dairy industry which does not reduce the amount of crops available for human consumption⁴⁴⁶.

Civil society organisations have also played an important role in promoting SSA. They are continuously calling on governments to implement programmes of agrarian reform which is based on the needs

⁴⁴¹ United Nations Environmental Programme, 2009, p. 77.

⁴⁴² Ibidem.

⁴⁴³ A/HRC/12/31, 21 July 2009, para. 13.

⁴⁴⁴ Brown, 2012, p. 32.

⁴⁴⁵ Ibidem.

⁴⁴⁶ Ibidem, p. 33.

and rights of peasant farmers⁴⁴⁷. These programmes aim at providing rural communities with access to land, as well as security of tenure for those workers cultivating the land⁴⁴⁸. One of these organisations, La Via Campesina

brings together millions of peasants, small and medium-size farmers, landless people, women farmers, indigenous people, migrants and agricultural workers from around the world. It defends small-scale sustainable agriculture as a way to promote social justice and dignity. It strongly opposes corporate driven agriculture and transnational companies that are destroying people and nature⁴⁴⁹.

Another organisation, the International Fund for Agricultural Development, has also made a lot of progress in promoting SSA. Its aim is to finance agricultural development projects aimed at food production in the developing countries⁴⁵⁰. Examples of future projects include: a) reducing the vulnerability to climate change and poverty of coastal rural communities in Djibouti; and b) an inclusive rural economic and climate resilience programme in the Republic of Moldova⁴⁵¹. Through these and other programmes they can aid small-scale farmers to adapt to climate change and preserve natural resources which will help to guarantee the food security of future generations. The Brundtland Commission included the following statement in their 1987 report:

The task of agriculture is thus not confined to obtaining the biological product but extends to constant maintenance and augmentation of soil fertility. Otherwise we will very quickly consume what by right belongs to our children, grandchildren, and great-grandchildren, to say nothing of more distant descendants. It is this misgiving – that our generation lives to a certain extent at the expense of the coming generations, thoughtlessly drawing on the basic reserves of soil fertility accumulated in the millennia of the biospheric development, instead of living off the current annual increment [...]⁴⁵².

⁴⁴⁷ Coomans, 2006, p. 7.

⁴⁴⁸ Ibidem, p. 8.

⁴⁴⁹ La Via Campesina, The International Peasant's Voice, available at <http://viacampesina.org/en/index.php/organisation-mainmenu-44> (consulted on 10 April 2013).

⁴⁵⁰ International Fund for Agricultural Development, Who We Are, available at <http://www.ifad.org/governance/index.htm> (consulted on 10 April 2013).

⁴⁵¹ International Fund for Agricultural Development, Planned Project Activities: 2012-2015, available at <http://www.ifad.org/operations/pipeline/index.htm> (consulted on 10 April 2013).

⁴⁵² World Commission on Environment and Development, 1987, Chapter 5, para. 62.

As was demonstrated above, SSA provides various benefits when compared to large-scale agriculture. However, SSA is continuously threatened by industrial agriculture. Therefore, it is up to the government of each country to ensure that small-scale farmers, under their jurisdiction, have sufficient support and protection against these threats. This will aid states in fulfilling their duties of preservation and conservation of the environment.

4.4. ADVANCEMENT OF THE PRINCIPLE OF FOOD SOVEREIGNTY TO PROTECT SMALL-SCALE FARMERS AND ENVIRONMENTAL RESOURCES

According to La Via Campesina, food sovereignty is the key to providing livelihoods to millions of people and protecting life on Earth⁴⁵³. They have defined food sovereignty as:

[T]he right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations. Food sovereignty prioritizes local and national economies and markets, empowers peasant and family farmer-driven agriculture, artisan-style fishing, pastoralist-led grazing, and protects food production, distribution and consumption based on environmental, social and economic sustainability⁴⁵⁴.

The notion of food sovereignty was launched at the 1996 Civil Society Forum on Food Security. It was developed as a strategy by civil society to strengthen the promotion of the RTAF⁴⁵⁵. The above-mentioned definition, as well as many others provided for the term “food sovereignty,” reiterates the right to self-determination contained in Article 1 of the International Covenant on Civil and Political Rights⁴⁵⁶ and the ICESCR⁴⁵⁷. The 2004 Summary Report by the International NGO/CSO Planning Committee for Food Sovereignty identified four pillars under the concept of food sovereignty, namely: a) the right to food

⁴⁵³ La Via Campesina, Policy documents, 5th Conference, 2009, p. 73.

⁴⁵⁴ Ibidem, p. 74.

⁴⁵⁵ Valente & Franco, 2010, p. 453.

⁴⁵⁶ International Covenant on Civil and Political Rights (adopted on 16 December 1966 and entered into force on 23 March 1976).

⁴⁵⁷ Haugen, 2009, p. 273.

and food sovereignty; b) access to and management of local resources; c) small-scale and family-based agro-ecological food production; and d) the priority of food sovereignty over trade⁴⁵⁸.

The main idea under the concept of food sovereignty is to gather respect for the contributions and rights of small-scale and peasant farmers. In addition, proponents of food sovereignty aim to guarantee access to and control over local resources to these farmers⁴⁵⁹. The notion of food sovereignty is also used to protect environmental resources as it promotes the sharing of resources in a socially and environmentally sustainable manner. In addition, it focuses on the contributions of nature and ecosystems in order to achieve “low external input agro-ecological production and harvesting methods⁴⁶⁰.” Furthermore, food sovereignty ensures the use of the skills and local knowledge of small-scale farmers in food production and harvesting systems. It also aims to promote the development of environment-friendly research and technologies based on local knowledge which could then be passed on to future generations⁴⁶¹. It is clear that the concept of food sovereignty is not only an important tool to ensure the food security of this generation but can also be employed to protect the interests of future generation.

4.5. MOVING TOWARDS LEGAL OBLIGATIONS ON THE PRESENT GENERATION

As already mentioned, a moral duty to conserve natural resources and protect the environment is not enough to effectively address the damage that our unsustainable practices are causing. What is needed is a move towards legal obligations on states with regard to the protection of the interests of future generations.

It has already been demonstrated that, under the RTAF, states

⁴⁵⁸ International NGO/CSO Planning Committee for Food Sovereignty, *Summary Report on the Results of the Regional NGO/CSO Consultation*, 2004, available at http://www.foodsovereignty.org/Portals/0/documents%20sito/Resources/Archive/Regional%20Meetings/2004-FINAL_IPC_CONSULTATION_STATEMENT.pdf (consulted on 10 June 2013), p. 1; Haugen, 2009, p. 277.

⁴⁵⁹ Grassroots International, “The 6 Food Sovereignty Principles”, available at <http://www.grassrootsonline.org/sites/default/files/The-6-Food-Sovereignty-Principles.pdf> (consulted on 10 June 2013).

⁴⁶⁰ Ibidem.

⁴⁶¹ Ibidem; Suppan, 2008, p. 115.

must ensure sustainable access to food for both present and future generations. This requires the sustainable use of natural resources. In addition, it was also demonstrated that in order to fulfill the tripartite duties of respect, protect and fulfill under the RTAF, states have a legal obligation to maintain certain environmental conditions.

Moreover, Chapter 1 showed that under the principle of intergenerational equity there are also certain obligations on the present generation. These include: a) the duty to conserve options; b) the duty to conserve quality; and c) the duty to conserve access. In order to fulfill these duties the present generation must use all natural resources in a sustainable manner. Unfortunately, these duties have not yet achieved the status of legal obligations. However, legal recognition for the principle of intergenerational equity is growing which opens up the possibility of legalising these duties in the years to come.

This chapter explored the ways through which states can fulfill their legal obligations under the RTAF and possible future legal obligations under the principle of intergenerational equity. Although the measures discussed in this chapter are not the only ways to achieve the goals of sustainability, conservation and preservation, it was demonstrated that if they are utilised correctly they can play a significant role in achieving these goals.

Therefore, what is needed is a move towards legal obligations on states to implement and support the measures discussed in this chapter. This can include legal obligations to put in place measures to promote food energy efficiency and ways to reduce food wastages. Furthermore, as was demonstrated above, SSA holds various benefits for the sustainable use of resources. Therefore, there should be a legal obligation on states to provide sufficient support and protection for these farmers. In addition, states must ensure that all future scientific and technological research are aimed at small-scale and resource poor farmers. Moreover, under climate change governance there must be a legal obligation on states to protect these farmers from the adverse effects of global warming. It must also be borne in mind that states are under a legal obligation to ensure the food sovereignty of all, as part of the right to self-determination under the ICESCR and the International Covenant on Civil and Political Rights. This can also be used to impose legal obligations on states to support small-scale farmers in their jurisdiction.

In order to effectively protect the future right to food of those to come it is essential that we create legal obligations to protect these interests. This section looked at some examples of how legal obligations

can be created based on the duties under the RTAF and the principle of intergenerational equity. When these obligations are put into place they can play a significant role in guaranteeing future food security.

4.6. CONCLUSION

In order to meet the obligations towards future generations, under the principle of intergenerational equity and the RTAF, we have to substantially minimise the pressure that the food supply chain places on environmental resources. One way to achieve this is by increasing food energy efficiency, thereby minimising the loss of energy along the food supply chain. A decrease in the food wasted will also ensure that less production is needed to keep up with demand, thereby ensuring that more environmental resources are available to future generations to meet their own food needs.

Scientific and technological advancements can also play a significant role in providing new agricultural practices and innovations which can reduce the pressures on our natural resources. However, the development of new research and technologies should take into account the interests of small-scale and peasant farmers. It is essential that these technologies are not harmful to environmental resources and benefit everyone equally, so as not to repeat the mistakes of past agricultural innovations.

SSA is another way through which we can start to fulfill our duties towards future generations. SSA has various benefits compared to industrial agriculture, the most important of which is the conservation and preservation of environmental resources. The promotion of food sovereignty can play an important role in protecting the interests of small-scale and peasant farmers. However, in order to meet our obligations to future generations a substantial change across the entire food supply chain is needed; all the way from production through to the disposal of discarded food.

The chapter concluded with a discussion on how legal obligations can be created under the RTAF and the principle of intergenerational equity to support and implement measures that promote food energy efficiency, scientific and technological advancement and SSA. It is through the fulfillment of these obligations that we will be able to protect the right to food of future generations.

CONCLUSION

As global food demand is expected to increase by 60 per cent in 2050, production will have to increase accordingly. However, as a result of the effects of climate change, constraints on natural resources and competing demands this might not be achievable⁴⁶². This means that by 2050 food security might already be in jeopardy. This begs the question what will the food security status of future generations be?

The aim of this thesis was to determine whether we are protecting the right to food of future generations. To answer this question Chapter 1 focused on the principle of intergenerational equity and the different relationships under this principle. Regarding the relationship between generations, it was established that all generations should be viewed as acting in partnership with one another in relation to their use of natural resources. It was further demonstrated that each generation acts as trustees of the planetary resources when it becomes the living generation. It is therefore up to each generation to preserve natural resources for use by future generations. The primary duty that was identified under the principle of intergenerational equity is the obligation to pass on the planet in no worse condition than how we received it. The only way to fulfill this obligation and still meet our own food needs is through the sustainable use of natural resources.

Chapter 2 focused on the RTAF and the obligations upon states under this particular human right. It was determined that in order to fulfill its obligations to *respect, protect and fulfill* the RTAF each state

⁴⁶² Food and Agricultural Organisation of the United Nations, World Food Programme, International Fund for Agricultural Development, The State of Food Insecurity in the World. Economic Growth Is Necessary but not Sufficient to Accelerate Reduction of Hunger and Malnutrition, 2012, available at www.fao.org/docrep/016/i3027e/i3027e.pdf, p. 30.

has to ensure the protection of environmental resources. In addition, states are under an obligation to ensure sustainability of food supply. This means that states have to ensure that food is accessible for both present and future generations. In order to fulfill this duty states have to ensure that future generations will have the necessary resource base to fulfill their food needs. Again this requires the sustainable use of natural resources. This chapter also focused on the different drivers of sustainability and how our current lifestyles are affecting the rate of use of the natural resources essential for food production.

Chapter 3 focused on different unsustainable human practices that have led to the degradation and depletion of environmental resources. It was discussed how global warming has affected the environment, and how our contributions towards climate change can be seen as a violation of the principle of intergenerational equity and the RTAF. The chapter also looked at how various unsustainable practices have affected land and water resources, as well as biodiversity and fisheries. When answering the question whether we are protecting the right to food of future generations, the answer has to be overwhelmingly no. It was demonstrated that, if predictions are true, we will hand over a water-scarce planet, with low biodiversity and fish stocks, little access to fertile land and hazardous weather conditions. In addition, our actions have caused significant damage to the natural resource base, which will make meeting future food needs near impossible. It was established that this is a violation of our duties towards future generations to use the planetary resources in a sustainable manner.

It is clear that we as a generation are inflicting irreparable harm to the environment. Unfortunately, it is the generation that will succeed as that will have to bear the consequences⁴⁶³. Chapter 4 explored various ways on how we can rectify the damage. This chapter commenced with a discussion on optimising food energy efficiency as a method for conserving natural resources, thereby fulfilling the obligations that rests upon this generation. The chapter looked at the various ways in which the amount of energy expended along the food chain can be decreased. It also discussed how to reduce the amount of wasted food, and accordingly, lower the amount of resources going into producing food which will ultimately be lost along the food chain. The chapter

⁴⁶³ Weston, 2007-2008, p. 375.

also looked at scientific and technological advancements and how this can be employed to increase yields, whilst preserving natural resources. However, it was established that for new innovations to be successful in fulfilling our duties towards future generations, it has to benefit everyone equally, whilst protecting the environment. Chapter 4 concluded with a discussion on SSA and the benefits it has to offer when compared to industrial agriculture. It was established that small-scale and family-based agriculture can play a key role in mitigating our contribution towards climate change, as well as in the conservation of natural resources. It was determined that in order to meet our obligations towards those succeeding us SSA should be protected and supported. The promotion of food sovereignty by civil society organisations can play a vital role in this regard.

It is evident that we are failing in our duties under the principle of intergenerational equity and the RTAF. Moreover, we have damaged the natural resource base to such an extent that we have placed future food security in serious jeopardy. In order to achieve the goals of sustainability an ecologically sound and resilient food system must be in place⁴⁶⁴. In order to achieve this it is essential that we move towards legal obligations based on the duties proposed under the principle of intergenerational equity and the RTAF. As was demonstrated in Chapter 4, legal obligations can be developed which advances the goals of sustainability, conservation and preservation. It is only through these legalised obligations that we will be able to protect the resource base which will one day underpin the food production of future generations. In addition, for these obligations to be truly effective they must be extended to each member of society, with the state as the primary duty-holder. The state has the obligation to create the environment under which these obligations can be carried out.

It should be added that it's our ancestors that we have to thank for the opportunities and resources we have today. It is from their knowledge and skills that we have learned how to provide for ourselves. Generations of agricultural practices and scientific and technological developments have brought us where we are today. It is up to us to carry on this tradition and ensure a prosperous planet for those to come.

⁴⁶⁴ Lawrence, Lyons & Wallington, 2011, p. 14.

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