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Thesis for the MASTER IN EUROPEAN AFFAIRS

Title: *A Comparative analysis of the “Livre Vert de la Défense”
and the relation between climate change and systemic crisis.*

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3 June 2014

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I: Introduction

This thesis will provide an original comparative analysis of the “Livre Vert de la Défense”, a French policy paper on environmental security published in February 2014. The book represents a response by the French section of the “Europe Ecologie les Verts” (EELV) political movement to the near complete neglect of environmental security issues in the “Livre Blanc de la Défense et la Sécurité Nationale”, made public by French President Hollande in April 2013. The aim of the French environmental party is to enhance the standing of environmental security in French and European strategic and military thinking by integrating the concept of a “green defence”. However, the “Livre Vert” attempts as much as possible to take a global approach to the threats and strategies it identifies, so the book has international applicability, especially since climate change represents a global risk. The objective of this thesis is to compare and contrast the “Livre Vert” to other policy papers and analyses from governments, think tanks or academia, in order to highlight both its strengths and weaknesses. This will involve answering three main research questions:

- 1) How comprehensive are the security threats and the corresponding strategies identified by the “Livre Vert de la Défense”?
- 2) Does the concept of a “green defence” fit into any conventional political categorization, or does it represent a new way of looking at international security?
- 3) Does the “Livre Vert” offer a framework that is exhaustive enough to successfully address the potential for systemic crisis stemming from future environmental challenges?

The project for a “Livre Vert de la Défense” was directed by EELV Senator Leila Aïchi, who is Secretary of the Defence Commission at the French Senate. The political context of the “Livre Vert” reveals both its strengths and weaknesses as a policy paper. Because it is responding to the absence of ecological issues in the “Livre Blanc”, it offers a comprehensive assessment of all the main environmental security threats. Moreover, in order to enhance the standing of environmental

issues in French and European strategic thinking, the “Livre Vert” underlines how various environmental risks interact and mutually reinforce one another, and presents them as primary threats and triggers. Likewise, because the EELV movement is both locally established and transnational across the EU, the strategies outlined in the “Livre Vert” are comprehensive because they are multi-level. Policies are proposed at the local, national, European and international levels, and often go much further than other policy papers on the topic. However, because Senator Aïchi’s political commitments concentrate on defence and military issues due to her leadership role in the Senate Defence Commission, the focus of the “Livre Vert” tends to be rather narrow. The environmental threats are analysed from a “hard security” perspective that prioritizes their potential to trigger conflict, and there is a neglect of “soft security”, or the equally significant economic and social impact of environmental degradation. Likewise, the strategies that are proposed focus on a “high politics” approach that prioritizes adaptation to environmental threats by creating new military and governance structures, while neglecting “low politics” strategies of mitigation involving sustainable development policies.

The distinction between “hard” and “soft” security has its origin in the broadening of the notion of “security” at the end of the Cold War. This was linked to the fact that traditional theories of international relations had proved wholly inadequate to anticipate and explain the collapse of the USSR; the realist approach, in particular, had explicitly claimed this to be part of its intellectual ambit. The subsequent discrediting of traditional approaches to international relations opened the possibility for scholars such as Barry Buzan, Ole Waever and Jaap de Wilde (founders of the “Copenhagen School”) to expand the concept of security beyond the military and state-centric realist approach to include individual, social and environmental security.¹ Their work helped to establish a now classic distinction between “hard security”, seen to represent the traditional realist focus on macro level military threats to national and international security, and “soft security”, understood as referring to economic, social and environmental threats at both the macro and micro level. The

¹ Buzan B., Waever O. and de Wilde J. (1997), *Security: A New Framework for Analysis*, Lynne Rienner Publishers Press.

originality of the “Livre Vert” is to analyse environmental issues from a “hard security” perspective, focusing on their potential to trigger civil and inter-state conflict at the macro level.

A further classical distinction has been made between “high” and “low” politics, as conceived by Hans Morgenthau, one of the leading international relations theorists of the 20th century and an outstanding figure of the realist school:

*The interaction of sovereign entities (high politics) commands the leader’s agenda while state-market relationships (low politics) are merely means to high political ends.*²

“High politics” is usually seen to represent the domain of war and peace, which covers matters that are vital to the very survival of the state. By contrast, “low politics” refers to all other matters that are not absolutely vital to the survival of the state, including economic and social issues. This classical distinction has come under strong criticism since the end of the Cold War. The possibility of war between the world’s main powers appears to have receded, and “low politics” economic and social matters linked to globalization are now seen to have a direct impact on the “high politics” of national and international security.³ This thesis will attempt to demonstrate that environmental security offers another example of why the classical distinction is inappropriate. Climate change has the potential to become a systemic crisis precisely due to the interaction and interdependence between “high politics” matters of war and peace together with “low politics” economic and social issues. Hence, a holistic approach is required both for analysing environmental threats and risks, as well as the corresponding policies and strategies to address them.

While they share many similarities, “soft security” is not the same thing as “low politics”, and “hard security” must be distinguished from “high politics”. The concept of “hard” and “soft” security relates to an analysis of threats and risks at the individual, local and global level. By contrast, the notions of “high” and “low” politics are much broader and constitute an overarching domain of politics, which includes both an analysis of threats and risks together with the corresponding policies

² Morgenthau H. J. (1958), *Politics among Nations: The Struggle for Power and Peace*, New York: Knopf Press.

³ Ripsman N. M. (2006), *False Dichotomies: Why Economics is High Politics*, Political Science Department, Concordia University.

and strategies to address them. Therefore, while they must be distinguished, both concepts are in fact complementary and mutually reinforcing, as they represent two sides of the same coin. “High politics” is the domain of war and peace, which comprises an analysis of “hard security” risks together with the corresponding strategies to address them. “Low politics” encompasses everything traditionally not considered as absolutely vital to the survival of the state, which includes an analysis of “soft security” threats and the corresponding strategies to address them.

This thesis will aim to test the validity of the three following groups of hypotheses by adopting a holistic approach to environmental security:

1) A) The security threats and risks identified in the “Livre Vert” present a paradox. On the one hand, the analysis is comprehensive as it examines in detail all the main environmental security issues and presents them as primary threats, underlining how they interact and mutually reinforce one another. On the other hand, the focus of the “Livre Vert” is one-sided, as it overly concentrates on matters of “hard security” involving civil or inter-state conflict, while neglecting “soft security” or the equally significant economic and social impact.

B) The strategic framework outlined by the “Livre Vert” also presents a paradox. On the one hand, it is comprehensive as it proposes policies at the national, European and international level, both over the short run and over the long run. The strategies it recommends are much more ambitious and far-reaching than most other policy papers. On the other hand, the strategic focus is again too narrow as it overly relies on “high politics” strategies for adapting to climate change by creating new military and governance structures, while neglecting “low politics” strategies of sustainable development for mitigating the impact of environmental degradation.

2) A) As a result, the security threats and risks identified by the “Livre Vert” do not fit into any conventional political categorization. They represent an unusual political undertaking that may be labelled as a form of “green hard security”.

B) Likewise, the strategic framework outlined by the “Livre Vert” does not fit into any conventional political categorization. The strategies it proposes can be seen to represent a form of “green high politics”, an attempt to reconcile and bring together the usually separate fields of defence and environmentalism.

3) A) Nevertheless, an analysis that overly focuses on “green hard security” is incomplete. It must be combined with an assessment of the economic and social impact of environmental degradation and the ways in which “hard” and “soft security” interact. Otherwise, the analysis fails to address the danger that climate change may become a systemic crisis.

B) Likewise, a strategic framework that focuses too narrowly on “green high politics” is insufficient to address the systemic risk posed by climate change. In order to effectively tackle such a threat, a holistic approach is required, and “high politics” strategies of adaptation must be combined with “low politics” strategies for mitigating the impact of environmental degradation.

Many policy papers tend to analyse threats and risks first, and then to propose policies and strategies for addressing them, an approach that is also taken up by the “Livre Vert”. As a result, this thesis will analyse the concept of a “green defence” by distinguishing threats from strategies. In order to answer the research questions and test the validity of the three groups of hypotheses, the thesis will be divided into three chapters:

- 1) The first chapter will provide a literature review that analyses how the “Livre Vert” fits into the relevant topics of French foreign policy, EU external relations and environmental security.
- 2) The second chapter will provide a comparative analysis of the environmental threats and risks identified by the “Livre Vert” in relation to other policy papers.
- 3) The third chapter will provide a comparative analysis of the strategies and policies proposed by the “Livre Vert” in relation to other policy papers.

Chapter I: Theoretical literature review

The “Livre Vert” represents an original political undertaking, hence no scholarly literature is yet available to fully analyse the topic. However, the concept of “green defence” is situated at the crossroads between three major subjects with an impressive array of academic writing on each: French foreign and defence policy, European external relations, and environmental politics/security. The aim of this literature review is to critically assess how the concept of a “green defence” can fit into the various intellectual traditions of these three fields of scholarship. This will help to determine how comprehensive the analysis provided by the “Livre Vert” is when compared to the relevant theoretical literature. This first chapter will attempt to answer the three research questions and provide a preliminary analysis of the main arguments that will be developed in more detail in the next two chapters.

1) How to integrate the concept of a “green defence” with the literature on French and European external relations

a) Literature on the evolution of French foreign policy

There are several important elements in the strategic framework of the “Livre Vert” which fit into the Gaullist tradition of French foreign policy. Scholars such as Jean Touchard have underlined the importance of independence in the Gaullist paradigm. A famous example was the General’s unilateral withdrawal from NATO’s central command structure in 1966, on the grounds that it was dominated by the United States.⁴ Likewise, de Gaulle strongly believed in the idea of “l’Europe puissance”, capable of asserting a strong voice on the world stage that was independent from the overbearing hegemony of the United States. Yet paradoxically, the Gaullist tradition of independence fits into the strategic framework of the “Livre Vert”. The latter supports the idea of “l’Europe

⁴ France remained part of the Western Alliance but independent from NATO’s command structure, a peculiar position that attracted widespread criticism at the time from other NATO members.

puissance”, and outlines strategies to reinforce EU external relations for enabling Europe to become a strong power on the world stage.⁵ Moreover, the “Livre Vert” argues that a strengthened European foreign and defence policy is not compatible with the integrated command structure of NATO, which is seen to be dominated by the United States. Like de Gaulle, the “Livre Vert” advocates the creation of a European framework for external relations outside of NATO and independent from the United States:

*Les Etats membres ont affirmé constamment, depuis le traité de Maastricht (...) la vocation de l'Union à être dotée d'une politique de défense (...) Cet objectif est incompatible avec la réalité hiérarchique de l'OTAN (...) L'inéluctable autonomisation vis-à-vis des Etats-Unis (...) (implique à terme que) l'Europe doit avoir l'ambition d'être un acteur stratégique autonome (...) Cette émancipation exprimera la volonté des peuples européens à assurer leur propre défense (...) Il ne peut revenir au peuple Américain (...) de présider aux choix européens en matière de défense.*⁶

Second, historians are also in agreement that the Gaullist tradition of French foreign policy was characterised by the General's desire for France to reclaim its “grandeur” or “rank” on the international stage. Lacouture explains how de Gaulle was under no illusions that after the end of WWII, France and other European countries no longer dominated world affairs as in the past.⁷

Nevertheless, he believed that:

*C'est parce que nous ne sommes plus une grande puissance qu'il nous faut une grande politique, parce que, si nous n'avons pas une grande politique, comme nous ne sommes plus une grande puissance, nous ne serons plus rien.*⁸

Alain Peyrefitte explains that the General was keen to develop France's nuclear capacity, which he believed would help to restore its standing on the world stage.⁹ Likewise, Lacouture highlights the international dimension of de Gaulle's foreign policy, his “grande politique mondiale”. For example, France became the first Western country to establish diplomatic recognition of the People's Republic of China in January 1964, to the consternation of the United States at the time. Once more, there are several elements in the strategic framework of the “Livre Vert” that fit into the Gaullist “grande

⁵ A fundamental difference however is that while the “Livre Vert” supports the creation of a federal European army, President de Gaulle remained vociferously opposed to any supranational integration.

⁶ Aïchi L. (2014), *Livre Vert de la Défense*, Europe Ecologie les Verts, Reprographie du Sénat, p.73-74.

⁷ Lacouture J. (2010), *De Gaulle: Tome 3, Le souverain 1959-1970*, Seuil Press

⁸ *Ibid*, p.286, *Entretien avec Philippe de Saint Robert en avril 1969* (extraits des Septennats interrompus, Laffont-1975).

⁹ Peyrefitte A. (2002), *C'était de Gaulle*, Gallimard Press.

politique mondiale”. If France and Europe develop a strong capacity for environmental security, they would be on the frontlines of future international efforts to address environmental degradation linked to climate change. This would represent an undoubted source of “grandeur” or prestige that the General would have supported, placing France and Europe at the heart of one of the main global challenges of the 21st century. However, an important point of disagreement relates to the Gaullist emphasis on the importance of the nuclear deterrent. The “Livre Vert” is strongly opposed to nuclear weapons, and outlines a comprehensive strategy for gradually reducing France’s nuclear arsenal, seen as a threat to world peace.

French foreign policy has undergone important transformations over the last couple of decades, and several of these new developments fit into the strategic framework outlined in the “Livre Vert”. Frédéric Bozo views the second term of Mitterrand’s presidency as an important bridge or point of transition, where several core aspects of the Gaullist paradigm had to be revised due to pressures from a rapidly changing international context with the ending of the Cold War.¹⁰ For example, the Maastricht Treaty signed in 1992 led to the adoption of the euro and a supranational European monetary policy, which would have been considered an unacceptable loss of national sovereignty by de Gaulle. This transition away from the Gaullist paradigm was confirmed by Mitterrand’s successors. For instance, President Sarkozy was instrumental in the ratification and implementation of the Lisbon Treaty in December 2009, which many commentators believe has kept the bulk of the provisions contained in the defunct constitutional treaty.¹¹ Moreover, together with German Chancellor Merkel, he pushed for deeper integration in fiscal and economic matters in response to the Eurozone debt crisis, including a timetable for a banking union. Such developments are fully consistent with the strategic paradigm outlined in the “Livre Vert”. The latter strongly supports these initiatives towards more supranational EU integration, and EELV is one of the few political parties that is openly in favour of a federal European Union. The project of an EU “green

¹⁰ Bozo F. (2012), *La politique étrangère de la France depuis 1945* (Champs Histoire), Flammarion Press, p.192.

¹¹ *Ibid*, Epilogue: la rupture?

defence” is presented as an opportunity to infuse a new dynamic for deeper European integration and provide a springboard for a “federal leap forward”.

However, there are several important elements in the recent evolution of French foreign policy that are not compatible with the strategic framework of the “Livre Vert”. For example, President Sarkozy sought to mark his mandate by a rapprochement with the United States, which was achieved through France’s full re-integration into NATO’s command structure in March 2009, more than forty years after the general’s withdrawal. As underlined above, the “Livre Vert” shares the Gaullist emphasis on maintaining independence vis-à-vis the United States by creating a strong European defence structure outside of NATO. Moreover, Presidents Mitterrand, Chirac and Sarkozy have insisted that initiatives for EU integration in foreign and defence policy since the Maastricht Treaty remain strictly intergovernmental and rely on unanimity. The “Livre Vert” is opposed to intergovernmental cooperation for EU external relations, and argues that the CFSP and CSDP remain weak precisely because they continue to rely on unanimity. The “Livre Vert” believes that only a federal European army and a federal structure for external relations can allow Europe to successfully meet the new challenges of the 21st century such as climate change. This is representative of the fact that the strategies proposed by the “Livre Vert” are bolder and more far-reaching than those from other more conventional analyses, an argument that will be developed in the third chapter.

b) The theoretical literature on the EU’s position in the international system

As we have seen, the “Livre Vert” seeks to place the concept of a “green defence” within the institutional framework of EU external relations. It argues that only Europe as a whole has sufficient weight and resources both to protect itself and play a major role on the international scene to tackle global environmental threats. The second section of this literature review will outline how the strategic framework of the “Livre Vert” fits into the main theories and approaches that have been developed to explain the EU’s unusual position in the international system.

An influential way to interpret the EU's place in the international system has been to describe it as a "civilian power", a viewpoint that is entirely consistent with the strategies proposed by the "Livre Vert". The concept was coined by François Duchêne, a French scholar who defined a civilian power as: "long on economic power and relatively short on armed force".¹² Lacking a federal army but representing the largest internal market in the world, the EU fits neatly into Duchêne's definition. The French scholar also underlined that a civilian power is one that relies on non-military means, including diplomacy and preventive action, to achieve civilian ends on the international scene such as the peaceful resolution of conflicts.¹³ This fits very well into the "Livre Vert's" strong emphasis on preventive action as one of the central elements of the strategic framework for a "green defence". It recommends the reinforcement of existing institutions such as the European Parliament, as well as the creation of new structures entirely devoted to preventive diplomacy on environmental issues. Therefore, "green defence" would help to reinforce the notion of the EU as a "civilian power", focused on preventive action that addresses the root causes of environmental degradation.

The notion of an EU "civilian power" was later extended with the development of the European Security and Defence Policy (ESDP). While the EU has shown itself capable of using hard military power in several high profile operations, the bulk of its missions abroad remain civilian in character, focusing on peacekeeping and post-conflict reconstruction. The EU has succeeded in establishing itself as a major civilian power on the international scene, having by 2010 embarked on a total of 27 missions in 16 countries on 3 different continents.¹⁴ The "Livre Vert" is keen on making full use of the EU's current framework for civilian missions and adapting it to meet the requirements of a "green defence". It underlines that reliance on the civilian element of the military is the most appropriate way to respond effectively to environmental crises in the future. This would take a variety of forms, including humanitarian rescue missions by the military following natural disasters

¹² Duchêne F. (1972), "Europe's Role and Place in World Peace", in R. Mayne (ed.), *Europe Tomorrow: Sixteen Europeans Look Ahead*, Fontana Press.

¹³ *Ibid.*

¹⁴ Hill C. and Smith M. (2011), *International Relations and the European Union* (2nd edition), Oxford University Press, Chapter 9: The EU's Security and Defence Policy: Towards a Strategic Approach.

linked to climate change. Once more, it is clear that an EU “green defence” would help to reinforce the EU’s profile as an international civilian power.

Second, the EU’s position in the international system may be viewed as that of an “exemplary power”, exerting influence through the power of attraction of its model. Scholars such as Hassner, Keohane and Nye, have underlined the success of European integration in pacifying a continent previously torn by ceaseless warfare, establishing what they call a “pluralistic security community”.¹⁵ Therefore, the EU’s influence on the world stage is linked to the model it offers of how to overcome bitter and ancient historical tensions by building a lasting peaceful alliance. Ian Manners further develops this approach in his theory of “normative power Europe”, where the EU is able to shape international norms or “what passes for normal in international relations”.¹⁶ Manners argues that the EU’s normative international influence goes beyond simply offering a model for peaceful reconciliation, and also includes its ability to promote democracy, human rights, the rule of law, social progress, and sustainable development, to other countries across the world.¹⁷

The notion of “normative power Europe” can only partly be reconciled with the concept of a “green defence”. On the one hand, the “Livre Vert” goes further than most other policy papers in its proposals to reinforce the EU’s capacity to address environmental security threats, both at home and abroad. By following the policy proposals of the “Livre Vert”, the EU could potentially developed the world’s most advanced “green defence” institutional framework. As the challenges stemming from climate change become more acute, countries around the world would start to emulate the EU, whose “green defence” would become a model on how to manage environmental degradation. On the other hand, Manners underlines that a key element in the EU’s normative power is the force of attraction of its model for environmental legislation based on sustainable development. The EU is widely considered to be “leading by example”, as it has enacted the most far reaching environmental

¹⁵ Hassner P. (1968), *Change and Security in Europe II: In Search of a System*, Adelphi Paper 49 (London: International Institute for Strategic Studies) - Keohane R., Nye J. and Hoffmann S. (1993), *After the Cold War: International Institutions and State Strategies in Europe*, Harvard University Press.

¹⁶ Manners I. (2002), “Normative Power Europe: A Contradiction in Terms?”, *Journal of Common Market Studies* 40/2: 235-58, p.32.

¹⁷ *Ibid*, p. 32-33.

legislation in the world. Because the “Livre Vert” primarily focuses on strategies for adapting to climate change by creating new military and governance structures, it tends to neglect mitigation strategies for achieving sustainable development. As will be analysed in more detail in the third chapter, the “Livre Vert” does not provide a comprehensive strategy to develop renewable energies and cut greenhouse gas emissions, which is why its strategic framework is incomplete. As a result, the “Livre Vert” does not strictly fit into Manner’s definition of the EU as a “normative power” due to the narrow focus of its policy recommendations.

The last two theoretical paradigms, which present the EU’s role in the international system as a “normative” and “civilian” power, rely on Joseph Nye’s concept of “soft power”. This famous contribution to the liberal school of international relations theory makes a distinction between “hard power”, involving coercive and mostly military action, and “soft power”, or the ability to persuade through non-coercive means. Soft power is the ability to make others want what you want.¹⁸ The “Livre Vert” relies to a great extent on Nye’s notion of “soft power”. It underlines how recent international military interventions in Iraq, Afghanistan or Libya were more problematic than originally anticipated, which has highlighted the limitations of coercive hard military power. The strategic paradigm of a “green defence” recommends prioritizing preventive action and civilian military operations to manage environmental security threats, with hard military power as a solution of last resort only if all other options have failed.

Finally, it is possible to interpret European attempts to integrate in the fields of foreign and defence policy, normally the ultimate remit of national sovereignty, as marking the first steps towards the creation of a “federal super state” with a major role to play on the world stage.¹⁹ Scholars such as Galtung and Buchan have argued that the EU can be seen as a “superpower in the making”: if it is able to integrate foreign and defence policy under a supranational framework, as it has already done for trade and monetary policy, the world would witness the most powerful super

¹⁸ Nye J. (2004), *Soft Power: The Means to Success in World Politics*, Public Affairs Press.

¹⁹ Galtung J. (1973), *The European Community: A Superpower in the Making?*, Allen and Unwin Press - Buchan D. (1993), *Europe: The Strange Superpower*, Dartmouth Press.

state in history.²⁰ This viewpoint corresponds precisely with the argument made in the “Livre Vert”, which underlines the great potential for the EU to become a world superpower. Not only is the EU’s internal market the largest in the world, but it is also the biggest commercial power, and its aggregate GDP is higher than that of the United States.²¹ Likewise, Europe’s combined military capacities are also impressive on paper, as the EU and its Member States together account for close to a quarter of global military spending.²² Several EU countries also have a global network due to the maintenance of strong links with their formal colonial empires, most notably the United Kingdom and France, both of which are nuclear powers with permanent seats on the UN Security Council. For all these reasons, the “Livre Vert” presents the concept of a “green defence” as an opportunity to reinforce European integration along federal lines, particularly for external relations, enabling Europe to realise its full potential as a world superpower. The “Livre Vert” underlines that only a federal European Union will be strong enough to confront future environmental challenges linked to climate change, a bold strategy which goes much further than most conventional analyses on the topic:

*La sécurité de chacun des membres de l’UE ne saurait être assurée individuellement face aux risques climatiques et environnementaux. Seule l’Europe a la taille critique pour anticiper et répondre efficacement aux crises qu’engendreront la modification du climat.*²³

*Prolongement naturel d’une Europe fédérale (...) les écologistes (...) affirment leur objectif d’un transfert au niveau européen de la compétence régaliennne de la défense.*²⁴

*Le concept de la « green defence » impulserait un mouvement fédérateur pour l’Europe de la défense (...) une armée Européenne pourrait alors se construire.*²⁵

*L’Union Européenne a vocation à être un acteur stratégique global.*²⁶

²⁰ *Ibid.*

²¹ European Union, *How the EU works - The Economy*. See: http://europa.eu/about-eu/facts-figures/economy/index_en.htm

²² Hill C. (2011), p.40.

²³ Livre Vert, p.78,

²⁴ *Ibid*, p.73

²⁵ *Ibid*, p.85.

²⁶ *Ibid*, p.40.

2) How to integrate the concept of a “green defence” with the literature on environmentalism and environmental security

The second section of the literature review will analyse how the concept of a “green defence” fits into academic scholarship in the fields of environmental security and environmental politics more generally. The first part will provide an overview of how the concept of environmental security has developed over time. The second part will define several key notions distinct from, but related to environmental security. The third part will outline the main theories and intellectual approaches to environmental security.

a) **Overview of how the concept of environmental security has developed over time**

The seminal work that marked the birth of contemporary academic literature on environmentalism was Rachel Carson’s “Silent Spring”, which highlighted the dangers associated with excessive use of pesticides and herbicides on plants and wildlife.²⁷ Her work helped propel the neo-Malthusian school, with scholars such as Lynn White Jr. or Garrett Hardin underlining the unsustainability of the Western capitalist growth model and its negative impact on the environment.²⁸ Scholars from the “Club of Rome”, a global think tank, were instrumental in raising public awareness about the limitations of exponential economic development due to the planet’s finite resources.²⁹ Moreover, environmental issues gradually began to be connected to national security. The former President of the Worldwatch Institute, Lester Brown, was amongst the first to establish a direct link between environmental degradation and US national security. Likewise, Richard Ullman argued for the need to redefine national security in the light of new environmental dangers such as increasing resource scarcity and uncontrolled population growth.³⁰

²⁷ Carson R. (1962), *Silent Spring*, Penguin Classics Press, New Edition 2000.

²⁸ White L. Jr. (1967), “The Historical Roots of Our Ecological Crisis”, reprinted in *Ecology and Religion in History* (1974), Harper and Row Press - Hardin G. (1968), “The Tragedy of the Commons”, *Science: New Series*, Vol. 162, No. 3859, pp. 1243-1248.

²⁹ Meadows D. H. *et al.* (1972), *The Limits to Growth*, Signet Press.

³⁰ Brown L. (1977), “Redefining National Security”, *Worldwatch Institute*, Paper 14, Washington DC - Ullman R. H. (1983), “Redefining Security”, *International Security* 8, p.133.

Nevertheless, it was not until the 1990's that the academic field of environmental security took-off. This was due first to the fact that traditional theories of international relations had proved inadequate to anticipate and explain the ending of the Cold War; the realist approach, in particular, had explicitly claimed this to be part of its intellectual ambit. The subsequent discrediting of traditional approaches to international relations opened the possibility for scholars such as Barry Buzan to expand the concept of security beyond the narrow state-centric approach to include individual, social and environmental security.³¹ Policy makers were able to widen their understanding of national security beyond the doctrine of nuclear deterrence and give a greater role to the United Nations.³² This was the context that led to the 1992 UN Rio Earth Summit, which established the foundation for the contemporary environmental movement. The Summit underlined the direct link between environmental degradation and international security, and encouraged the mainstreaming of environmental security issues into national defence and security strategies. For example, it prompted the Clinton administration to incorporate for the first time the concept of environmental security into US foreign and defence strategic planning.³³

The rise of the concept of environmental security has been supported by a growing scientific consensus about the impact of human development on the Earth's climate. While the issue was contested and debated by scientists for a long time, there is now widespread agreement that the probability of human responsibility for global warming is anywhere between 90 to 100%.³⁴ This is linked to new technologies that have made it possible not only to enhance our understanding of current climate changes, but also to compare them to past climate changes millions of years ago. The

³¹ Buzan B. (1991), *People, States and Fear: An Agenda for International Security Studies in the Post-Cold War Era* (2nd edition), Harvester Press.

³² Floyd R. and Matthew R. A. (Editors - 2013), *Environmental Security: Approaches and Issues*, Routledge Press, Chapter 1.

³³ *National Security Strategy of the United States of America*, The White House (1996).

³⁴ Maslin M. (2009), *Global Warming*, Oxford University Press.

2007 report by the Intergovernmental Panel on Climate Change has summarized the scientific consensus on climate change and reached the following conclusions:³⁵

- i) There is unequivocal certainty that the global climate system is warming due to noticeable increases in average ocean and air temperatures, as well as the acceleration of the melting of ice sheets and the rise of average sea levels. There is a very high probability that this is being caused by human activity.
- iii) While there will be both benefits and costs depending on local circumstances, the overall net effects of climate change are likely to be strongly negative and to worsen over time.
- iv) Eco-systems around the world are likely to be significantly damaged and many will disappear due to a combination of factors linked to climate change, such as ocean acidification, droughts, wildfires, and flooding.

b) Definition of key notions related to environmental security

The 1992 Rio Earth Summit was also instrumental in popularising the concept of “sustainable development”, which has become one of the key ideas of environmental politics. The exact meaning of sustainable development is contested, but the most prevalent definition was articulated in the 1987 report by the United Nations World Commission on Environment and Development entitled “Our Common Future”:

*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: 1) the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and 2) the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.*³⁶

The “Livre Vert” has an ambiguous relation with the concept of “sustainable development”. On the one hand, the environmental threats and risks it identifies support the idea that the Earth is a planet with finite resources. Many of the worrying trends outlined by the “Livre Vert”, such as increasing food, water, and primary resource scarcity, as well as rising sea levels and more extreme weather events linked climate change, indicate that current global development trends are not sustainable over the long run. On the other hand, the “Livre Vert’s” focus on “high politics”

³⁵ Intergovernmental Panel on Climate Change (2007), *Fourth Assessment Report, Synthesis Report - Summary for Policymakers*.

³⁶ United Nations World Commission on Environment and Development (1987): *Our Common Future*.

strategies for adapting to climate change leads to a neglect of “low politics” strategies aimed at achieving sustainable development to mitigate the impact of environmental degradation. The “Livre Vert” does not outline policies to develop and apply renewable energies for civilian use, cut greenhouse gas emissions and enhance water and food production in a sustainable way. Therefore, the concept of a “green defence” presents us with a paradox. The security analysis of threats and risks underlines that it is increasingly open to debate whether or not future generations will be able to meet their most basic needs. However, by neglecting “low politics” strategies involving sustainable development, it shies away from the underlying assumption that there is a moral duty of humanity towards future generations that are not yet born, and that present generations must address their needs in such a way that the needs of future generations are not compromised. Because the “Livre Vert” neglects this key aspect of the concept of “sustainable development” as part of the strategic framework for a “green defence”, it remains incomplete.

The concept of “carrying capacity” is closely linked to the concept of “sustainable development”. It is derived from biology and refers to the maximum population size that a natural ecosystem can sustain over the long run for a given animal or plant species. Resources such as water or food tend to naturally regenerate if they are consumed in moderation. However, if a species grows too much and consumes resources faster than they can regenerate, then it has surpassed the natural “carrying capacity” of its ecosystem and will start to decline. Populations of animal and plant species therefore tend to reach a natural equilibrium that is self-regulating.³⁷ The application of the concept of “carrying capacity” to humanity has been highly contentious. Critics such as N.F. Sayre argue that even if the concept has been shown to apply to species in small-scale natural ecosystems, it has never been demonstrated scientifically to apply to humanity on a global scale.³⁸

³⁷ United Nations Environment Programme, Global Environmental Alert Service (2012), *One Planet, How Many People? A Review of Earth's Carrying Capacity*. See: http://na.unep.net/geas/archive/pdfs/GEAS_Jun_12_Carrying_Capacity.pdf

³⁸ Sayre N. F. (2007), *Carrying Capacity: Genesis, History and Conceptual Flaws*, Prepared for the Environmental Politics Colloquium, Berkeley University. See: <http://globetrotter.berkeley.edu/bwep/colloquium/papers/Sayre2007.pdf>

By contrast, the “Livre Vert” fully supports the application of the concept of “carrying capacity to current global development trends. It argues that over the course of the 20th century, but particularly during the last few decades, the human species has been growing too fast both economically and demographically, stretching the planet’s finite resources to its limits. For example, the world population has more than tripled over the course of the 20th century, going from 1.7 billion in 1900 to 6 billion in 2000, reaching more than 7 billion people by 2014.³⁹ Most of this demographic boom is occurring in developing countries, particularly in Africa, the Middle East and South East Asia.⁴⁰ Likewise, global economic development has increased exponentially, with the Real World Gross Product going from 1102 billion dollars in 1900 to over 41016 in the year 2000.⁴¹ Over the last two decades, global economic growth has been driven by the so-called “BRIC” countries (Brazil, Russia, India and China), which are widely predicted to economically surpass many Western countries during the course of the 21st century.⁴² The “Livre Vert” argues that such trends are likely to result in a sharp increase of global tensions over access to dwindling resources, including primary resources, such as petrol, and vital resources, such as water. This represents a central aspect of the analysis in the “Livre Vert”, focused on “hard security” or the potential for environmental degradation to trigger civil and inter-state conflict.

Another key concept that features prominently in the “Livre Vert” is the notion of the “Anthropocene”. It posits that humanity is responsible for changing the climate to such an extent that the world is entering a new geological era. The concept was coined by ecologist Eugene F. Stoermer and was popularised by Paul Crutzen. Both argue that greenhouse gas emissions stemming from humanity’s industrial development over the last few centuries are leading to a transition from the current “Holocene” age to a new geological era marked by warmer temperatures and a changed

³⁹ Worldometers (2014), *World Population Clock*. See: <http://www.worldometers.info/world-population/>

⁴⁰ *Ibid.* The combined populations of India and China reaching nearly 2.6 billion people in 2014, more than a third of the entire world population

⁴¹ US Central Intelligence Agency (2013), *The World Factbook* - Delong B. J. (1998), *Estimating World GDP- One Million B. C. to the Present*, University of California Berkeley.

⁴² Price Waterhouse Coopers Economics (2013), *The World in 2050: The BRIC’s and beyond*. See: https://www.pwc.com/en_GX/gx/world-2050/assets/pwc-world-in-2050-report-january-2013.pdf

climate.⁴³ The “Livre Vert” fully supports the idea that human induced activity is leading to a new and more dangerous “Anthropocene” era. It relies on the 2013 report by the Intergovernmental Panel on Climate Change, which underlines that greenhouse gas emissions linked to human development have already increased global mean surface temperatures by 0.85°C between 1880 to 2012. The report predicts that this increase is likely to accelerate between 1.1 to 6.4 °C by 2100, with the most accurate estimates ranging between 1.8 and 4 °C.⁴⁴ The “Livre Vert” argues that such a sharp increase in global mean temperatures is likely to have a dramatic impact on human society, resulting in a wide range of environmental threats, such as acute resource scarcity, sea level rise, and an increase in extreme weather events. This is one of the main reasons why the strategic framework of the “Livre Vert” is focused on adaptation, as it argues it is imperative to create new military and governance structures to help absorb the shock stemming from the transition to the new “Anthropocene” era:

L’homme est devenu par l’avancée de sa technique, non plus seulement un être biologique, mais collectivement une « force géologique » capable d’infléchir l’évolution de sa planète (...) Cette idée est formulée sous le nom « d’Anthropocène », défini comme l’ère géologique nouvelle (...) Ainsi, le renforcement des structures de la défense, comme acteur principal notre sécurité (...) s’impose à tous comme une impérieuse nécessité (...) pour s’adapter aux défis majeurs du dérèglement climatique.⁴⁵

The concept of “global commons” is critical because it brings together all of the notions analysed above, including environmental security, sustainable development, carrying capacity and the Anthropocene. The exact meaning of “global commons” is debated, but one of the most widespread definitions is provided by the United Nations Environment Programme’s 2012 report on this subject:

⁴³ Although the concept has not yet become part of official geological classification, it is accepted by many prominent scientists as well as by some governments and international organizations. Stoermer E. F. and Crutzen P. (2000), “The Anthropocene”, *The International Geosphere–Biosphere Programme*, Newsletter 41, p.17.

⁴⁴ Intergovernmental Panel on Climate Change (2007), *Fourth Assessment Report: Synthesis Report*. See: https://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf

⁴⁵ Livre Vert, p.17.

*The 'Global Commons' refers to resource domains or areas that lie outside of the political reach of any one nation State. Thus, international law identifies four global commons, namely: the High Seas, the Atmosphere, Antarctica, and Outer Space. These areas have historically been guided by the principle of the common heritage of humankind - the open access doctrine or the mare liberum (free seas for everyone) in the case of the High Seas.*⁴⁶

With the development of science and technology during the 20th century, previously inaccessible areas such as the polar regions, the sky and outer space have become open to exploration. Thus, the question arose as to whether or not nations, private companies or individuals should be allowed to establish property rights over the global commons, or whether they should be protected and set aside as the “common heritage of mankind”.⁴⁷ The international legal framework that gradually developed during the 20th century attempted to strictly codify and regulate access to the “global commons”, but with mixed results. By way of explanation, legal scholars such as Malcolm Shaw underline that international environmental protocols suffer from weak monitoring and enforcement mechanisms because the traditional rules of State responsibility are not adequate for dealing with international environmental obligations.⁴⁸

As a result, the “Livre Vert” argues that current institutional mechanisms are insufficient for protecting the global commons, as there is no effective system to enforce compliance with international environmental treaties. A prominent example is that of the Arctic Council, in charge of protecting access to the North Pole, which issued only a symbolic condemnation when Russia unilaterally planted its flag there in August 2007 to substantiate territorial claims over a wide span of the Arctic’s rich natural resources.⁴⁹ The “Livre Vert” underlines that predatorial exploitation of the global commons is likely to worsen in the coming decades because supplies of vital and primary natural resources in areas covered by national jurisdiction are gradually shrinking. This is pushing

⁴⁶ United Nations Environment Programme - Division of Environmental Law and Conventions, *The Global Commons*. See: <http://www.unep.org/delc/GlobalCommons/tabid/54404/Default.aspx>

⁴⁷ The latter concept was coined by the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict, requiring its signatories to protect cultural property in the event of war, as it belongs to mankind’s “common heritage”. Evans M. D. (2010), *International Law* (3rd edition), Oxford University Press, Chapter 27: The Law of Armed Conflict.

⁴⁸ Shaw M. N. (2008), *International Law* (6th edition), Cambridge University Press. Chapter 15: International Environmental Law, p.862.

⁴⁹ Parfitt T. (2007), “Russia plants flag on North Pole seabed”, *The Guardian*. See: <http://www.theguardian.com/world/2007/aug/02/russia.arctic>

states and private corporations to look into new, unexploited parts of the global commons for additional resources to support demographic and economic growth. At the same time, global warming in the Arctic region has started to make the ice melt, liberating vast reserves of natural resources previously inaccessible. The “Livre Vert” argues that such trends represent a “perfect storm”, where international competition over access to the global commons is likely to escalate in the future and result in a global security crisis. This represents a central element in the “Livre Vert’s” focus on the “hard security” dimension of environmental degradation.

A scholarly debate has emerged over whether it is still possible to reach an international agreement on how to manage the global commons. One side of the debate argues that, although it is becoming increasingly difficult, it is still possible to achieve and is in the interest of the international community as a whole that a solution be found. For example, Mahnken and Jasper recommend military deterrence as the best way to contain states that breach the international rules and, as a last resort, the use hard of military power by a coalition of nations to force compliance with international environmental obligations. They argue that the United States, which is still the main global superpower, is best positioned to lead international efforts at managing the global commons in cooperation with allies.⁵⁰ The “Livre Vert” agrees that military force might be necessary as a last resort to force compliance with international environmental regulations and to protect the global commons. However, it is strongly critical of what it perceives as American unilateralism post-Cold War, particularly the handling of the 2003 invasion of Iraq. Thus, it argues that the only legitimate framework for managing global environmental problems remains the United Nations, and that military intervention to protect the global commons can only be legitimate if authorized by the Security Council. Moreover, it argues that a more integrated European defence structure should play a major role in international efforts for protecting the global commons, in cooperation with the United States.

⁵⁰ Mahnken T. G. and Jasper S. (2012), *Conflict and Cooperation in the Global Commons: A Comprehensive Approach for International Security*, Georgetown University Press.

Brousseau *et al.* argue that the best strategy for managing access to the global commons resides in building new and stronger global governance structures, as current mechanisms are inadequate.⁵¹ First, they support the development of new mechanisms for multilateral dialogue and decision-making where each nation is able to negotiate on an equal footing. The “Livre Vert” agrees that new and stronger structures of global governance are required. However, it goes much further than most other analyses by emphasising the need to move beyond intergovernmental cooperation, reinforcing the UN system to establish a genuine form of world governance. Second, Brousseau *et al.* argue that the complexity of managing the global commons means that any effective solution must be multi-level, involving concrete measures taken at the international, regional, national and local level. The “Livre Vert” fully supports this idea, and the strategic framework it proposes is comprehensive in that it outlines a set of policies at all levels (national, European and international) and explains how to combine them. Third, Brousseau *et al.* believe that in order to be legitimate, new global governance structures must involve citizens and civil society more directly in decision-making processes, critical for addressing the current lack of democratic accountability in international decision-making. Due to its focus on macro level issues of “hard security” and “high politics”, the “Livre Vert” tends to neglect the micro level, and does not propose ways to reinforce the involvement of civil society in global decision-making. This represents one of the main weaknesses of the strategic framework for a “green defence” as it is presented.

The other side of the debate adopts a more pessimistic point of view and is sceptical about the possibility for international cooperation over the global commons. For example, William D. Nordhaus⁵² argues that the momentum of climate change and global resource scarcity is speeding up. There is widespread inertia on the part of the international community to take bold action for tackling environmental degradation and protecting the global commons. Any effective global response is likely to prove costly and upset powerful interest groups that are focused on short-term profit; these

⁵¹ Brousseau E., Dedeurwaerdere T., Jouvét P. A., Willinger M. (2012), *Global Environmental Commons: Analytical and Political Challenges in Building Governance Mechanisms*, Oxford University Press.

⁵² Nordhaus W. D. (1994), *Managing the Global Commons*, MIT Press.

groups have the resources to put strong pressure on governments through intensive lobbying.⁵³ The “Livre Vert” is in agreement that global environmental problems are likely to worsen significantly in the coming decades, leading to enhanced international competition over access to the global commons. This is one of the main reasons why it identifies environmental issues as primary threats and triggers of insecurity, instead of seeing them as secondary “threat multipliers”. Moreover, this pessimistic assessment of the future helps to explain why the strategic framework of the “Livre Vert” is focused mostly on adapting to climate change (with a corresponding neglect of mitigation strategies), as it argues that the world must be prepared for the worst. However, unlike Nordhaus, the “Livre Vert” believes it is possible to protect the global commons if bold and far-reaching measures are taken at the international level, which will be covered in the third chapter.

c) Main theories and intellectual approaches to environmental security

The last section of this literature review will analyse the main academic theories and intellectual approaches to environmental security and see how they relate to the notion of a “green defence”. The theoretical base for contemporary environmental security dates back to the early 1990’s with scholarship produced by the so-called “Bern-Zurich group” led by Günther Baechler, and the “Toronto group” led by Thomas Homer-Dixon.⁵⁴ These two research groups developed a coherent theoretical model by relying on case studies that demonstrated how environmental degradation could lead to resource scarcity, which would have adverse political, economic and social consequences on local societies and increase the likelihood of conflict.⁵⁵ Their work was very influential, and most of the intellectual approaches discussed below derive either directly or indirectly from a critical engagement with the “environmental scarcity and violent conflict thesis”.⁵⁶ Since then, the academic field of environmental security has developed into a vast body of literature

⁵³ *Ibid.*

⁵⁴ Floyd R. (2013), *Environmental security studies: an introduction*.

⁵⁵ Homer-Dixon T. (1999), *Environmental Scarcity and Violence*, Princeton University Press.

⁵⁶ Floyd R. (2013), p.7.

that is today characterized by diversity, heterogeneity, and, to a certain extent, fragmentation. This is due to the fact that there is still no clear agreement amongst scholars as to the exact meaning of “environmental security”, and what issues and concepts it refers to. Rita Floyd and Richard A. Matthew (as editors), together with a group of prominent international scholars, have provided what is so far one of the most comprehensive attempts to synthesize the literature on environmental security.⁵⁷ They identify several main theories or approaches on how to conceptualize the connection between security and the environment.

The first approach groups together literature dealing with the so-called “resource curse”, which is fully integrated in the strategic framework of the “Livre Vert”. This theory may appear paradoxical at first glance, as it suggests that violent conflict is not linked to resource scarcity as is commonly assumed, but is rather the result of local resource abundance, particularly for non-renewable resources such as petrol or minerals. Indra de Soysa argues that there is a relationship between bad, corrupt governance and resource abundance, which in turn often leads to violent conflict and insecurity.⁵⁸ While not naming it explicitly, the “Livre Vert” relies on the resource curse theory to explain how environmental degradation is likely to trigger civil or inter-state conflict. It argues that the paradox of resources becoming globally scarce but locally abundant means that countries or regions where resources are still plentiful are likely to become victims of predatorial intervention by outside powers. This represents one of the principal elements in the “Livre Vert’s” analytical focus on the “hard security” dimension of environmental degradation (to be analysed in more detail in the second chapter).

The second main approach focuses on the impact of environmental degradation on human security, which tends to be neglected by the “Livre Vert” due to its one-sided focus on macro-level threats. The concept of “human security” was established by the 1994 United Nations Development

⁵⁷ Floyd R. (2013).

⁵⁸ *Ibid*, p.7.

Programme (UNDP) report, which defined it as referring to the security of individuals instead of the traditional focus on national security:

*(Human security) has two main aspects. It means, first, safety from such chronic threats as hunger, disease and repression. And second, it means protection from sudden and harmful disruptions in the patterns of daily life.*⁵⁹

This formed part of the post-Cold War momentum to broaden the state-centric realist definition of security; since then, analysing the impact of environmental degradation on individuals and local communities has become a prominent aspect of the literature on environmental security.⁶⁰ Again, one of the main weaknesses of the analysis in the “Livre Vert” is the lack of consideration for micro-level “soft security” issues, and the corresponding focus on macro-level “hard security” threats. This rather narrow analysis is problematic, since both are interconnected and mutually reinforcing, and the second chapter will analyse in more detail how insecurity at the micro level can spread and trigger insecurity at the macro level.

The third main approach focuses on the link between gender and environmental security, another element that does not feature prominently in the “Livre Vert”. The connection between feminism and environmental security is linked to the perceived “gender-blindness” of all other approaches, which have ignored the fact that women are likely to be more impacted than men by environmental degradation due to their often subordinate position and gendered role in many traditional societies. Nicole Detraz argues that environmental degradation will mostly affect women, and other vulnerable sections of society, including children and the elderly.⁶¹ For the same reasons that the “Livre Vert” does not consider the human security perspective, it also neglects the issue of gender. This is problematic. The second chapter will analyse in more detail how the disproportionate impact of environmental degradation on women and other vulnerable sections of society may result in significant micro level social disruption, which risks spreading to generate insecurity at the macro level. Gender issues represent another example of how the “hard” and “soft” security dimensions of

⁵⁹ United Nations Development Programme (1994), *Human Development Report*, Oxford University Press, p.23.

⁶⁰ Floyd R. (2013), Chapter 6: Environmental Dimensions of Human Security.

⁶¹ *Ibid*, Chapter 8: Gender and environmental security.

environmental degradation are interconnected and mutually reinforcing, which renders the analysis in the “Livre Vert” incomplete.

The fourth approach focuses on the possibility for cooperation around scarce resources to become tools for peacebuilding and conflict resolution, an idea that is taken-up in the strategic framework proposed by the “Livre Vert”. This approach stands-out from the other ones described above, as it underlines the potentially positive impact of environmental degradation, rather than focusing on the likelihood for conflict and human suffering. For example, natural resources such food, water or petrol have been identified as possible tools for peacebuilding in a conflict zone, because they are vital for recovery and reconstruction.⁶² While not naming it explicitly, the “Livre Vert’s” emphasis on preventive action as a core element in the strategic paradigm for a “green defence” relies on the theory of resource scarcity and peacebuilding. The “Livre Vert” proposes to create new institutions at all levels that would rely on preventive diplomacy to foster dialogue between conflicting parties over environmental tensions points. Cooperative management of natural resources would help rebuild trust and foster reconciliation between warring factions.

The fifth and final approach underlines the relationship between issues of environmental security and systemic crisis. The concept of systemic crisis derives from finance, where it refers to the risk that the entire financial system may collapse, as opposed to the collapse of one or several entities, which can be isolated without harm being done to the system as a whole.⁶³ This is linked to growing financial interdependence in the globalized world economy, where the failure of a single large entity can trigger a domino effect, bringing down with it the entire financial system, as happened in 2008 with the collapse of the US subprime market. The application of the concept of systemic crisis to climate change goes back to the beginning of the environmental movement in the 1960’s, but it has become more prominent with the onset of the global recession since 2008. For instance, the “Europe Ecologie Les Verts” movement has warned about the risk that in the not too

⁶² *Ibid*, p.10.

⁶³ Hansen L. P. (2013), *Challenges in Identifying and Measuring Systemic Risk*, University of Chicago and the National Bureau of Economic Research. See: <http://www.nber.org/chapters/c12507.pdf>

distant future, the financial crisis might combine with the climate crisis and usher in a devastating global systemic crisis.⁶⁴ The “Livre Vert” shares an ambiguous relation with the concept of “systemic crisis” applied to climate change, because the one-sided focus of the analysis examines only half the picture.

On the one hand, the “Livre Vert” is in agreement with scholars such as Fiona Haines, who argue that climate change represents a systemic crisis because the root cause of the problem is linked to the very nature of the capitalist system itself. Haines provides a comparative analysis of the systemic risk stemming from both the financial and environmental crises.⁶⁵ She argues that the 2008 global financial crisis became systemic since it resulted in a global economic recession, which spread to weaken political legitimacy, generating widespread social unrest across the world. Nevertheless, she underlines that the crisis is being resolved with governments bailing out failing institutions and pumping vast amounts of money into the economy. This is gradually leading to a resumption of economic growth, and a return to a situation of “business as usual” appears to be the most likely outcome. However, she emphasises that climate change represents a far more challenging crisis to manage, as bailing out failing banks and pumping more money into the economy will not work in this case. The “Livre Vert” agrees with Haines that the challenge of climate change is linked to the very ideological foundation of the global capitalist system as it developed since the 19th century. The latter is based on maximising short-term profit and pursuing unremitting economic growth, with very little consideration of the long-term impact on the environment. This is straining the world’s finite resources and warming up the planet at a dangerous pace. Hence, the climate crisis is likely to be much more problematic to resolve than the current financial crisis, and risks escalating to trigger major global insecurity:

*L’impact de l’activité humaine sur le système terrestre est irréfutable. Les conséquences néfastes de cette activité (...) révèlent l’impasse d’une mondialisation économique et plus loin, d’un développement humain destructeur des conditions environnementales de sa réalisation.*⁶⁶

⁶⁴ Europe Ecologie les Verts, *Programme d’Action pour 2012 : Vivre mieux – Vers une Société Ecologique*.

⁶⁵ Haines F. (2010), Conference papers, Law and Society Annual Meeting, p.1.

⁶⁶ Livre Vert, p.17.

*Il est vrai que le cours de notre civilisation, devenue mondialisée, conduit à l'abîme et qu'il nous faut changer de voie.*⁶⁷

On the other hand, the one-sided analytical focus of the “Livre Vert” means that it neglects another major aspect of the systemic risk posed by climate change. Scholars such as Barry Naughten argue that the potential for systemic crisis stemming from environmental degradation is related to the danger that it will combine with and reinforce other types of systemic risk.⁶⁸ He underlines that climate change can exacerbate a wide variety of different types of threats, which are intimately interconnected and mutually reinforcing. Environmental degradation risks impacting virtually all aspects of society, triggering at the same time a political, military, economic and social crisis, thereby raising the spectre of a comprehensive global systemic crisis over the course of the 21st century. This aggregate risk is not taken into consideration by the “Livre Vert”, due to its focus on “hard security” threats. There is a neglect of the “soft security” dimension or the equally significant economic and social impact of climate change, as well as the interconnectedness of “soft” and “hard” security issues. Likewise, by focusing on how environmental degradation can trigger conflict, the “Livre Vert” does not examine how climate change can exacerbate many different types of threats such as terrorism, crime, cyber-security and nuclear proliferation. As a result, the concept of a “green defence” as it is presented only looks at half of the picture. A holistic approach to environmental security is needed to successfully address the danger of a comprehensive global systemic crisis stemming from climate change.

⁶⁷ *Ibid*, p.110, cited from Edgar Morin in his article « Changer le rapport de l'humanité à la nature n'est qu'un début », *Le Monde*, 13th of June 2009.

⁶⁸ Naughten B. (2010), *International Journal of Global Energy Issues*, Vol. 33 Issue 1/2, p.89-119.

3) Conclusion of the first chapter

Overall, it is apparent that the “Livre Vert” is an unusual political undertaking that does not exactly fit into the literature on French foreign policy, European external relations and environmental security. While it shares some similarities with various intellectual traditions in those fields, there are also many important points of contrast. This first chapter has provided a preliminary analysis of the concept of a “green defence” in relation to different theoretical approaches in the relevant fields. The points and arguments raised in this chapter will be developed in more detail in the next two chapters by comparing and contrasting the “Livre Vert” with official policy papers from governments and think tanks. The theoretical analysis in this first chapter will be reinforced by a more practical analysis in the next two chapters, first of environmental threats and risks, and then of the corresponding strategies to address them.

Chapter II: Environmental Threats and Risks

The second chapter of this thesis will provide a comparative analysis of the environmental threats and risks identified by the “Livre Vert”. The aim will be to answer the three research questions and test the validity of the first group of hypotheses. Are the environmental threats and risks identified by the “Livre Vert” comprehensive? Do they fit into any conventional political categorization? Is the security analysis outlined by the “Livre Vert” exhaustive enough to cover the potential for systemic crisis stemming from environmental degradation?

In order answer the research questions and test the validity of the first group of hypotheses, this chapter will be divided into three sections:

- 1) The first section will provide a comparative analysis of the environmental threats and risks identified by the “Livre Vert” presented from a “hard security” perspective, which focuses on their potential to trigger civil and inter-state conflict. We will see that the “Livre Vert” goes much further than other analyses on the topic by treating environmental problems as primary threats and triggers, showing how they interact and mutually reinforce one another.
- 2) The second section will broaden the analysis by looking at the same environmental threats and risks from a “soft security” perspective, underlining the equally significant economic and social impact, relying on official policy papers, think tank and academic reports.
- 3) The third section will show how the interaction between the “hard” and “soft” security dimensions of environmental issues has the potential to result in a comprehensive and global systemic crisis.

1) A comparative analysis of the environmental risks identified by the “Livre Vert”

a) The risk of water scarcity

The “Livre Vert” identifies water scarcity as a seminal environmental risk, with the potential to generate both civil and inter-state conflict. The book provides four main reasons as to why water is likely to become scarcer in the coming decades.⁶⁹ First, uncontrolled demographic growth in many regions already exposed to tight water supplies, such as the Middle East, Sub-Saharan Africa and parts of South-East Asia, means that water demand in those areas is increasingly outpacing supply. Second, certain countries facing water scarcity are poor and under-developed, relying on archaic agricultural techniques and inefficient water storage systems that are very wasteful. Third, strong economic growth in many developing countries, particularly the “BRIC’s”, has worsened regional water stress due to enhanced agricultural production, which consumes vast quantities of water. According to a report by the United Nations Development Programme, up to four billion people could face a form of water stress by 2030, a tenfold increase compared to 1995 when it was estimated that 400 million people suffered from water scarcity. Likewise, the report underlines that up to 90% of the population in the Middle East, North and Sub-Saharan Africa could be affected by water stress as early as 2030.⁷⁰ Fourth, this situation is likely to be exacerbated by climate change, as regions already facing hot and dry climates could become exposed to harsher heat waves and droughts, further drying up water supplies.

A debate has emerged over whether or not growing water scarcity in several highly populated regions of the world has the potential to trigger conflict, or “water wars”. Those who refute this, such as Wendy Barnaby, argue that “countries do not go to war over water, they solve their water shortages through trade and international agreements”.⁷¹ She points out that trade in so-called “virtual water”, contained in food products, is allowing countries with arid climates to partially offset

⁶⁹ Livre Vert, Chapitre 1: Risques et enjeux stratégiques pour la défense.

⁷⁰ Livre Vert, p.31, taken from the 2009 United Nations Development Programme Report: “Communication and Influence”.

⁷¹ Barnaby W. (2009), “Do nations go to war over water?”, *Nature: International Weekly Journal of Science*.

water shortages without the need to go to war. Likewise, the 1999 Nile Basin Initiative, a multilateral accord between nine countries dependent on water from the Nile River, offers an example of the potential for cooperation rather than conflict over the sharing of water.⁷² On the other hand, a vast body of literature has developed over the last few years warning that in the near future, new resource wars will be fought over water, just as they are currently fought over oil or gas. In 2007, the British non-profit organization “International Alert” published a report that identified 46 countries, containing over 2.7 billion people, where the combined effects of climate change and enhanced water scarcity had the potential to trigger violent conflict by 2025.⁷³ This led the UN Secretary General Ban Ki-Moon to declare that: “The consequences for humanity are grave. Water scarcity ... is a potent fuel for wars and conflict”.⁷⁴ The “Livre Vert” firmly stands on this side of the debate, and argues that in many parts of the world, virtual water trade and multilateral agreements are increasingly unable to contain tensions over access to shrinking water supplies. It argues that this critical situation is already generating serious regional tensions that are likely to worsen in the coming decades:

Dans un contexte où l'eau reste un enjeu majeur du fait d'une surexposition aux stress hydriques (...) et de l'apparition de conflits d'usage, il est aisé de comprendre que cette ressource est un problème excessivement sensible, à l'origine de tensions âpres, voire de violences, qui frappent plusieurs régions du monde (...) l'épuisement des ressources hydriques sera un facteur de tensions prépondérant dans les décennies à venir.⁷⁵

For example, tensions are already high between Ethiopia and Egypt over the construction of a dam on the Blue Nile. Ethiopia considers this dam to be vital for its economic development, with the potential to generate up to 6000 megawatts of energy. Egypt, on the other hand, claims that this dam could threaten its most vital water supply, as the country derives up to 90% of its water needs from the Nile River and is already facing serious problems of scarcity. While tensions have not yet

⁷² Ibid.

⁷³ Smith D. and Vivekananda J. (2007), *A Climate of Conflict: The links between climate change, peace and war*, International Alert.

⁷⁴ UN Secretary General Ban Ki Moon, December 2007. See: http://seedmagazine.com/content/article/the_truth_about_water_wars

⁷⁵ Livre Vert, p.30-31.

escalated thanks to international mediation efforts, both nations have made it clear that they would not hesitate to go to war to defend their vital interests on this matter.⁷⁶

This is one example of how water scarcity can lead to conflict, which is paralleled by many other similar situations across the world. Examples include tensions between Turkey, Iraq and Syria over the Euphrates River, Israel and Palestine over the West Bank mountain aquifer⁷⁷, and, more seriously, tensions between India and Pakistan, both of which are nuclear powers, over access to the Indus River.⁷⁸ The “Livre Vert” also underlines the potential for water scarcity to trigger internal conflicts, sometimes even leading to state collapse. It points to the example of Sudan, where tensions over access to surface waters in the southern “Sudd” wetlands for the construction of the “Jonglei” canal were instrumental in the outbreak of the bloody second Sudanese civil war, which lasted from 1983 to 2005 and led to the independence of South Sudan in 2011.⁷⁹

Overall, it is apparent that the “Livre Vert” presents the risk of water scarcity from a “hard security” perspective, focusing on its potential to generate civil and inter-state conflict. The “Livre Vert” identifies water scarcity as a primary security threat, with the potential on its own to trigger major disruption. Such an analysis goes much further than other policy papers dealing with environmental security, which tend to treat water scarcity simply as a “threat multiplier”. For example, the 2012 National Intelligence Council (NIC) report on global water security underlines that water scarcity represents a secondary factor that merely tends to exacerbate other underlying primary causes of conflict:

*Water shortages (...) are unlikely to result in state failure (on their own). However, water problems - when combined with poverty, social tensions, environmental degradation, ineffectual leadership, and weak political institutions - contribute to social disruptions that can result in state failure (...) We assess that water stresses contribute to or aggravate existing problems.*⁸⁰

⁷⁶ *Ibid*, p.30.

⁷⁷ Many political scientists argue that the 1967 “Six Day War”, particularly the conflict between Israel and Jordan, was at least partly triggered by competition over water supplies. See Floyd R. (2013), Introduction.

⁷⁸ Pervez Musharraf, the former president of Pakistan, underlined in his thesis at the Royal College of Defence Studies in London that one of the main underlying causes of the Kashmir conflict between India and Pakistan was tensions over the distribution of the Indus River and its tributaries. See:

http://www.strategicforesight.com/media_inner.php?id=342#.U1zf9q2SxhQ

⁷⁹ Livre Vert, p.30.

⁸⁰ National Intelligence Council (2012), *Global Water Security*, Intelligence Community Assessment, p.3 and 4.

b) The risk of food scarcity

The second principle environmental risk identified by the “Livre Vert” relates to food scarcity. One of the main strengths of the security analysis in the “Livre Vert” is that it strongly emphasises the potential interconnections between different types of environmental risks. Thus, it goes into detail about the direct link between problems of water scarcity and food scarcity. Agriculture is very dependent on a large supply of water, as it represents more than two thirds (close to 70%) of global fresh water consumption.⁸¹ Most of the food consumed globally derives either directly or indirectly from agriculture, particularly in developing countries. As a result, the “Livre Vert” underlines that an increase in water scarcity will have dire consequences on global food supply. This is also related to the gradual depletion of groundwater supplies and aquifers for large agricultural producing regions due to over-exploitation. For example, the “Guarani” aquifer in South America is increasingly unable to provide enough water to sustain agriculture and food production for millions of people in Brazil, Argentina, Paraguay and Bolivia, a factor that has caused mounting social unrest in recent years.⁸²

Nevertheless, the “Livre Vert” underlines that food scarcity is not only the result of water scarcity. It is also linked to strong economic and demographic growth in many developing countries that is sharply increasing global demand. The UN Food and Agriculture Organization (FAO) estimates that if current trends continue, global food demand may increase by as much as 70% by 2050, requiring a production increase of nearly 100%.⁸³ This situation is leading to over-exploitation of agricultural soils, which are gradually becoming exhausted until they can no longer yield any more crops:

*Some 40% of the world’s agricultural land is seriously degraded. Among the worst affected regions are Central America, where 75% of land is infertile, Africa, where a fifth of soil is degraded, and Asia, where 11% is unsuitable for farming.*⁸⁴

⁸¹ Livre Vert, p.30.

⁸² *Ibid*, p.32.

⁸³ National Intelligence Council (2013), *Natural Resources in 2020, 2030 and 2040: Implications for the United States*, p.11.

⁸⁴ Sample I. (2007), “Global Food crisis looms as climate change and population strip fertile land”, *The Guardian*. See: <http://www.theguardian.com/environment/2007/aug/31/climatechange.food>

This situation is likely to be exacerbated by climate change, particularly in regions such as the Middle East and Sub-Saharan Africa, where agriculture is being damaged by longer heat waves and droughts, or South East Asia due to an increase in the frequency of floods and storms. Unlike the debate over the possibility for “water wars”, however, there is widespread agreement about the potential for food scarcity to generate insecurity, a recurrent theme throughout history.⁸⁵ The “Livre Vert” points to the food riots of 2007-8 as a contemporary example of how food scarcity can be a primary trigger for disruption, threatening fragile states with internal collapse. Following a dramatic increase in global food prices in 2007 and early 2008 due to the financial crisis, as many as 61 developing countries, including several large states such as Bangladesh, Cameroon, Indonesia or Mexico, faced widespread social unrest. In 23 countries, violent food riots erupted that involved tens of thousands of hungry people who began looting and burning official buildings and city centres. In many cases, the riots were only put down with brutal intervention by the military.⁸⁶

The “Livre Vert” also underlines the potential for food scarcity to trigger tensions and conflict not just internally, but also between states, particularly in relation to fishing rights. Increasingly bitter disputes over fishing are an example of how national resource scarcity (in this case the depletion of national fish stocks) can push governments and private companies to compete for resources beyond national jurisdiction in the global commons (fish stocks in the high seas and oceans).⁸⁷ Seafood is essential to nutritional habits across the world and the problem of overfishing is global in scale, but in some regions, such as South-East Asia, the situation is becoming particularly severe. For many South-East Asian nations, fishing is not only a central part of ancestral dietary customs, but also serves as the local economic backbone in coastal regions. As a result, overfishing in the South China Sea has been responsible for depleting fish stocks to such a critical level that bitter disputes between China and its neighbours have emerged over the right to exploit the remaining fish stocks. While conflict has been averted for the time being, China and other neighbouring countries have stated that they will not hesitate to rely on military force if necessary to secure access to vital fish stocks. As a

⁸⁵ 2013 NIC Report on Natural Resources, Section 1: Key Drivers and Trends, Food.

⁸⁶ Livre Vert, p.32.

⁸⁷ *Ibid*, p.33.

result, the “Livre Vert” underlines that the increasingly dire scarcity of global fish supplies could result in “fish wars” in the not too distant future.⁸⁸

Overall, it is apparent that, like for water scarcity, the “Livre Vert” presents the risk of food scarcity from a “hard security” perspective, focusing on its potential to generate civil and inter-state conflict. The “Livre Vert” identifies food scarcity as a primary security threat, with the potential on its own trigger major disruption. Such an analysis goes much further than most other policy papers dealing environmental security, which tend to treat food scarcity, similarly to water scarcity, simply as a “threat multiplier”. For example, the 2007 report by the Centre for Strategic and International Studies underlines that climate change-induced food scarcity represents a secondary factor, with the potential only to worsen or magnify other underlying primary causes of conflict such as ethnic rivalry, economic decline or corruption.⁸⁹

c) The risk of fossil fuel and energy scarcity

The third main environmental risk identified by the “Livre Vert” relates to scarcity of primary natural resources such as petrol, gas and coal, possibly resulting in a global energy crisis. The dynamics behind this trend are similar to those driving water and food scarcity, involving at the same time strong demographic and economic growth in many developing countries, particularly China and the other rising “BRIC” countries. The “Livre Vert” underlines that global consumption of fossil fuels has increased exponentially over the last couple of decades. From 1960 to 2010, oil and coal consumption has tripled, while natural gas consumption has quadrupled.⁹⁰ The International Energy Agency (IEA) predicts that if current trends continue, global energy demand will increase by 50% before 2035, with fossil fuels continuing to provide 80% of the energy supply.⁹¹ The “Livre Vert”

⁸⁸ *Ibid.* The “Livre Vert” points out that the idea of “fish wars”, similarly to “water wars”, is contested and not universally accepted, although there is no question that tensions between countries are growing over this issue.

⁸⁹ Campbell K. M., Lennon A. T. J., Smith J. (project co-directors, 2007), *The Age of Consequences: The Foreign Policy and National Security Implications of Global Climate Change*, Centre for Strategic and International Studies and Centre for a New American Security, Executive Summary.

⁹⁰ British Petroleum (2013), *Statistical Review of World Energy 2013*. See:

<http://www.bp.com/en/global/corporate/about-bp/energy-economics/statistical-review-of-world-energy-2013.html>

⁹¹ 2013 NIC report on Natural Resources, p.16.

emphasises that such tendencies are straining fossil fuel reserves around the world. Already, several major conventional reserves have reached their “peak”, defined as “the point at which half the total oil (or gas) known to have existed in a field or a country has been consumed, beyond which extraction goes into irreversible decline”.⁹² For instance, British Petroleum estimates that at current production levels, the world has at most only 46 years left of conventional oil supplies, and 58 years of conventional gas supplies. Likewise, the discovery of new oil fields has been declining since the 1960’s, and those which have been found were in most cases smaller and more expensive to exploit.⁹³ These trends have prompted energy experts such as Colin Campbell to underline that the world’s fossil fuel reserves may have reached or are close to reaching their “peak” level.⁹⁴

Nevertheless, such views are contested, and an important debate has emerged over whether or not the world is going to run out of fossil fuel reserves. Those who deny it point to other analyses from the IEA, which underline the potential to partially replenish global fossil fuel supplies with new technological breakthroughs. The latter have made it possible to extract vast amounts of oil and gas using unconventional techniques, such as hydraulic fracturing. In the United States for example, massive public and private investment in unconventional fossil fuel extraction is revolutionising the energy market. The IEA’s 2012 World Energy Outlook predicts that the US is about to become self-sufficient for both oil and gas practically for the first time in its history. Even more surprising, the report explains that if current trends continue, the US could become the world’s largest oil exporting nation as soon as 2017, outstripping Saudi Arabia.⁹⁵ The “Livre Vert” rejects such predictions, underlining that technological breakthroughs are merely palliating global fossil fuel scarcity, and that global demand for energy is still increasing faster than supply. The book fully supports the idea of an imminent global energy crisis, and emphasises that tensions are already growing between and within countries over access to dwindling fossil fuel reserves:

⁹² Vidal J. (2005), “The end of oil is closer than you think”, *The Guardian*. See: <http://www.theguardian.com/science/2005/apr/21/oilandpetrol.news>

⁹³ 2013 NIC report on Natural Resources, p.19.

⁹⁴ Colin Campbell underlines that: “The first half of the oil age now closes ... it lasted 150 years and saw the rapid expansion of industry, transport, trade, agriculture and financial capital ... the second half now dawns, and will be marked by the decline of oil and all that depends on it”.. See: <http://www.theguardian.com/science/2005/apr/21/oilandpetrol.news>

⁹⁵ International Energy Agency (2012), *World Energy Outlook*.

*La dépendance aux hydrocarbures se heurte à l'épuisement des énergies fossiles (...) l'effet de raréfaction provient essentiellement du fait que la consommation croît plus vite que n'augmentent les découvertes de réserves d'énergies fossiles.*⁹⁶

*Face à cette raréfaction grandissante, les acteurs étatiques entrent dans une confrontation (...) générant potentiellement des affrontements (...) la raréfaction des ressources devient une source de conflit à part entière (...) qui risque aussi de générer des troubles internes graves (...) pouvant se muer en guerre civile.*⁹⁷

As an example, the “Livre Vert” points to the recent escalation of international tensions over access to primary resources in the global commons.⁹⁸ The melting of parts of the Arctic ice sheet linked to global warming has made it possible for the first time to exploit vast reserves of hydrocarbons. The US Geological survey estimates that up to 22% of global oil and gas reserves could be located beneath the Arctic.⁹⁹ This has prompted countries bordering the Arctic Circle, including Canada, Russia, the United States and the Scandinavian nations, to make competing claims to territorial and economic rights over Arctic resources. Tensions escalated in August 2007 when the Russian expedition *Arktika* unilaterally planted a Russian flag at the North Pole.¹⁰⁰ Likewise, the “Livre Vert” highlights that international competition over access to offshore gas and oil located in the high seas and oceans has increased over the last decade. Two prominent examples involve heightened tensions between China and its South-East Asian neighbours over islands in the South China Sea thought to contain vast off-shore fossil fuel reserves, vital for supporting the region’s economic growth. This includes bitter disputes over the *Senkaku / Diaoyu* islands opposing China and Japan, and the *Paracels / Spratleys* islands opposing China against the Philippines, Taiwan, Vietnam, Malaysia and Brunei.

Furthermore, the “Livre Vert” also underlines the potential for civil conflict linked to competition over domestic hydrocarbon reserves. The book points to the example of South Sudan, where rivalry over control of the regions’ extensive oil reserves was one of the main triggers of a series of civil wars beginning in 1983 and continuing to this day. Petrol continues to destabilise the

⁹⁶ Livre Vert, p.24.

⁹⁷ *Ibid*, p.26.

⁹⁸ *Ibid*, p.28.

⁹⁹ US Congressional Hearing (2009), *Strategic Importance of the Arctic in US Policy*, p.15. See: http://www.fas.org/irp/congress/2009_hr/arctic.pdf

¹⁰⁰ Livre Vert, p.28.

region, as was demonstrated with the recent attacks by south Sudanese rebels on pipelines in the “Abyei” region near Karthoum. Likewise, Nigeria has been plagued by chronic instability due to ceaseless attacks by pirates marauding the new offshore oil and gas platforms, driving up energy prices and leading to widespread social unrest.¹⁰¹ This is not only due to local corruption and bad governance, but also represents an example of the resource curse theory.

Overall, it is apparent that the “Livre Vert” presents the risk of primary resource scarcity from a “hard security” perspective, focusing on its potential to generate both civil and inter-state conflict. The book goes further than most other policy papers on the topic by underlining the potential interconnection between a global energy crisis and other environmental risks. First, it underlines that unconventional fossil fuel extraction techniques such as hydraulic fracking are very dependent on large amounts of fresh water supplies, which could be compromised in regions facing acute water scarcity. Second, it emphasises that large offshore fossil fuel reserves and coastal power plants are very vulnerable to sea level rise and an increase in extreme weather events such as hurricanes, both of which are directly related to climate change. For example, hurricanes Katrina and Rita that hit the south coast of the United States in 2005 destroyed as many as 113 offshore petrol and gas platforms and seriously damaged 52 platforms and 457 pipelines. Six months later, 46% of energy infrastructure was still not operational again.¹⁰² This perspective differs from many other policy papers on the topic; for example, the 2013 NIC Report on Natural Resources treats energy security, climate change and water scarcity separately and does not emphasise to the same extent their interconnectedness.

¹⁰¹ *Ibid*, p.24.

¹⁰² *Ibid*, taken from the 2011 National Wildfire Federation report: *More Extreme Weather and the US Energy Infrastructure*.

d) The risk of mineral scarcity

Minerals are another important primary natural resource that is analysed by the “Livre Vert”, used both for personal collection (gold, silver or diamonds) and industrial production (copper, steel or iron).¹⁰³ The “Livre Vert” underlines that for the same reasons as hydrocarbons, global demand for minerals has sharply increased over the last couple of decades, and the supply has struggled to keep up. The book relies on studies from the Organisation for Economic Cooperation and Development (OECD), which predict that global demand for minerals could increase by as much as 250% by 2030, with a 5.1% increase each year.¹⁰⁴ Likewise, the Ellen McArthur Foundation anticipates that global ore extraction will rise from eight billion tons annually in 2011 to eleven billion tons by 2020, a 37% increase.¹⁰⁵ The 2013 report from the NIC on Natural Resources explains that new technologies have allowed for the discovery and exploitation of new mineral reserves, in addition to deeper exploitation of existing reserves. Nevertheless, the report underlines that demand is increasing faster than supply, so that the overall global supply of minerals is shrinking; this is apparent with the continuous increase in the price of nearly all types of minerals over the last two decades.¹⁰⁶ The “Livre Vert” fully articulates the likelihood of a global mineral scarcity crisis. It emphasises that competition over access to dwindling mineral reserves is likely to enhance tensions, potentially leading to state collapse or inter-state conflict. The book points to the example of competition over access to the Democratic Republic of Congo’s lucrative mineral reserves of copper, diamonds and gold as being a primary cause for the outbreak of the second Congo War that lasted from 1998 to 2003. The latter became the deadliest conflict since WWII, and is illustrative of the “resource curse” theory, since it attracted intervention by neighbouring states such as Rwanda, Uganda and Burundi, drawn in by

¹⁰³ Such minerals have become essential to industrial production and are used in such diverse fields as construction, electronics, paints, glass, detergents, paper, ceramics and plastics.

¹⁰⁴ Organisation for Economic Cooperation and Development, *Report on future global mineral supply*, cited in the 2013 NIC report on Natural Resources, p.33.

¹⁰⁵ Ellen McArthur Foundation, *Report on future global ore extraction*, cited in the 2013 NIC report on Natural Resources, p.33.

¹⁰⁶ 2013 NIC Report on Natural Resources, Section 1: Key Drivers and Trends, Minerals.

potential gains from Congo's vast mineral reserves.¹⁰⁷ Likewise, the "Livre Vert" emphasises that the "scramble for the Arctic" is also partly due to the discovery of potentially huge mineral reserves (see above). This includes metals such as nickel, molybdenum, silver and zinc, whose exploitation has become possible with the melting of ice sheets stemming from global warming.¹⁰⁸ Combined with the discovery of large fossil fuel reserves, the "Livre Vert" believes that international tensions over access to Arctic resources is likely to escalate in the coming decades.

Overall, it is apparent that the "Livre Vert" also presents the risk of mineral scarcity from a "hard security" perspective, focusing on its potential to generate civil and inter-state conflict. Once again, the book goes further than many other analyses on the topic because it underlines the potential interconnection between mineral scarcity and other environmental risks. The "Livre Vert" points out that extensive global mining activity over the last couple of decades means that high grade ores are increasingly running out, and that the remaining lower grade ores require much more oil and water (with hydraulic mining) to extract. As a result, water and fossil fuel scarcity are likely to increase the cost of mining activities, further tightening global mineral supplies. Moreover, it points out that mining infrastructure in coastal areas is often not well adapted to handle the increase in extreme weather events stemming from climate change, leading to increasingly common mine flooding.¹⁰⁹ This contrasts with many other policy papers on the topic, for example the 2013 OECD report on Mineral Supply Chains, which does not emphasise to the same extent how mineral scarcity could be impacted by other environmental risks.¹¹⁰

¹⁰⁷ Global Witness, *Conflict Resources and their Supply Chains*. See:

http://www.globalwitness.org/sites/default/files/GlobalWitnessConflict_ResourcesAndTheirSupplyChains-Logo.pdf

¹⁰⁸ "Russia and Arctic Minerals", *The Arctic*. See: <http://arctic.ru/natural-resources/other-minerals>

¹⁰⁹ Livre Vert, *Partie 1: risques et enjeux stratégiques pour la défense*.

¹¹⁰ Organisation for Economic Cooperation and Development (2012), *OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas* (2nd edition). See: <http://www.oecd.org/corporate/mne/GuidanceEdition2.pdf>

e) Other types of risks linked to climate change

The “Livre Vert” posits that climate change is not just a factor likely to exacerbate resource scarcity and potentially trigger conflict, but also risks becoming the source of many other significant threats to international security. A foremost example is sea level rise stemming from global warming. There is increasing evidence that sea level rise is being caused by increased mean surface temperatures due both to thermal expansion of ocean and sea waters (as water warms, it expands), and the melting of the world’s main glaciers such as Greenland, the Arctic and Antarctica.¹¹¹ As a result, the 2007 IPCC report predicts an increase in global mean sea level between 18 and 59 cm by 2100 due to thermal expansion, and between 28 to 79 cm by adding the melting of global ice sheets.¹¹² However, the “Livre Vert” insists that IPCC reports and many other analyses on the topic are too conservative and have consistently under-estimated the impact of sea level rise. It relies on other more alarmist projections such as the 2010 report by the US National Research Council, which suggests global sea levels could rise by 2 metres up to 2100.¹¹³ The “Livre Vert” emphasises that all coastal areas are likely to face at least some of the potentially devastating consequences of sea level rise, while some small island nations may disappear altogether. For example, a one-metre sea level rise would flood about 75% of dry land in the Maldives (Indian Ocean) or the Marshall islands (Pacific Ocean), rendering them uninhabitable.¹¹⁴ The parts of the world most vulnerable to sea level rise are the over-populated river delta regions in developing countries such as Bangladesh, Nigeria, Thailand or Egypt. The latter could face mass population displacement involving millions of people. Of these, Bangladesh is probably the most exposed, as over half the country is located less than five meters above sea level, and a quarter of the landmass is flooded each year during the monsoon season. While this is necessary for fertilising the agricultural soil, the destruction caused by the floods has been increasing since the 1990’s. The World Bank has estimated that by 2100, relative sea level in

¹¹¹ It should be noted there is still scientific disagreement over the extent to which climate change will result in the melting of the world’s glaciers.

¹¹² Intergovernmental Panel on Climate Change (2007), *Fourth Assessment Report*.

¹¹³ National Research Council of the National Academies (2010), *America's Climate Choices: Panel on Advancing the Science of Climate Change*, Board on Atmospheric Sciences and Climate, Division on Earth and Life Studies.

¹¹⁴ Maslin M. (2009), p.83.

Bangladesh could increase by up to 1.8 metres, resulting in a loss of over 16 % of the country's landmass containing 13% of its population.¹¹⁵

Furthermore, the “Livre Vert” underlines that climate change is also likely to result in a sharp increase in the intensity and frequency of storms, hurricanes, heat waves and droughts. While the issue is still being debated, many scientists now agree that global warming is probably one of the main factors responsible for the multiplication of extreme weather events observed over the last couple of decades.¹¹⁶ For example, the occurrence of storms and hurricanes is directly related to sea-surface temperatures. Hurricane Katrina, which destroyed the city of New Orleans in August 2005, is one example of the potentially devastating consequences extreme weather events may have in the future.¹¹⁷ The “Livre Vert” also highlights that severe heat waves, already impacting parts of the world with arid climates such as the Middle East or sub-Saharan Africa, may spread to temperate regions such as Europe. Several IPCC climate models predict that the 2003 European summer heat wave that killed over 35,000 people could become the average summer temperature by 2050. This would cause a sharp increase of droughts, wild fires and other types of risks linked to higher temperatures.¹¹⁸

The “Livre Vert” emphasises that the combination of all environmental risks outlined above is likely to result in potentially huge numbers of global climate refugees. While there is still disagreement on this matter, policy papers such as the 2009 Report by the UN Secretary-General on environmental security, estimate that climate change could result in between 50 to 350 million refugees by 2050.¹¹⁹ The “Livre Vert” goes much further and criticizes other analyses for being too conservative. It underlines that the aggregate impact of environmental degradation could result in up to 1 billion climate refugees by the end of this century if current trends continue unabated.¹²⁰ This

¹¹⁵ *Ibid*, p.84.

¹¹⁶ Maslin M. (2009).

¹¹⁷ Livre Vert, *Partie 1 : risques et enjeux stratégiques pour la défense*.

¹¹⁸ Maslin M. (2009), p.90.

¹¹⁹ United Nations Secretary-General (2009), Report to the General Assembly, Sixty-fourth session, Item 114 of the provisional agenda, *Climate Change and its possible security implications*, p.15

¹²⁰ Livre Vert, p.33.

potentially huge number of displaced people is likely to pose major challenges for the international community. Already fragile countries could become overwhelmed and unable to deal with millions of displaced citizens, leading to significant internal disruption and even state collapse. Neighbouring countries might feel threatened by invading swarms of climate refugees and come to rely on military force to protect their borders, potentially leading to inter-state conflict.

For all these reasons, the “Livre Vert” argues that it is essential for the international community to recognize that climate change is not just a mere “threat multiplier”, but represents a primary threat that can trigger major disruption in and of itself. For example, the book is critical of the 2009 report by the UN Secretary General on the security implications of climate change, which continues to highlight that “it is useful to think of climate change as a threat multiplier, namely a factor that can work through several channels to exacerbate existing sources of conflict and insecurity”.¹²¹ The “Livre Vert” points to this consistent under-estimation of environmental risks as one of the main reasons why finding global solutions has been so problematic, as these risks are still not taken seriously enough. Therefore, one of the main contributions of the “Livre Vert” to the field of environmental security is to raise the standing of environmental issues to that of primary threats and triggers of insecurity, instead of treating them merely as secondary “threat multipliers”:

*Le dérèglement climatique, plus qu'un simple multiplicateur, est un risque stratégique à part entière par le caractère inédit (...) et global de ses conséquences (...) il représente un risque stratégique direct pour les Etats.*¹²²

*Il est essentiel de traiter le dérèglement climatique comme risque stratégique à part entière, dépassant ainsi la simple vision d'un effet multiplicateur.*¹²³

¹²¹ 2009 Report of the UN Secretary-General on Climate Change and Security, p.6.

¹²² Livre Vert, p.20.

¹²³ *Ibid*, p.51.

f) Conclusion of the first section

Overall, it is apparent from this first section that the “Livre Vert” analyses environmental risks, whether they relate to climate change or resource scarcity, from a “hard security” perspective, focusing on their potential to generate conflict and affect international security. The analysis provided by the “Livre Vert” is comprehensive in that it looks in detail at the main environmental risks, highlighting how they interact and mutually reinforce one another. It also goes further than other policy papers by presenting environmental issues as primary threats and triggers of insecurity, instead of treating them as secondary “threat multipliers”. Nevertheless, it is equally clear that the security analysis is narrow because it neglects the “soft security” dimension of environmental risks. The second section of this chapter will seek to determine whether the “soft security” or the economic and social effects of environmental degradation are as significant as the impact of “hard security” issues. This will allow us to ascertain whether or not the security analysis presented by the “Livre Vert” is comprehensive, and whether the concept of a “green defence” should be broadened to also include the “soft security” dimension of environmental risks.

2) The economic and social impact of environmental degradation

a) The economic and social impact of vital resource scarcity (water and food)

The economic and social consequences of water and food scarcity are potentially severe. The “Livre Vert” does mention that climate change is likely to seriously impact countries whose economy relies on agriculture or hydropower, particularly in Africa, the Middle East and parts of South East Asia. However, it does not analyse this in detail, as it concentrates on “hard security” or the potential for “water wars” and “food riots” in the near future. This stands in contrast to many other policy papers on environmental security, which tend to focus more on the “soft security” aspect of vital resource scarcity. For example, the 2013 NIC report on Natural Resources underlines that

water is of critical importance in a wide range of manufacturing industries, but especially for the energy sector. In the latter case, water is relied on for cooling systems in nuclear and thermal power plants, but especially for generating electricity in hydropower stations. The report highlights that water consumption by the energy sector is likely to more than double by 2030, meaning that water scarcity could trigger a global energy crisis.¹²⁴ Likewise, the 2012 Worldwatch Institute report contends that many countries likely to be impacted by water scarcity in the near future rely on hydropower to generate a large proportion of their energy. Already, hydropower accounts for 16% of global electricity generation, a figure expected to rise by about 3.1% every year over the next 25 years.¹²⁵ In 2010, China derived 6.7% of its energy from hydropower, and in Brazil, the figure was as high as 35.3%. Both countries rely partly on cheap energy from hydropower to sustain their strong economic growth, which could be seriously impacted if water flows dry up.¹²⁶

However, the most significant economic impact of water scarcity is likely to be its negative effect on agriculture, still the economic backbone for many developing countries. For example, the UN Food and Agricultural Organization states that, while agriculture represents merely 3% of global GDP, for the vast majority of developing countries it represents at least 25% of national GDP.¹²⁷ Likewise, the International Labour Organization highlights that about one billion people, representing more than a third of the global workforce, work in the agricultural sector, again mostly in developing countries.¹²⁸ In Africa for example, agriculture employs as much as 65% of the available labour force, accounting for 32% of the continent's GDP.¹²⁹ As a result, water and food scarcity are likely to enhance the gap between rich and poor countries. This is because richer nations

¹²⁴ 2013 NIC report on Natural Resources, p.62.

¹²⁵ Worldwatch Institute (2012), *Use and Capacity of Global Hydropower Increases*. See: <http://www.worldwatch.org/use-and-capacity-global-hydropower-increases>

¹²⁶ Sustainable Technology Forum (2012), *Which countries get the most energy from hydropower?* See: http://www.greenbang.com/which-countries-get-the-most-energy-from-hydropower_21763.html

¹²⁷ UN Food and Agriculture Organization, *Agriculture and Macroeconomy*. See: <http://www.fao.org/docrep/015/i2490e/i2490e01c.pdf>

¹²⁸ International Labour Organization (2011), *Safety and Health in Agriculture*.

¹²⁹ The World Bank (2013), *Fact Sheet: Agriculture in Africa*. See: <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,,contentMDK:21935583~pagePK:146736~piPK:146830~theSitePK:258644,00.html>

tend to have more diversified economies, as well as more resources to protect themselves from the economic shock of water scarcity and agricultural decline.

Moreover, while the “Livre Vert” mentions that climate change will disproportionately impact the poorest sections of the world population, it neglects the micro level impact of vital resource scarcity, focusing instead on macro level issues of international security. This differs from many other policy papers on the topic, which tend to concentrate on the human security perspective, involving the effects of food and water scarcity on individuals and communities. For example, the International Food Policy Research Institute estimates that agricultural decline due to rising global demand, soil exhaustion and climate change is likely to result in a sharp increase in the price of all basic food commodities. The price of maize could double by 2050, while the price of wheat and rice could increase by up to 60%.¹³⁰ Other more alarmist reports from the Institute of Development Studies predict price increases of 70% for all basic cereals by 2030, and anywhere between 130 and 170% after the impact of climate change.¹³¹ Consequently, basic food items risk becoming unaffordable for the poorest sections of the world population, potentially driving hundreds of millions of people into extreme poverty and triggering widespread famines in developing countries.

Moreover, the 2012 NIC report on global water security underlines that vital resource scarcity is likely to enhance the proliferation of infectious diseases and pandemics.¹³² As water reserves dry up and food prices increase, poor people, particularly in developing countries, will increasingly be forced to rely on substandard and contaminated food and water supplies. Lethal waterborne and foodborne diseases include cholera, dysentery or typhoid fever, which will impact children and the elderly disproportionately. The 2006 UN Human Development Report highlights that on average, a child dies from a foodborne or waterborne disease every 15 seconds, a figure likely to double in the coming decades due to climate change.¹³³ Finally, scholars such as Nicole Detraz have analysed vital resource scarcity through the lens of gender studies to underline that women, due to their often

¹³⁰ 2013 NIC report on Natural Resources, p.7.

¹³¹ *Ibid*, information taken from the Institute of Development Studies.

¹³² 2012 NIC report on global water security, p.5.

¹³³ United Nations Human Development Report (2006), *Beyond scarcity: Power, poverty and the global water crisis*.

subordinate position in many traditional societies, risk suffering disproportionately from the effects of climate change.¹³⁴ For example, as water and food become scarce, women will increasingly be unable to fulfil their imposed gendered role as homemakers and child bearers. Climate change will disproportionately impact the most vulnerable members of society, including women, as well as children and the elderly; this risks causing significant micro level social disruptions.

Therefore, given the potentially significant socio-economic macro and micro level impact of vital resource scarcity, the analysis of the “Livre Vert”, focused on macro level “hard security” issues, appears to be incomplete. The concept of a “green defence” should be broadened to include a “soft security” analysis of the economic and micro level social impact of vital resource scarcity.

b) The economic and social impact of primary resource scarcity (fossil fuels)

Similarly to vital resources, scarcity of natural primary resources such as petrol, gas or minerals may also have far reaching economic and social consequences. The “Livre Vert” mentions that, given the critical importance of fossil fuels for global energy supply, the dwindling of conventional reserves is likely to trigger supply shocks in the future that could significantly affect the global economy. However, it does not analyse this in detail, as it focuses rather on the risk of both inter-state and civil conflict over shrinking fossil fuel reserves. This differs from many policy papers on energy security, which tend to concentrate more on “soft security” issues involving the impact of primary resource scarcity on the global economy. For example, the 2013 NIC report on Natural Resources underlines that because global demand for energy is increasing faster than supply, markets for primary resources are becoming increasingly tight and prices are likely to continue rising in the coming decades. Already the price of oil has inflated from a little over 20 dollars a barrel in 1990 to reach a peak at 145 dollars a barrel in July 2008, a more than seven-fold increase.¹³⁵ The IEA anticipates that because of a strong increase in domestic energy demand from oil exporting countries

¹³⁴ Detraz N. in Floyd R. (2013), Chapter 8: Gender and Environmental Security.

¹³⁵ The price of oil subsequently decreased sharply due to the global recession, before increasing again at a little over 100 dollars a barrel today, still considered to be a high price by most experts. 2013 NIC report on Natural Resources, Section 1: *Fuel and Other Energy Sources*.

such as Saudi Arabia, the price of oil is likely to remain high in the coming decades, and could return to 140 dollars per barrel by 2035.¹³⁶

If new extraction techniques and renewable energies are unable to compensate for depleting conventional supplies, the global economy may face potentially very disruptive supply shocks in the near future. This already occurred in 1973 and 1979, when the two subsequent oil shocks triggered a global recession that lasted for at least a decade and put a brutal end to the post-War economic boom. The 2013 NIC report on Natural Resources underlines that climate change, combined with an exponential increase in global energy demand and dwindling conventional reserves, could result in acute supply shocks potentially far worse than those of the 1970's.¹³⁷ This is because the global economy remains extremely dependent on fossil fuels, which currently represent 81.6% of global energy consumption, including 31.5% for oil, 21.3% for natural gas and 28.8% for coal.¹³⁸

In order to avoid this looming global energy crisis, we saw in the previous section that many governments and private companies have begun to invest in “unconventional techniques” of extraction such as shale oil and gas. The “Livre Vert” and the EELV movement are very critical of these new unconventional extraction techniques. They underline that there are growing fears they could be much more damaging for the environment than conventional extraction techniques.¹³⁹ The example of hydraulic fracturing is illustrative, as many scientists now believe it may increase the frequency of earthquakes and possibly lead to irreversible pollution of groundwater supplies, essential for agriculture and drinking water.

Once more, however, the “Livre Vert” differs from many other policy papers on energy security by neglecting to analyse the economic impact of the shale oil and gas “revolution”. For example, the 2013 NIC report on Natural Resources underlines that, while unconventional fossil fuels are helping to significantly reduce dependence on imported oil and gas, they are more expensive to extract than conventional reserves. Therefore, the effect is to exacerbate the ongoing

¹³⁶ 2013 NIC report on Natural Resources, p.24.

¹³⁷ *Ibid*, Section 1: *Fuel and Other Energy Sources*.

¹³⁸ International Energy Agency (2013), *Key World Energy Statistics*.

¹³⁹ Livre Vert, *Partie 1: risques et enjeux stratégiques pour la défense*.

increase in the price of fossil fuels, with further negative consequences on the global economy.¹⁴⁰

The NIC report also underlines that poor and developing countries are likely to suffer the most, since many of them lack the financial means to engage in widespread development of unconventional hydrocarbons. Thus, they risk facing acute energy shortages in the coming decades as conventional supplies dwindle. This is likely to compromise their economic development, as well as exacerbate the gap between developed and developing nations.

Similarly to vital resource scarcity, the “Livre Vert” also tends to neglect the micro level impact of primary resource scarcity, focusing instead on how competition over dwindling fossil fuel reserves at the macro level threatens international security. This stands in contrast to many other analyses on energy security, which have increasingly come to adopt a so-called “critical approach”. Instead of concentrating on the ability of powerful states in the developed North to secure their energy supply, “a critical energy security perspective relates more to the ability of individuals (...) to secure sufficient access to energy for their personal needs (...) particularly in marginalized and deprived communities (...) in the (less developed) South”.¹⁴¹ Policy papers such as the 2013 NIC report on Natural Resources underline that the poorest sections of the world’s population are already struggling to cope with high oil and gas prices to meet daily needs such as transport, food and heating. In many developing countries, fuel costs already amount to at least 50% of low-income household expenditure. As a result, an increase in global fuel prices would significantly deteriorate the standard of living for hundreds of millions of poor people.¹⁴² Therefore, like water and food scarcity, primary resource scarcity is likely to exacerbate the gap between the richer and poorer sections of the world population, enhancing economic inequalities.

¹⁴⁰ 2013 NIC report on Natural Resources, Section 1: *Fuel and Other Energy Sources*.

¹⁴¹ Floyd R. (2013), p.250.

¹⁴² 2013 NIC report on Natural Resources, p.75.

c) Other economic and social consequences of climate change

The total economic cost of climate change is difficult to measure. The “Livre Vert” estimates that the cumulative effects of environmental degradation could become overwhelming and result in another “Great Depression”, potentially even worse than those of the 1930’s and 2008.¹⁴³ However, it does not analyse this in detail, as it focuses on how sea level rise and extreme weather events can generate widespread destruction and mass population displacement, threatening international security. This differs from other policy papers on the topic, many of which focus on “soft security”, or a detailed analysis of the aggregate economic consequences of global warming. For example, the 2006 report by the British economist Nicholas Stern underlines that if appropriate measures are not taken immediately, the cost of climate change could well become astronomical in the coming decades.¹⁴⁴ While the so-called “Stern Report” has been criticized, many economists now support its conclusions that mitigation of the worst effects of climate change requires an immediate investment of between 1 to 2% of global GDP each year. Otherwise, the negative effects will accumulate during the course of the century and could end up costing up to 20% or more of global GDP each year, perhaps indefinitely.¹⁴⁵

Part of this seemingly gigantic cost is linked to concerns about growing water, food and primary resource scarcity discussed above. Another aspect relates to the real possibility that sea level rise, combined with an increase in the frequency of extreme weather events, could result in major disruptions to vital financial or industrial centres. For example, hurricane Sandy completely shut down New York City for several days when it hit the US East Coast in October 2012, and ended up costing approximately 68 billion dollars.¹⁴⁶ Likewise, in a letter to *The Times* in January 2013, Richard Bloore, formerly a member of the Thames Barrier Project Management Team, expressed concern that London’s great flood barrier, designed in the decades following WWII, may not be

¹⁴³ Livre Vert, p.21.

¹⁴⁴ Nicholas Stern has served as Chief Economist at the World Bank, Second Permanent Secretary of the UK Treasury, and head of the UK Government Economic Service.

¹⁴⁵ Stern N. (2006), *Stern Review: The Economics of Climate Change*.

¹⁴⁶ Blake E. S., Kimberlain T. B., Berg R. J., Cangialosi J. P. and John L. Beven J. L. (2013), *Tropical Cyclone Report: Hurricane Sandy*, US National Hurricane Center. See: http://www.nhc.noaa.gov/data/tcr/AL182012_Sandy.pdf

equipped to handle the type of flooding and extreme weather scientists predict could result from climate change.¹⁴⁷ London and New York being the world's two leading financial centres, it is easy to imagine the potentially catastrophic impact on the global economy if extreme weather events were to shut them down for a prolonged period of time.

While the “Livre Vert” does mention that climate change could lead to a proliferation of pandemics and respiratory diseases, it tends to neglect the human security perspective or the impact on individuals and communities. By contrast, many other policy papers have focused on a detailed analysis of the micro level impact of climate change. For example, the World Health Organization (WHO) states that the increase in global mean temperatures is likely to result in a warmer climate conducive to the proliferation of diseases such as malaria or dengue fever, which thrive in tropical climates.¹⁴⁸ As a result, the report underlines that the changing of the Earth's climate may cause pandemics previously limited to the southern hemisphere to spread north to formerly temperate climates, such as Southern Europe. Likewise, a 2014 report by the WHO highlights a direct link between the global increase of respiratory diseases, cancers or strokes and growing industrial pollution, particularly air pollution in large cities. For example, the report underlines that air pollution was responsible for killing seven million people worldwide in 2012, and is already the leading cause of death in China, where it has become a major national health concern.¹⁴⁹ Furthermore, the 2009 report by the UN Secretary General on environmental security also points to the potentially significant impact of climate change on micro level issues such as cultural diversity and human rights. Climate change is likely to jeopardise the protection and achievement of a whole range of human rights enshrined in the UN Universal Declaration of Human Rights, including the rights to life, health, food, water and housing.¹⁵⁰ Similarly, the report explains that:

¹⁴⁷ Bloore R. (3 January 2013), “Letters to the Editor: Thames Barrier”, *The Times*.

¹⁴⁸ World Health Organization, *Climate change and infectious diseases*. See: <http://www.who.int/globalchange/climate/summary/en/index5.html>

¹⁴⁹ World Health Organization (2014), Media centre: *7 million premature deaths annually linked to air pollution*. See: <http://www.who.int/mediacentre/news/releases/2014/air-pollution/en/>

¹⁵⁰ 2009 Report by the UN Secretary-General on Climate Change and Security, p.7.

*Climate change poses a fundamental threat to cultural survival for those societies whose territories and ways of life are threatened by sea level rise and inundation, as noted by small island developing states (...) such people may also face challenges in using migration as a coping strategy as a result of discrimination in receiving locations.*¹⁵¹

d) Conclusion of the second section

Overall, the “soft security” socio-economic impact of environmental degradation at the micro and macro level is likely to be very significant, as much so as the risk of civil and inter-state conflict. Consequently, the security framework of the “Livre Vert” presents us with a paradox. On the one hand, it provides a comprehensive analysis of the main environmental risks, as well as how they interact and mutually reinforce one another. Moreover, in contrast to most other analyses, it presents environmental issues as primary threats in and of themselves, and not just as secondary “threat multipliers”. On the other hand, by overly concentrating on “hard security” or how environmental degradation can threaten international security, the focus of the “Livre Vert” is one-sided. The concept of “green defence” should be broadened by integrating a “soft security” analysis of the equally significant economic and social impact of climate change.

For all these reasons, the security analysis of the “Livre Vert” does not really fit into any conventional political categorization. It does not correspond to a typical “hard security” perspective; realist scholars, while sharing the same concern for civil and inter-state conflict, have traditionally neglected environmental matters, which are not considered to have any bearing on national and international security.¹⁵² At the same time, we have seen above that the “Livre Vert” does not resemble a typical environmental policy analysis, which usually concentrates on “soft security” issues involving the socio-economic effects of environmental degradation at the micro and macro level. As a result, the “Livre Vert” represents an unusual hybrid, mixing together a “hard security” framework focused on matters relating to conflict and international security with environmental challenges such as climate change and resource scarcity. Such an original outlook is best described

¹⁵¹ *Ibid*, p.21.

¹⁵² Floyd R. (2013), *Environmental security studies: an introduction*.

as a form of “green hard security”, an attempt to reconcile the usually separate fields of defence and environmentalism. This represents a valuable and insightful contribution to both fields. Nevertheless, the one-sided focus of the security analysis in the “Livre Vert” means that the concept of a “green defence”, as presented, fails to address the danger that climate change may usher in a comprehensive systemic crisis.

3) The potential for a comprehensive systemic crisis linked to environmental degradation

a) How the interaction between “hard” and “soft” security can result in a systemic crisis

The potential for a systemic crisis stemming from environmental degradation is not only linked to the danger that the “hard security” risks described in the first section will simply be added to the “soft security” risks described in the second section. While this certainly represents an important aspect of any climate-related systemic crisis, it is only half the picture. The heart of the problem relates to the fact that both types of risks are in many ways interconnected and mutually reinforcing. There are many different ways in which the “soft security” socio-economic macro and micro level impact of environmental degradation might exacerbate and reinforce the “hard security” risk of civil and inter-state conflict, the main focus of the “Livre Vert”. The following section will provide some ideas and examples of how they potentially interact.

First, as the economic and social effects of climate change become more severe and hits poor countries disproportionately, tensions are likely to escalate between developed and developing countries over rights to emit greenhouse gas emissions into the atmosphere (part of the global commons), threatening international security. Already, it has proven to be very difficult at world summits in Kyoto or Copenhagen to reach an agreement on which countries should bear the greatest share of emissions cuts. The latter are considered to harm economic growth, but are necessary to mitigate global warming. Developing countries have rightly pointed out that developed Western nations have already contributed a historical share of emissions since the industrial revolution in the

19th century. This has allowed them to develop economically, and it would be unfair to impose drastic cuts on emerging countries and deny them the same right to develop. Rhetoric from developing countries has become increasingly hostile over the last two decades. For example, the President of Uganda, Yoweri Museveni, insisted on several occasions that climate change represents an unacceptable “act of aggression” by rich countries against poor countries.¹⁵³ From a legal perspective, this has led developing countries to put strong pressure for obtaining “opt-outs” from international environmental treaties such as the Kyoto Protocol, which rely on symbolic but non-binding emission cuts.¹⁵⁴ This situation has become increasingly problematic, as powerful countries such as the United States have refused to contemplate any significant legally binding agreement to cut emissions as long as developing countries are not also included. The latter are now responsible for the more or less the same share of global emissions as developed countries, with China becoming the largest world CO₂ emitter in 2007. This has had the effect of stalling international climate negotiations, further enhancing tensions between rich and poor countries.

Second, a similar situation might occur at the micro level, as we saw how resource scarcity is likely to exacerbate economic inequalities between the rich and poor sections of the world population. This could make poor people in both developed and developing countries more resentful and more desperate, fuelling the rise of domestic social tensions. In already fragile countries, this situation might become overwhelming, potentially leading to civil conflict. Third, we have seen above that climate change risks impacting vulnerable sections of society disproportionately, including women, children and the elderly, particularly in underdeveloped parts of the world. This could result in prolonged and widespread micro level social disruptions which, over the long run, could trigger significant insecurity at the macro level.

Fourth, the increased possibility of global pandemics due to warmer temperatures, as well as food and water scarcity, poses a major threat to international security. Already unstable countries risk

¹⁵³ Abbott C. (2008), *An uncertain future: law enforcement, national security and climate change*, Oxford University Research Group, Foundation for International Relations and Foreign Dialogue.

¹⁵⁴ Evans M. D. (2010), *International Law* (3rd edition), Oxford University Press, Chapter 23: International Environmental Law.

not being able to deal with an internal pandemic, which could trigger civil unrest. In a worst-case scenario, entire countries and regions may be forced to close down their borders in an effort to avert the spread of lethal contagious diseases and to defend them militarily against refugees fleeing from contaminated areas.

Finally, if climate change ends up costing 20% of global GDP for a prolonged period of time, nations with large defence budgets, such as the United States, France or China, will be forced to drastically cut back on military spending. This could seriously weaken national defence capabilities precisely at a time when both domestic and international tensions are likely to peak due to the combined effects of environmental degradation. Indeed, countries that are suffering acutely from the internal economic and social effects of climate change risk becoming more belligerent on the international stage, especially in their attempt to secure access to vital resources such as water and food, enhancing the threat of inter-state conflict.

Therefore, the ways in which “hard” and “soft” security interact and mutually reinforce one another illustrates the potential for a comprehensive systemic crisis caused by climate change. The latter should be understood as a crisis of interdependency that impacts all aspects of the global system, becoming at the same time a political, security, economic and social crisis, both at the micro and macro level. By focusing too narrowly on “hard security”, the “Livre Vert” does not sufficiently analyse the “soft security” socio-economic impact of environmental degradation, and how the latter could exacerbate the risk of civil and inter-state conflict. As a result, the concept of a “green defence” as presented represents only half the picture, and should be broadened to include an analysis of how the “hard” and “soft” security dimensions of climate change are interconnected.

b) How climate change can exacerbate a wide variety of different types of security threats and lead to a systemic crisis

The “Livre Vert” primarily focuses on how resource scarcity can enhance both civil and inter-state conflict, or how extreme weather events can cause widespread destruction and mass population displacement. However, it does not consider the possibility that environmental degradation may aggravate other threats such as terrorism, crime, cyber security and nuclear proliferation. This will be the focus of the last section, which will analyse how climate change has the potential to exacerbate a wide range of security threats, resulting in a comprehensive systemic crisis.

The “Livre Vert” neglects the issue of terrorism. It posits that the latter is an exaggerated threat, and that many more people have already died from the effects of climate change than from acts of terrorism.¹⁵⁵ Moreover, the “Livre Vert” argues that governments have used the possibility of weapons of mass destruction falling into the hands of terrorists as a pretext to further their own interests and those of private lobbies. It points to the example of the 2003 US invasion of Iraq, ostensibly to protect the world from Saddam Hussein’s weapons of mass destruction that were subsequently never found, whereas Iraqi oil fields were immediately taken under control by the US military. This viewpoint stands in sharp contrast to other more conventional policy papers, for example the French “Livre Blanc”, the European Security Strategy and especially the American National Security Strategy. All three share a common emphasis on seeing terrorism and weapons of mass destruction as a primary security threat, especially since the 9-11 terrorist attacks.¹⁵⁶

Moreover, the “Livre Vert” differs from other policy papers on environmental security, many of which argue that environmental degradation risks exacerbating the threat of terrorism. For example, the 2007 report from the Centre of New American Security on the impact of climate

¹⁵⁵ Livre Vert, p.41.

¹⁵⁶ *Livre Blanc: Défense et Sécurité Nationale* (2013), La Documentation Française - *National Security Strategy of the United States of America* (2010), The White House - *A Secure Europe in a Better World* (2003), European Security Strategy.

change outlines different ways in which environmental factors might enhance Islamic terrorism.¹⁵⁷ First, the report explains that growing global energy demand, combined with an increasingly tight market for fossil fuels, is likely to encourage developed countries to reinforce their involvement in the Middle East, which still contains the world's largest hydrocarbon reserves. This would have the effect of further inflaming radical Islamic terrorist movements, who resent what they perceive as Western imperialism. Second, water and food scarcity could combine with mass population displacement due to rising sea levels and more extreme weather events, triggering domestic upheaval and pushing already fragile states to the verge of collapse. The examples of Syria, Iraq and Libya illustrate how state failure is highly conducive to the spread of terrorism.¹⁵⁸ Third, the 2008 FRIDE report on national security and climate change highlights that as the effects of global warming worsen in the near future, extremist radical green movements may come to rely on "eco-terrorism". This would involve blowing-up polluting factories or other symbolic gestures to gain public attention and put pressure on governments to implement more radical policies to tackle climate change. For example, the FRIDE report explains that in the United States:

*The FBI has observed worrying signs of an escalation in violent rhetoric and tactics amongst a small minority of environmental extremists, and they currently consider "eco-terrorism" to be one of the most serious domestic terrorism threats.*¹⁵⁹

The risk that terrorism might be exacerbated by environmental factors illustrates the potential for climate change to become a systemic crisis, a possibility not considered by the "Livre Vert".

Likewise, the "Livre Vert" also neglects the threat stemming from both domestic and international crime. The book focuses on the problem of illegal trafficking in plant and animal species, and devotes many pages to outlining strategies for protecting biodiversity.¹⁶⁰ While undoubtedly significant, the illegal trafficking of plant and animal species represents only a minor part of global crime, especially when compared to drugs, weapons, mineral resources and human

¹⁵⁷ Campbell K. M. et al (2007), *The Age of Consequences: The Foreign Policy and National Security Implications of Global Climate Change*, Executive Summary.

¹⁵⁸ Although in all three cases state collapse had little to do with climate change, these examples highlight how Al Qaeda is able to take advantage of the breakdown of law and order to establish itself in a failed state.

¹⁵⁹ Abbott C. (2008), *An uncertain future: law enforcement, national security and climate change*, p.5.

¹⁶⁰ Livre Vert, *Partie 2.3: Protection de la biodiversité et surveillance des frontières maritimes*.

trafficking. Once more, this stands in sharp contrast to other more conventional policy papers such as the French “Livre Blanc”, the European Security Strategy or the American National Security Strategy, where crime has always featured as a primary threat.¹⁶¹

Unlike the “Livre Vert”, other policy papers on environmental security have highlighted the risk that environmental degradation may exacerbate both domestic and international crime. For example, the 2008 FRIDE report on national security and climate change warns that global warming could potentially cause serious internal disruption in both developing and developed countries, opening the way for crime.¹⁶² In the same way that failed states are conducive to the spread of Islamic terrorism, they are also conducive to the proliferation of criminal networks, a notorious example being widespread piracy in Somalia. Even if states do not collapse, we have seen how climate change is likely to exacerbate poverty worldwide, pushing desperate people to turn to crime as the only way to feed themselves and their families. In developed countries, the arrival each year of thousands of illegal immigrants, some of whom may turn to petty crime if they fail to integrate, is already a significant challenge. This situation could be made much worse by the displacement of millions of people due to climate change. Moreover, the breakdown of law and order following extreme weather events is also conducive to the spread of crime, as was demonstrated in New Orleans following the devastation caused by Hurricane Katrina. The risk that domestic and international crime might be exacerbated by environmental factors is another example of the potential for climate change to become a systemic crisis, a factor not addressed by the “Livre Vert”.

Cyber security is another significant issue that does not feature prominently in the “Livre Vert”. Although cyber defence is mentioned, it occupies only half a page out of a total of 120 pages and is not presented as a primary threat in the same way as environmental degradation.¹⁶³ While cyber security issues were similarly neglected for a long time in more conventional policy analyses,

¹⁶¹ *Livre Blanc: Défense et Sécurité Nationale* (2013), La Documentation Française - *National Security Strategy of the United States of America* (2010), The White House - *A Secure Europe in a Better World* (2003), European Security Strategy.

¹⁶² Abbott C. (2008), *An uncertain future: law enforcement, national security and climate change*.

¹⁶³ Livre Vert, p.77.

this has radically changed over the last decade. For example, the French “Livre Blanc”, the European Security Strategy and the American National Security Strategy now all devote many pages to outlining ways for enhancing cyber defence mechanisms, now considered a security priority at the same level as terrorism.¹⁶⁴

The “Livre Vert” also differs from other policy papers on environmental security, which point to the ways in which environmental factors could enhance the risk of cyber-attacks. For example, the 2013 NIC report on natural resources highlights that modern energy infrastructure is increasingly controlled and regulated by digital technology.¹⁶⁵ This makes it vulnerable to cyber-attacks, which poses a real danger for nuclear and certain renewable energies. There is the prospect of cyber-pirates hacking into nuclear power plants or large hydroelectric dams, causing potentially widespread chaos and destruction. The potential for environmental factors to exacerbate cyber threats indirectly is another example of how climate change risks becoming a systemic crisis, which is not considered by the “Livre Vert”.

In contrast with the three security threats described above, the danger of nuclear proliferation is taken seriously by the “Livre Vert”. The book points to the important weaknesses in the global nuclear non-proliferation regime and outlines many proposals aimed at strengthening and updating the Treaty on the Non-Proliferation of Nuclear Weapons. This includes, for example, reinforcing mechanisms for the international regulation of “nuclear-weapons-free zones” under the aegis of United Nations.¹⁶⁶ Such a proposal is similar to more conventional policy papers such as the French “Livre Blanc”, the European Security Strategy and the American National Security Strategy. The latter support greater international oversight and highlight that globalization has enhanced the danger

¹⁶⁴ *Livre Blanc: Défense et Sécurité Nationale* (2013), La Documentation Française - *National Security Strategy of the United States of America* (2010), The White House - *A Secure Europe in a Better World* (2003), European Security Strategy.

¹⁶⁵ 2013 NIC report on Natural Resources.

¹⁶⁶ Livre Vert, p.90-93.

of nuclear proliferation.¹⁶⁷ However, the “Livre Vert” is more radical because it supports, over the long run, a gradual disarmament of all nuclear arsenals, joining US President Obama’s declared objective of “global zero”.¹⁶⁸

Although the “Livre Vert” pays close attention to the threat of nuclear proliferation, it does not consider how environmental factors can potentially exacerbate it. This differs from other policy papers on environmental security. For example, the 2007 report by the Centre for a New American Security explains that several countries such as Israel, Pakistan and India, which are likely to experience sharp water scarcity in the coming decades, possess nuclear weapons and may feel forced to use them if their water supply reaches a critical level.¹⁶⁹ Likewise, several other states that have the capacity to develop nuclear weapons, but have made the deliberate choice not to do so, might be pushed into acquiring them if they experience dire resource stress linked to climate change. For example, while South Africa gave up its nuclear weapons programme at the end of Apartheid, it is likely to experience sharp water scarcity in the near future. This could potentially encourage the country to resume its nuclear programme if the situation becomes desperate. Under such circumstances, there is very little surrounding countries can do to defend themselves against a nuclear power intent on securing access to vital resources. Finally, the 2013 FRIDE and Chatham House think tank reports underline that sea level rise and the increase of extreme weather events stemming from climate change increase the risk that a nuclear power plant may be damaged due to flooding. Although the Fukushima nuclear incident had nothing to do with climate change and was caused by a tsunami following an earthquake, it is illustrative of the vulnerability of supposedly well-protected modern nuclear power plants. A strong hurricane or large flood could have similar effects

¹⁶⁷ *Livre Blanc: Défense et Sécurité Nationale* (2013), La Documentation Française - *National Security Strategy of the United States of America* (2010), The White House - *A Secure Europe in a Better World* (2003), European Security Strategy.

¹⁶⁸ Livre Vert, p.92. During a speech in Prague on April 5 2009, US President Obama declared his intention of achieving “global zero”, which implies ridding the world of nuclear weapons.

¹⁶⁹ Campbell K. M. *et al* (2007), *The Age of Consequences: The Foreign Policy and National Security Implications of Global Climate Change*, Executive Summary.

and damage the nuclear reactor, releasing large amounts of radioactive material in the surrounding area.¹⁷⁰

4) Conclusion of the second chapter

Overall, the risk that environmental degradation might trigger a systemic crisis is two-fold. First, climate change represents a crisis of interdependency, as the “hard” and “soft” security dimensions are interconnected and mutually reinforcing, with the potential to become at the same time a political, security, economic and social crisis, both at the micro and macro level. Second, there is the danger that environmental factors could exacerbate a wide range of different types of threats, such as terrorism, crime, cyber security and nuclear proliferation. The “Livre Vert” fails to consider these risks, because it overly concentrates on the “hard security” dimension. This includes the potential for civil and inter-state conflict over dwindling resources, or how extreme weather and sea level rise might result in widespread destruction and mass population displacement. While these represent significant threats, it is only half of the picture. A much more compelling danger is the fact that climate change has the potential to impact virtually all aspects of society, ushering in a comprehensive global systemic crisis. As a result, while the security paradigm outlined by the “Livre Vert” is insightful, it remains incomplete. The concept of “green defence” should be broadened by adopting a holistic approach to environmental security. The third chapter of this thesis will provide a comparative analysis of the strategies and policies proposed by the “Livre Vert” for addressing the environmental threats and risks outlined in the second chapter. The aim will be to determine how a holistic approach to environmental security can also be applied in the context of concrete policies for mitigating and adapting to climate change.

¹⁷⁰ Grevi G., Keohane D., Lee B. and Lewis P., *Empowering Europe's Future: Governance, Power and Options for the EU in a Changing World*, with Chatham House, FRIDE and ESPAS think tanks, p.40.

Chapter III: Strategies for addressing environmental threats and risks

The third chapter of this thesis will provide a comparative analysis of the strategies proposed by the “Livre Vert” for addressing the environmental threats identified in the previous chapter. It will attempt to answer the three research questions and test the validity of the second group of hypotheses. Are the strategies outlined by the “Livre Vert” comprehensive? Do they fit into any conventional political categorization? Is the strategic paradigm outlined by the “Livre Vert” exhaustive enough to address the potential for systemic crisis stemming from future environmental challenges?

In order to answer the research questions and test the validity of the second group of hypotheses, the chapter will be divided into two sections, which will be followed by a conclusion recapitulating the findings of the thesis:

- 1) The first section will provide a comparative analysis of the strategic paradigm proposed by the “Livre Vert” for adapting to climate change. The policies it presents are aimed at absorbing the shock stemming from environmental degradation by reinforcing and creating new military and governance structures. We will see that the multi-level strategies proposed by the “Livre Vert” are often more ambitious than those of other policy papers on the topic.
- 2) The second section will broaden the analysis by examining the strengths and weaknesses of “low politics” strategies aimed at mitigating or attenuating the impact of environmental degradation. This refers to economic and social policies for achieving sustainable development, which are not discussed in the “Livre Vert”. This section aims to determine whether or not “low politics” strategies of mitigation can be effective when compared to “high politics” strategies of adaptation, in order to ascertain whether they should also be included in the strategic framework of a “green defence”.

1) A comparative analysis of the “high politics” strategies proposed by the “Livre Vert” for adapting to the impact of environmental degradation

a) Adapting to climate change by placing environmental security at the heart of military strategic planning

The “Livre Vert” proposes first of all to place environmental security issues at the heart of military planning and defence, as environmental issues are still too often neglected in national security and military strategies. For example, it points to the near complete lack of consideration for environmental security in the 2013 French “Livre Blanc”, where it occupies only half a page, arguing that scientific uncertainties remain about the real impact of climate change.¹⁷¹ This neglect stands in contrast with the strategies from other powers such as the United States, the United Kingdom or Germany. For example, the 2010 US Quadrennial Defence Review devotes an entire section to matters of environmental security.¹⁷² Likewise, the US department of Defence has published a “Climate Change Adaptation Roadmap” in 2012 to prepare the US military for future environmental challenges.¹⁷³ Thus, the “Livre Vert” underlines that France is lagging behind on environmental security, and proposes several strategies that would allow France to become a model for “green defence”. France would need to create an institution for dialogue and consultation between the defence/military establishment and the environmental party. This could take the form of a ministry entirely devoted to environmental security that would be linked to the ministry of defence, a far-reaching proposal. It also recommends the commissioning of a parliamentary report on how to develop and apply the concept of “green defence” in the context of the French military.¹⁷⁴

The “Livre Vert” acknowledges that the concept of environmental security has been developing over the last decade, but argues that other analyses do not go far enough. For instance, even in countries such as the UK and the US where environmental threats are taken more seriously,

¹⁷¹ *Livre Blanc: Défense et Sécurité Nationale* (2013), La Documentation Française, p.46.

¹⁷² United States Department of Defense (2010), *Quadrennial Defense Review Report*, p.84-88.

¹⁷³ United States Department of Defense (2012), *Climate Change Adaptation Roadmap*.

¹⁷⁴ Livre Vert, p.111.

they are still often not integrated in military reports and school curricula. The “Livre Vert” proposes both to create specialised “green defence” training in military academies, as well as to integrate environmental security with international relations university curricula. Moreover, it underlines the need to systematically include a clause on environmental security in military reports and policies relating to defence more generally.¹⁷⁵

At the European level, the “Livre Vert” underlines that the European Security Strategy still does not place environmental security on the same level as issues such as terrorism or cyber security, even if more consideration was given in the 2008 update.¹⁷⁶ Thus, it proposes the elaboration of a “Livre Vert Européen de la Défense”, to be written in collaboration between member states, the Commission, the European Parliament and the External Action Service. This would help position environmental security at the heart of the EU’s “Common Security and Defence Policy”.¹⁷⁷ Such a proposal goes much further than suggestions from other policy papers such as the 2008 EU High Representative’s Report on security and climate change. The latter simply recommends to “further integrate adaptation and resilience to climate change into EU regional strategies”.¹⁷⁸

At the international level, progress has been made with the adoption by the UN General Assembly of a resolution in June 2009 explicitly recognising that climate change has security implications.¹⁷⁹ Nevertheless, the “Livre Vert” argues that environmental security is still not taken seriously enough by UN institutions. Many countries continue to consider environmental issues to be economic and social matters, and reject the idea of associating them with international security.¹⁸⁰ Hence, the “Livre Vert” recommends that France and other EU member states use their influence within the UN system to push for a new resolution by the General Assembly that identifies

¹⁷⁵ *Ibid*, p.111

¹⁷⁶ European Security Strategy (2003), *A Secure Europe in a Better World* - Report on the Implementation of the European Security Strategy (2008), *Providing Security in a Changing World*.

¹⁷⁷ Livre Vert, Partie 2: les missions de la défense: la nécessaire mutation de l’armée nationale vers une défense européenne et internationale.

¹⁷⁸ Paper from the High Representative and the European Commission to the European Council (2008), *Climate Change and International Security*, p.11.

¹⁷⁹ Resolution adopted by the General Assembly of the United Nations 63/28: Climate change and its possible security implications, Sixty-third session, Agenda item 107, 11 June 2009.

¹⁸⁰ United Nations (2007), Press Release: *Security Council Holds First-Ever Debate on Impact of Climate Change on Peace and Security - Some Delegations Raise Doubts Regarding the Council’s Role on Issue*. See:

<http://www.un.org/News/Press/docs/2007/sc9000.doc.htm>

environmental degradation linked to climate change as one of the main threats facing the international community.¹⁸¹

b) Adapting to climate change through greater use of preventive action

The “Livre Vert” focuses on preventive action and diplomacy to forestall environmental conflicts before they emerge. Like many current policy analyses, it is critical of international interventions post-Cold War, underlining that excessive military action has shown its limits.¹⁸² It relies on the examples of recent interventions in Afghanistan, Iraq and Libya to highlight the immense difficulties of post conflict reconstruction and stabilization following rapid victory over indigenous regimes. All three countries are now prone to internal collapse, and the “Livre Vert” points to the enormous human and economic cost of these interventions.¹⁸³ As a result, it argues for more diplomacy and preventive action to resolve the root causes of conflicts before they emerge, thus forestalling the need for intervention later on:

*L'action coercitive a montré ses limites (...) (ce qui implique) la nécessité du retour à l'action préventive dans le traitement des crises internationales (...) L'élaboration de solutions préventives et patientes, moins médiatiques, mais également plus acceptables par l'opinion publique (...) est une piste sur laquelle il est impératif d'avancer.*¹⁸⁴

This is especially true for environmental threats, whose origins are often linked to conflicts over the sharing of a resource, which should be addressed through diplomacy and dialogue. While not naming it explicitly, the “Livre Vert” relies on the theory described in the literature review that sees cooperation over environmental issues as a potentially key tool for peacebuilding and reconciliation.¹⁸⁵

¹⁸¹ Livre Vert, Partie 2: les missions de la défense: la nécessaire mutation de l'armée nationale vers une défense européenne et internationale.

¹⁸² Seybolt T. B. (2008), *Humanitarian Military Interventions: The Conditions for Success and Failure*, Oxford University Press.

¹⁸³ Livre Vert, p. 43-44.

¹⁸⁴ *Ibid.*

¹⁸⁵ Floyd (2013), Chapter 5: From Conflict to cooperation? Environmental cooperation as a tool for peacebuilding.

Many other security strategies such as the 2013 French “Livre Blanc” also share this emphasis on the importance of preventive action, since recent international interventions have ended up being more problematic than anticipated.¹⁸⁶ The example of the United States is illustrative on this matter. While the 2003 National Security Strategy under President Bush prioritized military intervention, unilaterally if necessary, to defeat the Al Qaeda threat, the 2010 National Security Strategy under President Obama puts strong emphasis on preventive action, involving diplomacy and multilateral negotiation to resolve crises.¹⁸⁷ The main difference with the “Livre Vert” is that preventive action is not the strategic priority and the main focus of the 2010 US National Security Strategy. It represents one tool amongst others, including military intervention when necessary, that governments must use in a balanced way according to the international context.

The “Livre Vert” outlines several proposals for reinforcing preventive action at the national level. First, it recommends strengthening Parliamentary oversight over defence. It criticizes current procedures in countries such as France or the United States, where the executive does not need Parliamentary approval for launching a military operation abroad. The “Livre Vert” argues that this often leads to abuse and lack of transparency, as was the case with the 2003 US invasion of Iraq. Stronger Parliamentary supervision over defence would help to contain the risk of unilateral military intervention, reinforcing preventive action and diplomacy.¹⁸⁸ While this is supported in some countries such as the UK or Germany, others such as France and the United States are opposed to greater Parliamentary oversight for military interventions. The latter argue that it is likely to compromise the efficiency and ultimately the success of military operations because the legislature may become bogged down in endless debates.¹⁸⁹ Second, the “Livre Vert” proposes to create a section entirely devoted to conflict prevention within the ministry for environmental security described above that would work in close cooperation with the Ministry of Defence. Once more, this goes further than most other security strategies. For example, while the 2013 French “Livre Blanc”

¹⁸⁶ Livre Blanc, Chapitre 6 – La mise en œuvre de la stratégie: D. La prévention.

¹⁸⁷ *National Security Strategy of the United States* (September 2002 and May 2010), The White House.

¹⁸⁸ Livre Vert, Partie 2, section 2.4.3.2 : Le renforcement du contrôle parlementaire des opérations internationales.

¹⁸⁹ Livre Blanc (2013) - US National Security Strategy (2010).

mentions the idea of creating an institution for conflict prevention, it points to the potential overlap with traditional diplomatic channels.¹⁹⁰

At the European level, the “Livre Vert” recognises that the European External Action Service (EEAS) has been active in preventive diplomacy, including for example the central role it played in the peaceful secession of Aceh Province from Indonesia between 2004-08. However, it is critical of what it considers as insufficient preventive action for environmental crises, arguing that the EU has tended to focus instead on diplomacy for high profile tension points such as the Israeli-Palestinian conflict or Iran’s nuclear programme.¹⁹¹ It proposes to create an office entirely dedicated to preventive action for environmental security issues within the EEAS, and relies on the fact that preventive action enjoys a strong legal base in the EU Treaties.¹⁹² Moreover, as with the national level, the “Livre Vert” argues that reinforcing the European Parliament’s powers of oversight over EU external relations can strengthen preventive action. For example, it proposes to transform the current Sub-Committee on Security and Defence into a full standing committee in the European Parliament.¹⁹³ While other policy papers, such as the EU High Representative’s Report on Security and Climate change, also support the reinforcing of preventive action, the strategies it proposes are less ambitious. The report simply recommends relying on the existing institutional framework, particularly on the High Representative, to engage in international preventive diplomacy on environmental crises, rather than creating any new structures.¹⁹⁴

At the international level, the “Livre Vert” welcomes the progress that has been made over the last two decades in reinforcing preventive action within the UN system, for example the creation in 2005 of a new UN Commission for Peacebuilding and Post-conflict Reconstruction. Nevertheless,

¹⁹⁰ Livre Blanc (2013), Chapitre 6 – La mise en œuvre de la stratégie: D. La prévention.

¹⁹¹ Livre Vert, Partie 2, Section 2.1.2: La prévention des conflits, voie pour une relance de l’Europe de la défense.

¹⁹² Article 42 TEU: *The Union may use them (operational capacity provided by member states) on missions for peacekeeping, conflict prevention and strengthening international security in accordance with the principles of the United Nations Charter.*

Article 43 TEU: *The tasks referred to in Article 42(1) ... shall include joint disarmament operations ... conflict prevention and peace-keeping tasks.* (Author’s emphasis).

¹⁹³ Livre Vert, p.111.

¹⁹⁴ *Climate Change and International Security* (2008), Paper from the High Representative and the Commission.

it argues that such initiatives are also insufficient because they do not focus enough on issues of environmental security. Thus, the “Livre Vert” recommends that France, together with other EU member states, submit a resolution to the UN General Assembly for creating new categories under international law such as a “State facing acute environmental challenges” or the notion of “environmental refuge” to reinforce the legal base for global preventive action.¹⁹⁵ Second, it suggests the creation of a specialized UN agency on matters of environmental security, particularly for climate refugees, that would rely on preventive action to address the root causes of environmental problems.¹⁹⁶ Once more, such strategies are more ambitious than those proposed by other policy papers on the topic. For example, while the 2009 report by the UN Secretary General on climate change also proposes to reinforce mechanisms for global preventive diplomacy on environmental issues, it proposes to strengthen the existing framework of UN institutions and international law, rather than create new institutions.¹⁹⁷

However, it should be noted that the “Livre Vert” does not rule out the use of force as a last resort if all other options have failed.¹⁹⁸ Preventive action cannot always succeed, and environmental degradation and resource scarcity are likely to enhance tensions that may result in civil or inter-state conflict, which might in some cases require intervention by the international community (to be analysed in more detail below). The main difference between the “Livre Vert” and other policy papers is that the strategic focus of “green defence” is on preventive action, whereas it represents just one policy option amongst others in the 2013 “Livre Blanc”.

¹⁹⁵ Livre Vert, p.111.

¹⁹⁶ *Ibid*, Partie 2: les missions de la défense: la nécessaire mutation de l’armée nationale vers une défense européenne et internationale.

¹⁹⁷ *Climate Change and its possible security implications* (2009), Report by the UN Secretary-General.

¹⁹⁸ Livre Vert, Partie 2: les missions de la défense: la nécessaire mutation de l’armée nationale vers une défense européenne et internationale.

c) Adapting to climate change by reinforcing the civilian capacity of the military

The “Livre Vert” highlights the need to develop the civilian potential of the military for responding to natural disasters, since hard military power will be of little use in dealing with a climate change-induced increase in extreme weather events such as hurricanes, floods or droughts. It argues that civilian rescue missions by the military offer the most appropriate framework for protecting populations from natural disasters. Soldiers are trained and equipped for handling difficult weather conditions, and can be rapidly dispatched in large numbers to remote locations.¹⁹⁹ Examples include international military efforts following Typhoon “Haiyan” that devastated the Philippines in November 2013, or the deployment of the Franco-German brigades during the flooding of Saxony and Bavaria in June 2013. Not only did they rescue and assist survivors, but they also contributed to rebuilding and maintaining order. The “Livre Vert” argues that national militaries must be better prepared for an increase in civilian rescue missions both domestically and abroad, when the scale of destruction caused by natural disasters has overwhelmed local authorities:

Le dérèglement climatique (...) appelle une orientation de nos armées vers une capacité renforcée de secours et d'assistance (...) Détentrice d'une capacité de déploiement en homes et en matériels importante (...) l'armée représente un acteur essentiel dans (...) la réaction face aux catastrophes naturelles d'ampleur exceptionnelle. Ces capacités, éprouvées lors de nombreuses interventions nationales et internationales, représenteront une part croissante de l'activité de nos soldats.²⁰⁰

The 2013 French “Livre Blanc” emphasises the importance of civilian missions focused on post-conflict reconstruction and peace-keeping, but it does not go into detail on how this could be applied in the context of natural disasters.²⁰¹ By contrast, many other countries have started to prepare their military for the type of civilian rescue missions needed to manage environmental crises. For example, Germany dedicated “Bundeswehr” units to handle the dire consequences of the Hamburg flooding in February 1962. Likewise, the American military has begun training marines to intervene and protect populations in areas hit by hurricanes, floods and droughts. The US Quadrennial Defense Review explains that:

¹⁹⁹ Livre Vert, Partie 2, Section 2.2: La mission d'assistance en situation de catastrophe naturelle.

²⁰⁰ *Ibid*, p.52-53.

²⁰¹ Livre Blanc (2013), Chapitre 7 – Les Moyens de la stratégie: B. L'approche globale dans la gestion des crises extérieures.

*Extreme weather events may lead to increased demands for defense support to civil authorities for humanitarian assistance or disaster response both within the United States and overseas.*²⁰²

However, the “Livre Vert” posits that these initiatives are insufficient, as was demonstrated by the US army’s belated and inadequate response to hurricane Katrina that devastated the city of New Orleans in 2006.²⁰³ This is because these units are created on an ad-hoc base for temporary missions when natural disasters hit the country, and then return to their regular military activities after the crisis has abated. By contrast, the “Livre Vert” proposes to create permanent units within national militaries entirely dedicated to and specifically trained for civilian rescue missions in areas hit by natural disasters, both at home and abroad. It also outlines ways to combine the joint deployment of such “green special forces” with other conventional sections of the military, such as the air force, navy and ground forces, a strategy which goes further than most other policy papers. It explains that an effective response to natural disasters will require joint operations from many different sections of the military, each of which can contribute a different but complementary type of effort.²⁰⁴ The “Livre Vert” also underlines that current evolutionary trends in many modern militaries, which prioritize qualitative advanced technology over the number of soldiers and machinery, is not compatible with the needs of a “green defence”. Civilian rescue missions following natural disasters do not require advanced missile technologies, but depend on large numbers of troops, ships and airplanes, as was demonstrated by the mobilization of over 100 000 soldiers following the tsunami that hit Japan in 2011.²⁰⁵

At the European level, while the “Livre Vert” supports initiatives such as the Disaster Preparedness European Community Humanitarian Office (DIPECHO) launched in 1996 to help poor countries manage the consequences of natural disasters, it believes the latter does not go far enough. This is because DIPECHO relies too much on development aid and does not mobilize the civilian potential of the military. The EU is ideally positioned to engage in civilian rescue missions abroad in

²⁰² US Quadrennial Defense Review Report (2010), p.85.

²⁰³ Livre Vert, p. 53.

²⁰⁴ *Ibid*, Partie 3 : les défis posés à l’armée de demain.

²⁰⁵ *Ibid*, p.100.

response to natural disasters, as most of the CSDP's missions already focus on civilian tasks²⁰⁶. Moreover, the legal base for civilian missions in the EU Treaties is strong.²⁰⁷ Thus, the "Livres Vert" proposes to rely on this solid base for EU civilian operations and apply it to situations of humanitarian assistance following natural disasters. This is similar to the strategies advocated by other policy papers such as the report by the EU High Representative on climate change and security, which proposes to "further build-up EU (...) capabilities including civil protection and the use of crisis management and disaster instruments to contribute to the response to the security risks posed by climate change".²⁰⁸ However, the "Livres Vert" argues that, while EU member states agreed to create a rapid reaction force for handling natural disasters by the end of 2014, they decided to separate it from the CSDP framework, which is likely to compromise its effectiveness. This is because member states are to contribute and manage their own logistical support without a strong mechanism to coordinate them. By contrast, the "Livres Vert" proposes to create a rapid reaction corps fully integrated into the CSDP and specialized in civilian rescue missions following natural disasters, both on the European territory and abroad, fully coordinated and managed by the EEAS.²⁰⁹

At the international level, the "Livres Vert" suggests the possibility of relying on existing principles such as the concepts of "humanitarian intervention" or the "responsibility to protect", but apply them in the context of civilian rescue missions following natural disasters.²¹⁰ Both notions are contentious as they potentially intrude on national sovereignty, which continues to be a pillar of

²⁰⁶ By 2010, the EU had embarked on a total of 27 missions in 16 countries on 3 different continents, and 15 of these missions have focused on civilian objectives such as of post-conflict stabilization and reconstruction.

²⁰⁷ Article 42 TEU: *The common security and defence policy ... shall provide the Union with an operational capacity drawing on **civilian** and military assets.*

Article 43 TEU: *The Union may use **civilian** means ... (including) humanitarian and rescue tasks ... military advice and assistance tasks.* (Author's emphasis).

²⁰⁸ *Climate Change and International Security* (2008), Paper from the High Representative and the Commission, p.10.

²⁰⁹ Livres Vert, p.52.

²¹⁰ A traditional definition of the concept of "humanitarian intervention" is provided for by Sean D. Murphy (1996) in *Humanitarian Intervention: The United Nations in an evolving world order 11-12*:

"The threat or use of force by a state, group of states, or international organization primarily for the purpose of protecting the nationals of the target state from wide-spread deprivations of internationally recognized human rights".

A good definition of the notion of "responsibility to protect" is provided for by the "R2P coalition" website: "The principles and elements of The Responsibility to Protect doctrine were elaborated in the 2001 report of the International Commission on Intervention and State Sovereignty (ICISS). Its basic principles are two-fold:

- 1) Inherent in the concept of sovereignty is a state's responsibility to protect its populations; and
- 2) If a population is suffering serious harm, and the state in question is unwilling or unable to halt or avert it, the responsibility to protect those people lies in the international community". See:

<http://r2pcoalition.org/content/view/full/73/93/>

international law. Critics accuse them of hiding the reality of self-interested interventions in pursuit of national interests.²¹¹ However, civilian rescue missions linked to environmental crises do not involve waging war to remove an indigenous regime, but focus on assisting populations, often at the express demand of local authorities. The “Livre Vert” implies that international civilian rescue operations to help countries suffering from natural disasters should be coordinated by the UN General Assembly, and, if the situation is critical, by the Security Council, in conformity with international law. Environmental issues are currently the purview of the UN Economic and Social Council, and many countries are opposed to extending them to the Security Council, which focuses on global security matters.²¹² Nevertheless, the Security Council has already passed resolutions to provide police and military assistance to protect humanitarian assistance efforts following natural disasters in places such as Haiti, so the aim would be to reinforce its implication in natural disaster relief.²¹³ Once more, this strategy goes further than most other policy papers dealing with environmental security, such as the 2009 report by the UN Secretary-General on the topic. While the latter does emphasise that the increasing severity of natural disasters will require more coordination by the international community for civilian rescue missions, it shies away from proposing any grand plan on how to synchronize them through the UN system, and simply encourages countries to reinforce channels for dialogue and cooperation.²¹⁴

d) Adapting to climate change by moving beyond a state-centric view of security

The “Livre Vert” advocates the need to move beyond a state-centric conception of security and adopt a transnational, possibly even a supranational, strategic framework. While national security strategies around the world acknowledge increasing transnational interconnections linked to

²¹¹ Baylis J., Smith S. and Owens P. (2011), *The Globalization of World Politics* (5th edition), Oxford University Press, Chapter 31: Humanitarian intervention in world politics.

²¹² United Nations (2007), Press Release: *Security Council Holds First-Ever Debate on Impact of Climate Change on Peace and Security - Some Delegations Raise Doubts Regarding the Council's Role on Issue*. See: <http://www.un.org/News/Press/docs/2007/sc9000.doc.htm>

²¹³ United Nations Security Council Resolution 1908, adopted on the 19th of January 2010.

²¹⁴ *Climate Change and its possible security implications* (2009), Report by the UN Secretary-General.

globalization and the corresponding need to reinforce multilateral governance platforms, they continue to consider the nation state as the ultimate strategic priority, especially for matters of defence. This is unsurprising, as there is consensus amongst scholars that the nation-state remains one of the core elements in the international system, as it has been since the Treaty of Westphalia enshrined the concept of national state sovereignty in 1648.²¹⁵ It might have been expected that European countries, having taken part in regional integration, would be less prone to a state-centric conception of security. For example, the 2013 French “Livre Blanc” underlines the mutual interdependence and solidarity between members of the European Union.²¹⁶ Nevertheless, it continues to assert that the preservation of national independence and sovereignty is one of the main strategic priorities:

*Les fondements de la stratégie de défense et de sécurité nationale: A. Préserver notre indépendance et notre souveraineté. Attribut essentiel de la nation, la souveraineté est un fondement de la sécurité nationale (...) le maintien de la souveraineté nationale est une responsabilité essentielle du pouvoir politique. Il fonde la mission des forces armées (...) L'efficacité des actions engagées à ce titre par les forces de défense et de sécurité implique de pouvoir disposer (...) d'une complète indépendance de décision et d'action.*²¹⁷

The “Livre Vert” argues that a state-centric conception of security is increasingly inappropriate given the rapidly changing context of world politics in the 21st century. First, it highlights that globalization has accelerated over the last few decades, and that the planet is becoming a single interdependent community.²¹⁸ This was underlined in 2008 when the collapse of the American subprime market rapidly turned into a global financial crisis. The increasing pace of globalization, with enhanced transnational movements of people, goods, capital, ideas and knowledge, is both a source of opportunity as well the origin of new transnational security threats and risks. This renders a state-centric conception of security increasingly inappropriate for addressing new threats stemming from global interdependence. For example, the “Livre Vert” underlines that climate change is a quintessentially global threat, as increasing temperatures,

²¹⁵ Heywood A. (2011), *Global Politics: Palgrave foundations*, Palgrave Macmillan Press, Chapter 7: The Nation State in a Global Age.

²¹⁶ Livre Blanc (2013), Chapitre 5, Partie B. La France dans l'Union Européenne.

²¹⁷ *Ibid*, p.19-20.

²¹⁸ Livre Vert, Partie 1, Section 1.1: L'interdépendance croissante d'un monde en pleine mutation.

greenhouse gas emissions, or sea level rise do not stop at national boundaries.²¹⁹ While scientists underline that the impact of climate change will vary from region to region, there is growing consensus that all nations around the world will suffer from its effects. Thus, any concerted attempt to effectively address future environmental challenges must concentrate on solutions at the regional and global level, in addition to solutions at the national and local levels.

This viewpoint is similar to the analyses proposed by both the UN and the EU, as they represent international and regional organizations. While they are more cautious in their rhetoric, both the European Security Strategy and the UN Secretary-General's report on environmental security agree that the changing nature of world politics in the 21st century makes it necessary to move beyond a state-centric conception of security. They also concur that only a transnational strategic framework offers any hope for successfully addressing new challenges linked to globalization and climate change.²²⁰

e) Adapting to climate change by strengthening regional integration

Due to its emphasis on the need to move beyond a state-centric conception of security, the "Livre Vert" supports the strengthening of regional integration, particularly on matters of defence. It welcomes the progress that has been made in Europe since the Maastricht Treaty in creating the EU's "Common Foreign and Security Policy" (CFSP) as well as the "Common Security and Defence Policy" (CSDP). The Lisbon Treaty in particular is supposed to have strengthened the EU's cohesion as an international actor with four significant innovations: a Permanent European Council President, a new High Representative for Foreign Policy, the creation of the "European External Action Service", and the legal enshrining of the "mutual assistance and solidarity" clauses.²²¹ Moreover,

²¹⁹ Livre Vert, Partie 1, Section 1.2.1 Le changement climatique : une donnée stratégique pour la défense.

²²⁰ European Security Strategy (2003) - Report of the UN Secretary General on climate change and its possible security implications (2009).

²²¹ Article 42(7) TEU: *If a Member State is the victim of armed aggression on its territory, the other Member States shall have towards it an obligation of aid and assistance by all the means in their power ...*

external relations have been explicitly defined as a Union competence for the first time, reinforcing its standing under EU law where it was previously subordinated to other Community policies.²²²

Nevertheless, the “Livre Vert” agrees with the 2013 “Livre Blanc” and the European Security Strategy that the current framework for EU external relations should be reinforced. While several new institutional mechanisms have been created by subsequent treaties, the CSDP continues to rely on the so-called “Petersberg tasks” agreed to in 1992. Although the Lisbon Treaty expanded the range of possible missions, the “Livre Vert” argues that the “Petersberg tasks” remain “minimalist” and are inadequate, since they are mostly based on humanitarian and “soft security” tasks.²²³ It underlines that reinforcing EU integration for external relations is becoming urgent since Europe is surrounded by several unstable regions. These include North Africa and the Middle East, which have been seriously destabilised by the Arab Spring, and also Eastern Europe and the Caucasus, with Russian interventionism in Georgia and the Ukraine. Both situations have highlighted the inadequacy of the EU’s current structure for foreign policy, because it was only able to offer civilian “soft security” assistance. This led large member states such as France, the UK, Germany or Poland to assume core military and diplomatic responsibilities instead.

The “Livre Vert” also emphasises that Europe’s neighbours in North Africa, the Middle East and Central Asia are likely to be amongst the regions of the world most exposed to climate change, with the risk of major environmental crises in the near future right on Europe’s borders.²²⁴ While not sharing the same degree of concern for environmental problems, both the 2013 “Livre Blanc” and the European Security Strategy agree that the changing context of world politics in the 21st century, with

Article 222 TFEU: *The Union and its Member States shall act jointly in a spirit of solidarity if a Member State is the object of a terrorist attack or the victim of a natural or man-made disaster. The Union shall mobilise all the instruments at its disposal, including the military resources made available by the Member States...*

²²² Article 24(1) TEU: *The Union’s competence in matters of common foreign and security policy shall cover all areas of foreign policy and all questions relating to the Union’s security, including the framing of a common defence policy.*

Pieter Jan Kuijper *et al.* (2013), *The Law of EU External Relations: Cases, Materials and Commentary on the EU as an International Legal Actor*, Oxford University Press, p.852.

²²³ Livre Vert, Partie 2, Section 2.6.2.2.1 Les missions de Petersberg: un cadre à dépasser.

The “Petersberg tasks” have been enshrined into EU law with Article 17 and 42 TEU, and include: humanitarian and rescue tasks, conflict prevention and peace-keeping tasks, joint disarmament operations, military advice and assistance tasks and post-conflict stabilisation tasks.

²²⁴ *Ibid*, Partie 2, Section 2.6.2.2.2 L’Europe, pôle stabilisateur de son voisinage.

new challenges stemming from globalization, renders it imperative to reinforce Europe's cohesion on the international stage. The "Livre Blanc" also concurs that Europe is surrounded by some unstable regions, which poses a security threat that should be met by reinforcing cooperation for foreign and defence policy, moving beyond the "Petersberg tasks".²²⁵

As a result, many of the "Livre Vert's" proposals for reinforcing the CSDP are mirrored in other policy papers, particularly the 2013 French "Livre Blanc". For example, both underline that France, as the principal military power in continental Europe, should lead efforts to reinforce European defence cooperation. This could start with the strengthening of defence partnership agreements such as the Lancaster House Treaties (2010) between France and United Kingdom, or the so-called "Weimar triangle" between France, Germany and Poland, recently extended to Spain and Italy.²²⁶ This core group of countries could initiate enhanced cooperation in the management of logistical means for transport and refuelling for air and sea, the buying of military equipment, and establish common training centres for soldiers. Such initiatives could then be integrated into the CSDP, expanding into new areas such as a common maritime surveillance policy, closer coordination of air defence and space policies (the EU's Galileo satellite programme), and greater cooperation on cyber security.²²⁷ Both the "Livre Blanc" and the "Livre Vert" also agree on the need to reinforce institutions such as the European External Action Service or the European Defence Agency, as well as strengthen coordination mechanisms between them to enhance cohesion for EU external relations. Finally, they also share the view that common EU defence structures must be supported by more integration of European industries and markets for security and military equipment, in order to guarantee technological and strategic autonomy.²²⁸

²²⁵ European Security Strategy (2003) - Livre Blanc (2013).

²²⁶ Livre Vert, Partie 2, Section 2.6.3.2 Les alliances et engagements militaires de la France - Livre Blanc (2013), Chapitre 5, Partie B. La France dans l'Union Européenne.

²²⁷ Livre Vert, Partie 2, Section 2.5.1.3 Pour un plan d'engagement des Etats membres en matière de défense commune - Livre Blanc (2013), Chapitre 5, Partie B. La France dans l'Union Européenne.

²²⁸ Livre Vert, Partie 3 : les défis posés à l'armée de demain - Livre Blanc (2013), Chapitre 7, Partie E. L'industrie de défense et de sécurité.

The fundamental point of disagreement between the “Livre Vert” and other policy papers on EU defence relates to the degree of integration that is required. Both the European Security Strategy and the 2013 French “Livre Blanc” emphasise that, while more cooperation is needed, it must continue to be based on intergovernmental mechanisms. They advocate a gradual step by step reinforcement of cooperative structures, which can be realized within the existing framework of EU Treaties.²²⁹ The “Livre Vert” sharply disagrees, and argues that the framework for EU external relations is weak precisely because it continues to rely exclusively on intergovernmental cooperation and unanimity in the European Council.²³⁰ It underlines that the changing nature of world politics in the 21st century means that only a federal European Union has the capacity to assert a strong voice on the world stage. Environmental threats linked to climate change render it urgent to engage in a “federal leap forward”.²³¹

The “Livre Vert” argues that individual member states will not have the capacity to handle on their own the potentially devastating effects of global warming. Only Europe as a whole has enough weight and sufficient resources both to protect itself and play a major role in international environmental politics. The EU is still widely considered to be a leading force in this area, as it was instrumental in pushing through the ratification and implementation of the Kyoto Protocol, so far the most ambitious attempt ever made to cut global greenhouse gas emissions. However, the “Livre Vert” underlines that bolder action will be needed if the worst effects of climate change are to be avoided. This will be difficult to achieve as long as the EU continues to be bogged down by internal divisions stemming from the need to achieve unanimity. This was lethal for the EU during the 2009

²²⁹ European Security Strategy (2003), Part III: Policy Implications for Europe - Livre Blanc (2013), Chapitre 5, Partie B. La France dans l’Union Européenne.

²³⁰ For example, member states insisted on including two declarations as annexes of the Lisbon treaty to emphasise that the new provisions on EU external relations do not affect national competence to carry out their own independent foreign and defence policies. See Declarations 13 and 14 annexed to the Final Act of the Intergovernmental Conference, which adopted the Lisbon Treaty, signed on 13 December 2007, Official Journal C 115, 9.5.2008, p.343.

²³¹ Livre Vert, p.74.

world summit at Copenhagen, where it was largely bypassed and ignored by other powers such as the United States and China.²³²

The “Livre Vert” outlines far-reaching proposals to create a federal European defence structure, the first step in the establishment of a federal European Union.²³³ It believes the project of an EU “green defence” can help to infuse a new dynamic for European integration and provide a springboard for a “federal leap forward”. First, it recommends reinforcing the powers of the High Representative by turning the position into a federal European minister of external relations. This would involve the transformation of the European External Action Service into a federal European ministry of foreign affairs and defence, placed above national ministries and with the power to set the agenda for the EU as a whole.²³⁴ Second, it proposes the creation of a federal European army under the authority of the EEAS, merging all national militaries into a single unit capable of being deployed in operations around the world. Third, the “Livre Vert” argues that the possession by two EU member states of an independent military nuclear capacity is incompatible with a federal European defence, and implies that France should extend its nuclear shield to cover the entire territory of the European Union.²³⁵ The “Livre Vert” acknowledges it will be very difficult to convince EU member states to agree on such far-reaching transfers of national sovereignty. This is because foreign and defence policy is a core sovereign power, and European countries have up until now been very sensitive about preserving it. Indeed, other policy papers such as the 2013 “Livre Blanc” and the European Security Strategy insist that any federal integration in the area of external relations remains utopic. They argue that the only way forward lies in a pragmatic, step by step reinforcing of intergovernmental cooperation.²³⁶

Another controversial element in the “Livre Vert” is its position on the relationship between NATO and a reinforced CSDP. It argues that the strengthening of a common European defence is not

²³² Hill C. (2011), Chapter 15: The Challenge of the Environment, Energy and Climate Change.

²³³ Livre Vert, p.73.

²³⁴ *Ibid*, p.76-77.

²³⁵ *Ibid*, Partie 3, Section 3.1.2 L’arme nucléaire : la fin d’un dogme.

²³⁶ European Security Strategy (2003) - Livre Blanc (2013).

compatible with the integrated command structure of NATO, where the United States enjoys a dominant influence. More than twenty years after the ending of the Cold War, the “Livre Vert” believes the rationale for NATO’s continued existence is questionable.²³⁷ This is especially true now that President Obama has enhanced the strategic pivot towards East Asia begun by his predecessors, and is gradually disengaging from Europe. Moreover, given that the crisis between Cyprus and Turkey is still ongoing, there remains a tension between Cyprus’ membership in the EU and Turkey’s membership of NATO. This implies the need to enhance the distinction between the two alliance systems.²³⁸ For all these reasons, the “Livre Vert” emphasises that it is now time for European countries to assume their own defence independently from the United States. It supports the creation of a strong EU defence structure outside of NATO, and appears to suggest the latter would gradually wither away under such circumstances. This argument coincides with the views of several neo-realist scholars such as Kenneth Waltz, who also believed that NATO would not survive the ending of the Cold War, which had provided the rationale for its existence.²³⁹

However, this sharply differs from the position of most official policy papers. For instance, both the 2013 French “Livre Blanc” and the European Security Strategy continue to see NATO as the pillar of Europe’s security.²⁴⁰ They devote many pages justifying how a stronger EU defence structure is perfectly compatible with continued NATO membership, and that both are mutually reinforcing. This is because NATO can provide essential equipment, expertise and military bases to support the CSDP, while a more integrated European defence pillar would strengthen NATO as a whole. Likewise, most scholars from the neo-liberal school of international relations, such as Leggold, agree that NATO can survive both the end of the Cold War and a reinforced European defence structure, since the Western Alliance is founded on common values and interests.²⁴¹ However, this depends on whether or not EU external relations continue to be based on

²³⁷ Livre Vert, Partie 2, Section 2.5.1 L’objectif d’une Europe assumant la défense de son territoire.

²³⁸ *Ibid*, p.85.

²³⁹ Waltz K. (1993), “The Emerging Structure of International Politics”, *International Security* 18/2: 44-79.

²⁴⁰ European Security Strategy (2003) - Livre Blanc (2013), Chapitre 5, Partie A. La France dans l’OTAN.

²⁴¹ Leggold J. (1998), “NATO’s Post-Cold War Collective Action Problem”, *International Security* 23/1: 76-106.

intergovernmental cooperation. If the EU does one day engage in the “federal leap forward” supported by the “Livre Vert”, it is difficult to imagine how this would be compatible with NATO’s existence under its current form. There would have to be a change from a multilateral to a bilateral alliance system between two powers of more or less equal strength. This would position the EU and the US on a more equal footing within the Western alliance, which implies that the United States would lose its current dominant position. The latter may not agree to this since, up until now, American support for greater European military self-reliance has been conditional on the so-called “three D’s”: “no discrimination against non-EU NATO members, no decoupling of European and North American security, and no duplication of NATO’s operational planning system or its command structure”.²⁴²

f) Adapting to climate change by reinforcing global governance

The “Livre Vert” underlines that regional integration in matters of defence and foreign policy, while essential, will not be sufficient on its own. Since climate change is a truly global threat, the strengthening of regional institutions is a first step, which then needs to be combined with the reinforcing of global governance within the UN framework. Only through a concerted effort from the international community as a whole can there be any hope of finding lasting solutions to global environmental problems. There is widespread consensus amongst both policy makers and academia that the UN remains, despite its flaws, the only legitimate framework for global governance. The “Livre Vert” is in agreement, as the UN includes 193 member states, representing the quasi totality

²⁴² US Secretary of State Madeleine K. Albright (December 7 1998), “The right balance will secure NATO’s future”, *Financial Times* - The three D’s were subsequently amended by NATO Secretary General Lord Robertson into the three ‘I’s’: indivisibility of the transatlantic link; improvement of capabilities; and inclusiveness of all Allies. Hamilton D., *American Perspectives on the European Security and Defense Policy*, Center for Transatlantic Relations, p.144.

of the world population, with only eleven states not being full members because their sovereignty is contested.²⁴³

Despite its legitimacy, the “Livre Vert” highlights that the current UN system of global governance is insufficient. Again, such views coincide with a widespread consensus that while the UN has had some successes, the current institutional framework is in urgent need of reform. Much of the criticism has been focused on the permanent membership of the Security Council, often accused of being anachronistic. The “Livre Vert” denounces the fact that it is composed of the five winners from WWII and has failed, more than seventy years after the war has ended, to integrate Germany and Japan.²⁴⁴ More importantly, it has yet to include new rising powers such as Brazil, India or South Africa, which will become increasingly problematic as their economies continue to grow, perhaps one day surpassing Western nations such as France and the UK that enjoy permanent membership. There is also a need to make the Security Council representative of all regions in the world, as currently there are no permanent members from Africa, Latin America or the Middle East. As a result, the “Livre Vert” recommends an increase in the number of permanent seats in the UN Security Council to include new members such as Germany, Japan, India or Brazil. This would make the institution more legitimate and representative of the changing balance of global power.²⁴⁵ The idea of reforming the Security Council is not new, and has been discussed by the international community for decades. It is supported by many countries around the world, including France. For example, the 2013 French “Livre Blanc” proposes to include new permanent members such as Germany or Brazil.²⁴⁶ Likewise, the former UN Secretary General Kofi Annan attempted to include six new permanent members as part of his comprehensive reform of the UN system in 2005.²⁴⁷ The

²⁴³ Livre Vert, Partie 2, Section 2.4.1.2 L’Organisation des Nations Unies, seul cadre légitime d’une monopolisation internationale de la violence.

²⁴⁴ *Ibid*, Partie 2, Section 2.4.1 Le renforcement de la sécurité collective onusienne.

²⁴⁵ *Ibid*.

²⁴⁶ Livre Blanc (2013).

²⁴⁷ However, Annan failed in the end to secure approval from several of the five permanent members, keen to protect their privileged status within the organization. “The United Nations: Kofi Annan’s reform plan” (2005), *The Economist*. See: <http://www.economist.com/node/3786918>

real originality of the “Livre Vert’s” recommendations for reinforcing global governance lies in its proposed reforms over the medium and long run, which are far more ambitious and far reaching.

The “Livre Vert” underlines that as environmental threats become more acute over the next few decades, the Security Council will increasingly have to manage global security crises involving civil and inter-state conflicts over scarce resources, which might require UN peace-keeping operations. While the Security Council held its first debate on environmental security on the 17th of April 2007, this remains an exceptional occurrence. The “Livre Vert” emphasises the need to institutionalise more regular debates on environmental security within the Security Council. This is also one of the reasons why enlarging the institution’s permanent membership is so important. Powerful countries that are not included are likely to become reluctant in contributing to international efforts for tackling global environmental crises, and a concerted effort by all of the world’s main powers will be needed in order to succeed. This strategy is much more ambitious than most other policy papers, such as the 2009 report by the UN Secretary-General on climate change and security. While the latter agrees that environmental security issues should be taken more seriously by UN institutions, the report simply recommends holding more regular debates within the General Assembly on this matter, and certainly not extending them to the Security Council.²⁴⁸

Furthermore, the “Livre Vert” argues that the UN system of global governance, similarly to the EU’s structure for external relations, is inadequate because it relies on intergovernmental decision-making, which tends to paralyze it.²⁴⁹ Even if the General Assembly votes by majority, its resolutions are not binding and amount to little more than recommendations, as there is no coercive mechanism to enforce them. Moreover, although resolutions from the Security Council are binding, the latter often become prisoner of the power politics strategies among its five permanent members, who tend to veto resolutions that go against their national interests. Consequently, it has proven very difficult for the UN system to have any meaningful impact on global environmental challenges. The

²⁴⁸ *Climate Change and its possible security implications* (2009), Report by the UN Secretary-General.

²⁴⁹ Livre Vert, Partie 2, Section 2.4.1 Le renforcement de la sécurité collective onusienne.

UN has relied on periodic world summits to negotiate international agreements for cutting greenhouse gas emissions, which have consistently yielded minimalist results. Likewise, the UN stood by and was powerless to prevent Russia from planting its flag on the North Pole in August 2007, since President Putin threatened to use his veto on any Security Council resolution. This seems to highlight the incapacity of the UN system as it exists today to effectively protect the global commons from intrusion and exploitation by powerful countries.

For all these reasons, the “Livre Vert” argues that bold and radical action will be needed to strengthen global governance. First, the powers of the UN General Assembly must be reinforced, so that its resolutions can be binding and amount to more than mere recommendations.²⁵⁰ Given the near universality of the institution, it has the potential to become a genuine global governance forum. The “Livre Vert” implies this could be achieved by reinforcing the institutional framework of international law, where the international court of justice would be responsible for enforcing UN resolutions.²⁵¹ Countries and individuals which do not abide by international agreements to protect the global commons or cut emissions would be sanctioned and have to pay fines, much like current mechanisms in the World Trade Organization. While the “Livre Vert” does not say so explicitly, it also appears to suggest that, as a last resort, the UN Security Council would pass a resolution to intervene militarily and stop a country from violating the global commons. There would need to be a gradual shift from unanimity to majority voting in the Security Council, putting an end to the perennial obstacle of the veto system.

The problem is that the “Livre Vert” is not very clear about exactly how this type of quasi-federal global governance is ever to be achieved, and it can easily be dismissed as wishful thinking and idealism. Indeed, such proposals are far more radical than those of other more conventional analyses. While there is broad agreement that current mechanisms of global governance are inadequate, most official policy papers simply recommend reinforcing existing multilateral policy

²⁵⁰ *Ibid*, Partie 2, Section 2.4.1 Le renforcement de la sécurité collective onusienne.

²⁵¹ *Ibid*, Partie 2, Section 2.4.1.1 Le droit et la justice internationale, première condition de la paix et de la sécurité internationale.

platforms such as the G-7 or the G-20.²⁵² Others propose more modest reforms of the UN system, which could take the form of a specialised unit within the UN Economic and Social Council dedicated to matters of environmental security.²⁵³ The concept of federal world governance is a classic topic that has been analysed by prominent philosophers such as Immanuel Kant.²⁵⁴ Although it has also been taken-up by some contemporary writers such as Nicholas Hagger, this concept is absent from most official policy papers due to its idealism.²⁵⁵

g) Conclusion of the first section

Overall, it is apparent from this first section that the strategic paradigm outlined by the “Livre Vert” is focused on “high politics” strategies for adapting to future environmental challenges. The policies it proposes are aimed at absorbing the shock stemming from environmental degradation by reinforcing and creating new military and governance structures. This strategic framework is comprehensive in that policies are proposed at the national, European and international levels, both over the short and the long run. Moreover, many of the strategies it recommends go much further than those found in other policy papers, to such an extent that some parts of the “Livre Vert” can be considered as idealistic and utopian. Nevertheless, it is equally clear that the strategic focus is narrow. There is no analysis of “low politics” strategies, which includes economic and social policies aimed at mitigating the impact of environmental threats. The second section of this chapter will seek to determine whether “low politics” strategies of mitigation can represent a viable strategy for addressing environmental threats compared to the “high politics” strategies of adaptation described above. This will allow us to ascertain whether or not the strategic paradigm of the “Livre Vert” is comprehensive, and if the concept of a “green defence” should be broadened to also include “low politics” strategies for achieving sustainable development.

²⁵² Livre Blanc (2013) - US National Security Strategy (2010).

²⁵³ *Climate Change and its possible security implications* (2009), Report by the UN Secretary-General.

²⁵⁴ Immanuel Kant wrote two main texts on cosmopolitanism and world government: *Idea for a Universal History with a Cosmopolitan Purpose* (1784) and *Perpetual Peace: A Philosophical Sketch* (1795).

²⁵⁵ Hagger N. (2010), *The World Government: A Blueprint for a Universal World State*, O Books Press.

2) A comparative analysis of “low politics” strategies for achieving sustainable development and mitigate the impact of environmental degradation

a) Strategies for mitigating vital resource scarcity (water and food)

The “Livre Vert” mentions the great potential of desalination technology, together with the development of new agricultural techniques and infrastructure, for addressing the problem of vital resource scarcity. However, it does not analyse this in detail, as it concentrates rather on “high politics” strategies for adapting to the impact of environmental threats. This stands in contrast to many other policy papers on environmental security, which tend to focus more on “low politics” strategies for mitigating water and food scarcity with policies of sustainable development. For example, the 2012 report by the NIC on global water scarcity underlines that up to 2050, the best solutions will involve improving infrastructure, technology and investments.²⁵⁶ First, since agriculture represents 70% of global freshwater consumption, reinforcing farming infrastructure and making better use of agro-technologies can enhance efficiency and reduce water wastage. This includes increasing the availability of existing technologies for water conservation, soil irrigation and land levelling (to generate an even distribution of water), which can enhance agricultural yields. The NIC report provides the example of the Amu Darya Basin in central Asia, where improving agricultural infrastructure in this way “could annually save 2,000 cubic meters of water for each of the 4 million hectares of irrigated area, totalling about 8 billion cubic meters throughout the basin” and would go a long way towards mitigating the region’s problems of water and food scarcity.²⁵⁷

Another promising strategy involves investing in research to develop new technologies that would reduce the amount of water needed for agriculture, thereby enhancing food yields. For example, the NIC report on water security points to recent technological advances in large-scale “drip irrigation” techniques, which have helped to save substantial quantities of both water and fertilizer. It relies on a complex system of pipes, emitters and valves that make water drip slowly to

²⁵⁶ 2012 NIC Report on Global Water Security, p.iv.

²⁵⁷ *Ibid*, p.7

reach the plant's roots.²⁵⁸ New versions of this technology have sharply reduced the cost, making it available in many arid parts of the world such as Mexico and Israel, where it has helped enhance food yields without endangering tight water supplies.

Likewise, the 2012 NIC report on Natural Resources highlights that, while controversial, the development of genetically modified foods represents another auspicious strategy for mitigating vital resource scarcity.²⁵⁹ Advances in genetic engineering have made it possible to modify specific aspects of the DNA in plant organisms, enhancing their size, lifespan, nutritious content and resistance to pathogens and insects, as well as reducing the amount of time and effort needed to grow them. New versions of this technology have helped cut the cost, making genetically modified foods affordable in many developing countries suffering from food scarcity. For instance, the PG Economics Ltd, a private British company that provides advisory and consultancy services on agriculture, believes that:

*GM technology has had a significant positive impact on farm income derived from a combination of enhanced productivity and efficiency gains. In 2010, the direct global farm income benefit from biotech crops was \$14 billion. This is equivalent to having added 4.3% to the value of global production of the four main crops of soybeans, maize, canola and cotton. Since 1996, farm incomes have increased by \$78.4 billion.*²⁶⁰

Moreover, recent technological breakthroughs have raised the prospect of developing drought resistant crops or grow plants that are resistant to salt or waste water, which would require half the amount of water used by an ordinary crop.²⁶¹

The “Livre Vert”, together with the EELV party and many other environmental movements across the world, have questioned the viability of genetically modified organisms as a strategy for mitigating vital resource scarcity. They warn about the impact genetically modified foods could have on human health.²⁶² While there is yet no scientific consensus on the matter, there may be a risk that

²⁵⁸ *Ibid*, Section 4: Improving Water Management.

²⁵⁹ 2013 NIC Report on Natural Resources, Section 1: Key Drivers and Trends, Food.

²⁶⁰ Brookes G. and Barfoot P. (2012), *GM crops: global socio-economic and environmental impacts 1996-2010*, PG Economics Ltd, UK. See: <file:///C:/Users/user/Downloads/2012globalimpactstudyfinal.pdf>

²⁶¹ 2012 NIC report on global water security.

²⁶² Europe Ecologie les Verts (2013), *Maïs OGM MON810: le combat continue pour son interdiction!* See: <http://eelv.fr/2013/08/01/mais-ogm-mon810-le-combat-continue-pour-son-interdiction/>

genetically modified plants produce on their own enhanced amounts of herbicides, pesticides and in some cases antibiotics, which are then digested by humans when eating derived food products. Moreover, the widespread growing of genetically modified crops has contributed to making certain types of weeds, insects and bacteria resistant to herbicides, pesticides and antibiotics, forcing farmers to double the quantities of chemical products used in agriculture. This has raised further concerns about the potential impact on human health, as well as the damage caused to the environment.

However, in some countries such as China, the largest increase in water consumption comes not from agriculture, but from industry and domestic use linked to strong economic and demographic growth. The 2012 NIC report on global water security underlines that this requires investing in other types of technologies and infrastructure that focus on improving economic efficiency as well as the quality of drinking water.²⁶³ For example, engineering solutions, such as diverting rivers from their natural course or transferring water between them, would help to mitigate growing water scarcity in urban areas. This strategy relies on a “diversion dam” that diverts water through artificial canals to the desired location, mostly large city reservoirs or hydroelectric power plants. The “Hoover Dam” for example, built in 1936 to divert the Colorado River, continues to fill up Lake Mead, the largest water reservoir in the United States by volume, providing water for millions of people and irrigating hundreds of thousands of acre of land to support agriculture across the region.²⁶⁴ However, the “Livre Vert” underlines that engineering solutions have become controversial because they tend to uproot local populations and force them to resettle elsewhere, as well as damage the environment by destroying local ecosystems. Thus, unlike many other policy papers that tend to see engineering solutions as a panacea, the “Livre Vert” explains that the benefits must be balanced against the costs in order to determine whether or not it represents a viable strategy for addressing vital resource scarcity.

OGM en Europe: Monsanto recule mais le combat continue. See: <http://eelv.fr/2013/07/18/ogm-en-europe-monsanto-recule-mais-le-combat-continue/>

²⁶³ 2012 NIC report on global water security, p.7.

²⁶⁴ US Department of the Interior (2014), *Managing Water in the West*. See: http://www.usbr.gov/pmts/eco_research/eco5.html

Probably one of the best hopes for meeting future growth in water demand for domestic consumption would be to improve desalination and water purification techniques. The International Desalination Association estimated in 2011 that there were 15,988 desalination plants operating around the world, which purified 66.5 million cubic meters of water per day for a total of 300 million people. It predicts this figure to increase up to 120 cubic meters of water by 2020, of which 40 million cubic meters would come from the Middle East.²⁶⁵ Already, many Middle Eastern countries are investing in desalination technology as a key strategy to mitigate the impact of water scarcity and climate change. The world's largest desalination plant ("Jebel Ali") is located in Dubai, and Israel currently obtains about 50% of its domestic water from desalinated seawater. The main drawback is that desalination requires large amounts of energy, which tends to make it expensive. Thus, many developing countries that need it most are often not able to afford it, even if technological breakthroughs are gradually reducing costs. Investing in research to develop new technologies to make desalination more affordable could become a prime mechanism for mitigating water scarcity in countries facing a surplus of salt water due to sea level rise.

One of the main challenges in addressing vital resource scarcity is that poor countries in regions such as Africa or the Middle East are already suffering disproportionately from its effects, and climate change combined with uncontrolled demographic growth is likely to exacerbate this situation. Many under-developed countries simply cannot afford investments in new technologies and infrastructure that would help to mitigate water and food shortages. The World Bank suggests that one solution could be for rich countries to increase financial aid for poor countries, as well as reinforce control mechanisms to ensure that the money is not diverted by corrupt local officials. Such foreign assistance may well become essential, since the World Bank estimates that even if developing countries manage to reinforce infrastructure, they would still require foreign aid of up to

²⁶⁵ International Desalination Association, *Desalination by the Numbers*. See: <http://idadesal.org/desalination-101/desalination-by-the-numbers/>

20 billion dollars by 2020 just to reach the UN Millennium Development Goals on basic access to water and sanitation.²⁶⁶

Likewise, the 2012 NIC report on global water security projects that the “investment shortfall” needed for developing countries to boost agricultural yields and meet growing food demand could amount to 90 billion dollars by 2020.²⁶⁷ The report also proposes to partly privatize water services and liberalize agriculture in order to attract foreign investment that would help fund new infrastructure and technologies. However, it warns that such privatisation must be accompanied by government supervision, otherwise abuse by self-interested multinational corporations at the expense of local populations would become a real threat.²⁶⁸ Furthermore, the World Economic Forum has provided another original strategy, which involves trading products with high water content, so-called “virtual water”. The 2012 NIC report on global water security underlines that:

*Although water is not a commodity that is directly traded on the open market, it is vital in the production of food and other commodities that are traded globally. Global commodity prices incorporate the value of water and other resource inputs used in production.*²⁶⁹

Already, countries in North Africa and the Middle East have succeeded in partially offsetting their water shortages through the purchase of vast amounts of food commodities with high virtual water content, equivalent to the entire Nile River.²⁷⁰ For example, over the period from 1996 to 2005, Algeria, Saudi Arabia and Yemen had a net virtual water import higher than 50 billion cubic meters per year, one of the highest in the world. The average across the Middle East and North Africa as a whole over the same period was between 10 to 15 billion cubic meters per year, far above most other regions in the world (except for Japan, Mexico and Western Europe), allowing these countries to partially compensate for internal water shortages.²⁷¹

²⁶⁶ 2012 NIC report on global water security, p.4.

²⁶⁷ *Ibid*, p.12.

²⁶⁸ *Ibid*, p.10.

²⁶⁹ *Ibid*, p.8.

²⁷⁰ *Ibid*.

²⁷¹ Mekonnen M. M., Hoekstra A. Y. (2011), *National Water Footprint Accounts: The Green, Blue and Grey Water Footprint of Production and Consumption*, Value of Water Research Report Series No. 50, UNESCO - IHE Institute for Water Education, p.21. See: <http://www.waterfootprint.org/Reports/Report50-NationalWaterFootprints-Vol1.pdf>

For all these reasons, it is apparent that “low politics” strategies aimed at mitigating the impact of vital resource scarcity can be just as effective as the “high politics” strategies of adaptation outlined by the “Livre Vert”. Given the range of promising economic and social policies based on achieving sustainable development, we can see that the strategic paradigm of the “Livre Vert” is incomplete. The focus on preventive action as one of the core elements of a “green defence” opens the possibility for expanding and stretching the concept to include “low politics” strategies aimed at mitigating resource scarcity. The latter should be combined together with the “high politics” strategies of adaptation outlined by the “Livre Vert”, which involve the creation of new military and governance structures.

b) Strategies to develop renewable energies for mitigating both primary resource scarcity and climate change

“Low politics” strategies aimed at achieving sustainable development also show great potential for mitigating both primary resource scarcity as well as climate change. We have seen in the previous chapter that the main problem with fossil fuels is that they are in large part responsible for climate change due to greenhouse gas emissions, and that global conventional reserves are rapidly drying up. Therefore, what is needed is a new form of energy that does not release greenhouse gases, and is abundant and renewable, meaning it can be used over and over again to meet the exponential increase of global demand. Most scientists are in agreement that so-called “renewable energies” offer the best hope of meeting such requirements and of one day replacing fossil fuels as the world’s main energy source. Renewable energies come in many different forms, and each type has its benefits and drawbacks. This represents a very important strategy for mitigating the impact of both climate change and natural primary resource scarcity.

The “Livre Vert” analyses the development of renewable energies in the context of “eco-conception” for the military, which it defines as the ability to reduce dependency on hydrocarbons and control the environmental impact of military equipment during all “life-phases”, including the

fabrication, usage and dismantling.²⁷² The “Livre Vert” highlights the significant strategic vulnerability of military dependence on imported petrol reserves, involving supplies from some of the most unstable regions in the world such as the Middle East, Africa and Central Asia. Moreover, as the price of petrol continues to increase due the drying up of conventional reserves, the expenses involved for drilling in difficult areas, and an increase in global demand, the cost of military operations is becoming prohibitive.²⁷³ For all those reasons, the “Livre Vert” outlines strategies to develop alternative renewable energy sources and generalize “eco-conception” across the military. Although France has recently improved the environmental credentials of its military²⁷⁴, it is still behind other Western countries such as the United States or the United Kingdom, where the concept of “eco-conception” is already at an advanced stage. For example, the 2010 US Quadrennial Defence Review contains an entire section outlining a comprehensive strategy for achieving a transition to renewable energies in the US military²⁷⁵, which is lacking in the 2013 French “Livre Blanc”. As a result, the “Livre Vert” proposes to increase the national budget for military research on renewable energies, with the aim of a gradual but complete ecological transition of French defence over the next couple of decades. Moreover, it recommends to generalise the concept of a “green passport”, already used for certain types of warships, to all sections of the military, as a way of enhancing transparency over the environmental credentials of military equipment.²⁷⁶ At the European level, the “Livre Vert” proposes to create common environmental norms involving greater use of renewable energy for the building, usage and dismantling of military installations that would be regulated by the Commission in cooperation with the European Defence Agency.²⁷⁷

While seemingly comprehensive, closer analysis reveals that the strategies outlined by the “Livre Vert” for developing renewable energies are limited compared to those proposed by other policy papers. This is because it does not offer any method for extending renewable energy

²⁷² Livre Vert, Partie 3, Section 3.1.5 B. Vers une éco-conception systématisée.

²⁷³ *Ibid*, Partie 3, Section 3.1.4.1 Les contraintes d’une armée dépendante du pétrole.

²⁷⁴ Ministère de la Défense de la République Française (2012), *Stratégie de Développement Durable de la Défense*.

²⁷⁵ US Department of Defense (2010), *Quadrennial Defense Review Report*, p.84-88.

²⁷⁶ Livre Vert, p.98.

²⁷⁷ *Ibid*, Partie 3, Section 3.1.4 La Transition énergétique et écologique: une nécessité pour notre défense.

technologies for civilian use across society as a whole. The development of renewable energies is only considered in the context of the military, from the perspective of making the armed forces less dependent on imported petrol reserves to reduce strategic vulnerability, not from the perspective of mitigating the impact of climate change. The “Livre Vert” simply explains that renewable energy technologies developed for the military can then be transferred to civilian use, but it does not explain how this is to be achieved.²⁷⁸ This fits into the framework of a “green defence” focused on “high politics” strategies for adapting to environmental threats, in this case how to adapt the armed forces to high prices and scarcity of petrol reserves. However, this differs from most other policy papers on energy security, which tend to focus on a detailed analysis of how to develop different types of renewable energies for civilian use in order to mitigate the impact of both climate change and primary resource scarcity.

Biofuels represent a type of renewable energy that offers hopeful perspectives for reducing the strategic vulnerability of the military, but suffers from drawbacks that limit its widespread application for civilian use. It is a form of energy derived from biomass (organisms taken either from dead plants or animals) that can be converted into fuel through a chemical or thermal reaction. Already, biomass accounts for about 10% of global energy supply, but this is mostly through the burning of wood for cooking or heating in the developing world, which results in greenhouse gas emissions and health problems. The most popular forms of biofuel are liquid bioethanol and biodiesel, which are alcohols derived from the fermentation of crops such as sugarcane or corn, animal fats and vegetable oils. The main advantages of liquid biofuels are that they do not emit any greenhouse gases and, more importantly, they can rely on the existing global infrastructure for liquid fossil fuels. In their pure form, biofuels can be used directly by any vehicle or machine because they are a liquid source of energy just like petrol, gasoline and diesel.²⁷⁹ This is why the “Livre Vert” argues that biofuels represent one of the most promising strategies for reducing the strategic vulnerability of the military on imported petrol, as a way of adapting to growing primary resource

²⁷⁸ *Ibid.*

²⁷⁹ International Energy Agency (2010), *Biofuels for Transport Roadmap*.

scarcity. However, the latter does not analyse how the technology could be applied for civilian use with the aim of mitigating climate change.

Other policy papers on energy security underline that biofuels could allow for a rapid, cheap and significant reduction in global greenhouse gas emissions. The International Energy Agency (IEA) argues that such a policy would save huge amounts of money needed to develop the infrastructure required for other types of renewable energies that cannot rely on existing energy systems for liquid fuels. For example, Brazil derived nearly a quarter (23%) of its road transport fuel from different types of biofuels in 2009.²⁸⁰ At the same time, the IEA points out that biofuels are not a panacea, as there are potentially significant drawbacks to using them on a global scale. Widespread use of biofuels would necessitate unsustainable quantities of agricultural produce, either in the form of plants or animal fats, which risk competing with food production and exacerbating the problem of food scarcity in developing countries. Second, we have seen that agriculture necessitates large amounts of water, so mass usage of biofuels risks exacerbating water scarcity. Likewise, the need to enhance global agricultural yield would aggravate soil erosion since many crop fields in developing countries, already strained due to demographic growth, may not be able to resist a further increase in demand.²⁸¹ Such limitations help to explain why biofuels only account for 3% of global energy consumption at present, and are not expected to provide a solution for completely replacing fossil fuels. Nevertheless, the IEA expects the global consumption of biofuels to increase in the near future, and could provide a useful transition type of energy for mitigating both primary resource scarcity and climate change. The IEA's "Biofuels for Transport" roadmap estimates that biofuels could represent up to 27% of global transport fuels by 2050, cutting CO₂ emissions by about 2.1 gigatonnes per year if produced sustainably.²⁸² Therefore, the IEA recommends that countries with excess supplies of food that emit large quantities of greenhouse gases (the situation of many Western countries) should invest more in research and adopt policies that support biofuels and make them more competitive.

²⁸⁰ International Energy Agency, *Topic: Biofuels*. See: <http://www.iea.org/topics/biofuels/>

²⁸¹ *Ibid.*

²⁸² International Energy Agency (2010), *Biofuels for Transport Roadmap*.

Hydropower represents another type of renewable energy that has great potential for both military and civilian application. Hydropower is currently the most widespread type of renewable energy worldwide, as it accounts for nearly 20% of global electricity production and supplies energy for about 1 billion people in 30 different countries.²⁸³ Most of the energy produced is derived from large dam projects that rely on the strength of water currents to make turbines turn inside power plants. The main advantage of hydropower is that, unlike most other types of renewables, it is a competitive source of energy since the cost of generating hydro-electricity is relatively low compared to fossil fuels. It is also a more flexible source of energy than other types of renewables, as it has a large storage capacity and built-in mechanisms that allow it to rapidly adjust to changing electricity demand.²⁸⁴ For all these reasons, the “Livre Vert” underlines that there is great potential for relying on hydropower to support the energy requirements of military infrastructure. Moreover, it can provide a reliable and cheap source of electricity to recharge batteries for military vehicles that use electrical engines, thus reducing the strategic vulnerability linked to dependence on imported oil. However, unlike other policy papers on energy security, the “Livre Vert” does not consider how hydropower can be used for civilian use in the context of mitigating climate change.

For instance, the IEA’s “Energy Technology Perspectives 2010 Blue map scenario” underlines that the actual generation of hydro-electricity does not emit any greenhouse gas. It estimates that as the impact of global warming becomes more acute and governments look for alternative sources of energy, hydropower could be relied on to produce up to 6,000 terawatt-hours of electricity by 2050, nearly twice as much as current levels.²⁸⁵ However, the IEA’s report also highlights that hydropower has become controversial as it involves flooding large areas of land above the dam, with negative consequences on local ecosystems and mass population displacement. In addition, large dam projects tend to slow down the water current, which can prevent nutrient-rich

²⁸³ Statistic Brain (2014), *Hydropower Statistics*. See: <http://www.statisticbrain.com/hydropower-statistics/>

²⁸⁴ International Energy Agency (2010), *Renewable Energy Essentials: Hydropower*. See: http://www.iea.org/publications/freepublications/publication/Hydropower_Essentials.pdf

²⁸⁵ International Energy Agency (2010), *Energy Technology Perspectives*, BLUE map scenario.

silt from being deposited further down the river.²⁸⁶ Hydropower may also become increasingly compromised in regions hit by dry weather and water scarcity, impacting countries such as Ethiopia, which derive a large portion of their energy needs from dams on the Nile River. Nevertheless, the IEA underlines that since the impact of climate change is likely to be uneven, some parts of the world such as Canada or Russia may end up having excess water supplies due to ice melting and an increase in precipitation. Moreover, new technologies are helping to contain some of the negative environmental and social side effects of large dam projects. As a result, the IEA recommends that countries not suffering from water scarcity should invest in developing hydropower as long as sufficient precautions are taken.²⁸⁷

Solar power is a type of renewable energy that has great potential but which currently suffers from technological drawbacks that limit its widespread application. The sun produces an enormous quantity of energy through thermonuclear fusion that is dispersed across the solar system via solar radiation. While approximately half of all solar radiation is reflected back into space by various elements in the atmosphere, the other half reaches the Earth's surface and can be used for energy through two main methods. The first one, dubbed "concentrating solar power" (CPS), captures the Sun's radiation using parabolic mirrors to concentrate solar energy and generate hot liquids, which then drive turbines to generate electricity. The second method, known as "solar photovoltaic", consists in absorbing sunrays with solar panels to generate electrons inside it, which produces an electrical current. The main advantage of solar energy is that it is potentially unlimited and totally renewable, since the Sun is expected to continue shining for another one billion years. The main drawback is that there is still no technology for storing solar energy, which means that it must be used immediately otherwise it is lost and wasted. This makes it an intermittent energy dependent on the weather, useful only in parts of the world that are sunny most of the year.²⁸⁸ As a result, the "Livre Vert" argues that for the time being, solar energy does not represent a viable policy for

²⁸⁶ For instance, scientists consider that large dams built by India on the Indus River are one of the factors causing Bangladesh to sink due to lack of silt in its landmass. See Maslin M. (2009), *Global Warming*.

²⁸⁷ International Energy Agency, *Topic: Hydropower*. See: <http://www.iea.org/topics/hydropower/>

²⁸⁸ International Energy Agency, *Topic: Solar (PV and CSP)*. See: <http://www.iea.org/topics/solarpvandcsp/>

enhancing the strategic autonomy of the military. This is especially true in countries with temperate climates, where lack of sunshine could seriously compromise national defence capabilities.

Nevertheless, other policy papers argue that there is great potential for mitigating climate change and primary resource scarcity by developing solar power for civilian use in parts of the world where the climate is propitious. Solar power does not emit any greenhouse gases; given that it is virtually unlimited, it has the potential to support humanity's energy demands for a very long time, no matter how much the world grows demographically or economically. The IEA underlines that in places such as low latitude deserts with very few cloudy days per year, solar technologies can become cost-effective, despite current drawbacks. For instance, during the period from 2000 up to 2011, solar photovoltaic became the fastest growing renewable energy source worldwide, driven by countries such as Spain and Italy that relied on the Mediterranean climate.²⁸⁹ According to the IEA's "Solar Energy Perspectives" report, in a best-case scenario, solar power could generate up to one third of global energy consumption by 2060.²⁹⁰ However, the report underlines that this is dependent on achieving a technological breakthrough that would allow solar energy to be stored, making it adaptable to changing demand and weather conditions. At present, a significant drawback is that solar power is only 17% efficient, which makes it less competitive than fossil fuels that are usually between 30 and 50% efficient. Moreover, solar panels are often made out of silicon, an expensive material that makes solar energy unaffordable for many developing countries.

Wind power is the last type of renewable energy that will be considered, and it shares many similitudes with solar energy. For example, both wind and solar power are totally renewable and potentially immense sources of energy, with some studies predicting that wind power could support up to five times current global energy consumption.²⁹¹ Electricity is generated through the turning of turbines with the blowing of the wind, similarly to the mechanism of a windmill. The energy that is created depends on the size of the turbine, so a viable strategy is to build hundreds of large turbines next to one another into a so-called "wind farm". The main drawback is that, like solar power, there

²⁸⁹ International Energy Agency, *Topic: Solar (PV and CSP)*. See: <http://www.iea.org/topics/solarpvandcsp/>

²⁹⁰ International Energy Agency (2011), *Solar Energy Perspectives*.

²⁹¹ Maslin M. (2009), p.159.

is still no technology to store wind power, thus the energy is intermittent and prone to waste. It is dependent on weather patterns, with some parts of the world enjoying more wind than others.²⁹² As a result, the “Livre Vert” underlines that wind power is not an optimal strategy for enhancing the strategic autonomy of the military due to intermittency problems linked to climate conditions.

In contrast, other policy papers have underlined the great potential of civilian wind power technology for mitigating both climate change and primary resource scarcity. This is because wind turbines do not generate greenhouse gases, and new technologies have helped to significantly cut the cost, making it much more competitive than solar power. In regions where there is strong wind, it can even rival fossil fuels in terms of cost-effectiveness. The IEA’s “Wind Power Technology Roadmap 2013 Edition” underlines that:

*Since 2008, wind power deployment has more than doubled, approaching 300 gigawatts (GW) of cumulative installed capacities, led by China (75 GW), the United States (60 GW) and Germany (31 GW). Wind power now provides 2.5% of global electricity demand – and up to 30% in Denmark, 20% in Portugal and 18% in Spain.*²⁹³

The report estimates that if appropriate measures are taken, wind power could represent between 15 to 18% of global energy consumption by 2050, a more than six-fold increase from current levels, which could avoid 4.8 gigatonnes of CO₂ emissions per year. Governments would have to invest more in developing offshore wind-farms, since winds are usually stronger at sea, requiring a global annual investment of up to 170 billion dollars. There would also need to be much more investment in research and development for wind power, which currently only accounts for 2% of global public energy research funding.²⁹⁴

Overall, it is apparent that each type of renewable energy has its strengths and weaknesses, both for military and civilian use. Their widespread application is often dependent on financial resources, geography and local weather patterns. Therefore, an optimal strategy for mitigating both climate change and primary resource scarcity would be to combine different types of renewable

²⁹² *Ibid.*

²⁹³ International Energy Agency (2013), *Wind Power Technology Roadmap*.

²⁹⁴ *Ibid.*

energies, depending on local conditions. Today, renewable energies account for about 17% of global energy production. The IEA's 2010 "Energy Technology Perspectives" report estimates that if the international community made a concerted effort to invest in renewable energies by following all the strategies outlined above, this figure could nearly triple and reach up to 48% of global energy production by 2050.²⁹⁵ This would have a very substantial impact in mitigating both climate change and primary resource scarcity. The report estimates that global CO₂ emissions would be cut by about a quarter, depending on what types of fossil fuel technologies it replaces.

For all these reasons, it is apparent that the strategic paradigm outlined by the "Livre Vert" is incomplete. We have seen how "low politics" strategies for mitigating the impact of primary resource scarcity and climate change can be just as effective as the "high politics" strategies of adaptation outlined by the "Livre Vert". While achieving strategic autonomy for the armed forces is critical, limiting renewable energy technologies to the military does not represent a comprehensive strategy. Only by extending them for civilian use across society as a whole can there be any hope of substantially cutting greenhouse gas emissions.

Nevertheless, it is equally clear that none of the renewable energy technologies are yet sufficiently developed to completely substitute fossil fuels. Either they are still too expensive to become globally competitive, or the energy supply is intermittent and dependent on weather patterns because it cannot be stored, and there can also be negative social and environmental side effects. Consequently, the IEA's 2010 "Energy Technology Perspectives" underlines the need to double investments in scientific research to hopefully one day achieve technological breakthroughs that would make renewable energies a viable strategy for replacing fossil fuels on a global scale.²⁹⁶ Therefore, the report highlights that at present, the most optimal strategy for mitigating climate change and primary resource scarcity is to combine the development of renewable energies with other mechanisms for cutting greenhouse gas emissions, which will be analysed in the final section.

²⁹⁵ International Energy Agency (2010), *Energy Technology Perspectives: Scenarios & Strategies to 2050*.

²⁹⁶ *Ibid.*

c) Other types of strategies for cutting greenhouse gas emissions and mitigating the impact of climate change

In the final section of this chapter, we will consider other types of strategies to mitigate the impact of climate change, which involve reducing the amount of greenhouse gas emissions from current technologies and infrastructure. A controversial alternative strategy involves the development of civil nuclear power. This is strongly supported by organizations such as the International Atomic Energy Agency (IAEA) or the World Nuclear Association. The debate between the advantages and disadvantages of nuclear energy is not new, but several new technologies have the potential to change the equation. First, supporters argue that nuclear fission technology is dependent on primary natural resources such as uranium that, unlike fossil fuels, are not undergoing global depletion. At current rates of consumption, the Earth's reserves of uranium are large enough to support global nuclear power demand for at least another 200 years, possibly more.²⁹⁷ Second, nuclear fission in itself does not generate any greenhouse gases, so it has the potential to make a substantial contribution to cutting global greenhouse gas emissions. A country like France derives nearly 75% of its electricity from nuclear power²⁹⁸ and represents the 5th largest economy in the world with a population of 65 million people, but was only the 18th largest greenhouse gas emitting nation in the world in 2010 with 1.15% of global emissions. This is less than a country like Australia ranked 17th with 1.19% of global emissions in 2010, but with a population and economy nearly three times smaller than France.²⁹⁹

Third, new technologies have made nuclear energy much cheaper and more efficient than any other renewable energy, with 90% efficiency compared to only 17% for solar photovoltaic and 30% for wind power.³⁰⁰ More importantly, nuclear energy is not intermittent and dependent on weather patterns like many renewables. It can be stored for long periods of time and adapt to changing

²⁹⁷ Fetter S. (2009), "How long will the world's uranium supplies last?", *Scientific American*. See: <http://www.scientificamerican.com/article/how-long-will-global-uranium-deposits-last/>

²⁹⁸ Electricité de France (2014), *Le nucléaire en France*. See: <http://jeunes.edf.com/article/le-nucleaire-en-france.72>

²⁹⁹ Carbon Dioxide Information Analysis Centre (2014), *Fossil-Fuel CO2 Emissions by Nation*. See: http://cdiac.ornl.gov/trends/emis/tre_coun.html

³⁰⁰ <http://www.globalwindday.org/faq/how-efficient-are-wind-turbines/>

demand, and a nuclear power plant has a long life span of about 40 years, making it cost-effective over the long run. Fourth, several new technologies such as “crystalline compounds (which) can be tailored to safely absorb radioactive ions from nuclear waste streams”, are helping to reduce both the quantity and the toxicity of radioactive waste generated by nuclear fission, as well as to store it more safely.³⁰¹ The World Nuclear Association argues that new technologies such as so-called “passive safety” mechanisms that incorporate as many as three sets of emergency core cooling systems, have also significantly improved safety systems within nuclear power plants.³⁰²

The “Livre Vert”, along with the majority of environmental organizations around the world, strongly rejects strategies aimed at developing civil nuclear energy in order to mitigate the impact of climate change.³⁰³ First, they argue that while nuclear fission may not generate greenhouse gases in itself, significant amounts of pollution result from mining the uranium, building the nuclear power plant and dismantling it once it is out of order. Second, and despite technological improvements, nuclear fission continues to generate extremely dangerous nuclear waste material that still emits high amounts of radiation for thousands of years. There is growing concern that countries are running out of places to store nuclear waste, which is being placed in increasingly hazardous locations. For example, the surroundings of Lake Michigan in the United States have become a storage ground for the Kewaunee nuclear power plant since 2009.³⁰⁴ Third, the economic benefits of nuclear energy are not so clear-cut if one takes into account the huge costs associated with building, maintaining and eventually dismantling nuclear power plants. In France for example, there have been contradictory

³⁰¹ Science Daily (2012), *New method for cleaning-up nuclear waste*. See: <http://www.sciencedaily.com/releases/2012/03/120320151958.htm>

³⁰² World Nuclear Association (2014), *Safety of Nuclear Power Reactors*. See: <http://www.world-nuclear.org/info/Safety-and-Security/Safety-of-Plants/Safety-of-Nuclear-Power-Reactors/>

³⁰³ Europe Ecologie les Verts (2014), *Ni nucléaire vieux, ni nucléaire neuf: transition énergétique*. See: <http://eelv.fr/2014/02/10/ni-nucleaire-vieux-ni-nucleaire-neuf-transition-energetique/>

³⁰⁴ Content T. (2009), *Running Out of Room: Nuke Waste Now Stored Outside Reactor*. See: http://www.millennium-ark.net/NEWS/09_USA/090901_nuke.waste.stored.outside.html

reports about the cost of dismantling and replacing its 58 nuclear power plants by 2060, ranging from 20 billion euros to as much as 750 billion euros.³⁰⁵

Fourth and most importantly, the “Livre Vert” strongly argues that despite new technological breakthroughs intended to enhance safety, the Fukushima nuclear incident took place only three years ago in a supposedly “safe” nuclear power plant in a developed country like Japan. Likewise, the global expansion of civil nuclear energy is increasing the threat of proliferation of nuclear weapons, since the conversion from civil to military nuclear technology is possible, if challenging. For example, many developing countries located in highly unstable parts of the world such as sub-Saharan Africa are seriously considering investing in civil nuclear technology to meet their growing energy needs.³⁰⁶

While it is opposed to the development of civil nuclear power, the “Livre Vert” strongly supports international initiatives for cutting global greenhouse gas emissions. It is particularly enthusiastic about the achievements of the Kyoto Protocol, which offered what is so far the most ambitious attempt ever made to mitigate the impact of climate change. However, many scientists are increasingly concerned that international agreements reached so far are insufficient for avoiding the worst effects of global warming.³⁰⁷ As a result, the “Livre Vert” supports the EELV position that emphasises the need for France and other EU member states to be more assertive in upcoming negotiations during the 2015 world climate summit to be held in Paris.³⁰⁸ Rather than cede to the lowest common denominator, as is often the case in climate negotiations, EU countries must push for more ambitious and legally binding targets for all the world’s main polluters. Stronger global enforcement mechanisms must be established, as there is currently no way to sanction countries that

³⁰⁵ Energies Actu (2013), *Démantèlement nucléaire: un coût encore incertain*. See:

<http://www.energiesactu.fr/production/demantelement-nucleaire-un-cout-encore-incertain>

³⁰⁶ International Business Times (2013), *Can Africa Go Nuclear? Energy Demands Battle with Safety Concerns Across the Continent*. See: <http://www.ibtimes.com/can-africa-go-nuclear-energy-demands-battle-safety-concerns-across-continent-1359279>

³⁰⁷ Maslin M. (2009).

³⁰⁸ Europe Ecologie les Verts (2013), *Quelle stratégie pour réussir la conférence de Paris sur le climat en 2015?*, See: <http://eelv.fr/2013/10/08/apres-le-rapport-du-giec-quelle-strategie-pour-reussir-la-conference-de-paris-sur-le-climat-en-2015/>

do not abide by their commitments to cut emissions. Moreover, instead of being given an opt-out, developing countries must now also be legally bound by any global agreement. This is because the so-called “BRIC” countries are gradually surpassing Western countries as the largest greenhouse gas emitters worldwide.³⁰⁹ Such a policy fits nicely into the “Livre Vert’s” emphasis on “high politics” strategies for creating new global governance structures to address environmental threats. Nevertheless, due to its neglect of “low politics” strategies, the “Livre Vert” does not analyse how such cuts in greenhouse gas emissions are to be achieved in practice.

By contrast, many other policy papers have focused on a detailed analysis of how to cut greenhouse gas emissions and mitigate the impact of climate change without significantly modifying the existing fossil fuel infrastructure, thus avoiding a costly transition to renewable or nuclear energy. For example, the 2007 IPCC report on climate change points out that there are natural mechanisms which rely on the photosynthesis from plants to absorb CO₂ from the atmosphere, a process known as “bio-sequestration”.³¹⁰ Deforestation, which involves the cutting down of trees and the clearing of forests to sell the wood or make way for agricultural land, has become a major concern for environmental movements around the world. Each year, as much as 12 to 15 million hectares of forest are lost, representing the equivalent of 36 football fields per minute.³¹¹ The IPCC estimates that deforestation accounts on its own for at least 20% of all global greenhouse gas emissions, more than the total for all transport emissions, because it interrupts the natural process of bio-sequestration.³¹² As a result, the “Coalition for Rainforest Nations” recommends urgent measures to slow down global deforestation, as well as global re-forestation in order to absorb CO₂ from the atmosphere and mitigate climate change.³¹³ For example, China has created the largest human-made forest in the world, supposed to halt desertification and absorb up to a quarter of China’s huge CO₂

³⁰⁹ For example, China surpassed the United States as the largest global greenhouse gas emitter in 2007, and is being followed closely by other developing countries such as India or Brazil.

³¹⁰ Intergovernmental Panel on Climate Change (2007), *Fourth Assessment Report*.

³¹¹ World Wildlife Fund for Nature (2013), *Deforestation*. See: http://wwf.panda.org/about_our_earth/about_forests/deforestation/

³¹² Intergovernmental Panel on Climate Change (2007), *Fourth Assessment Report*.

³¹³ The Coalition for Rainforest Nations is an intergovernmental organization that aims to reconcile economic growth with the protection of the world’s tropical rainforests. See: <http://www.rainforestcoalition.org/>

emissions.³¹⁴ Known as the “Great Green Wall”, the Communist Party aims to extend it further to cover 400 million hectares or 42% of China’s landmass by 2050, even though some scientists have begun to express doubts about its ultimate effectiveness.³¹⁵

There are also artificial ways of reducing greenhouse gas emissions from current fossil fuel infrastructure that rely on carbon capture and storage (CCS) mechanisms. The idea is to capture CO₂ emissions at large point sources before they diffuse into the air. The CO₂ is then removed to a storage site, mostly in underground geological formations. The IPCC estimates that CCS technology has the potential to reduce CO₂ emissions from large fossil fuel power plants by up to 90%. It predicts that CCS could contribute between 10 to 55% of global efforts in cutting greenhouse gas emissions by 2100.³¹⁶ The National Energy Technology Laboratory has pointed out that North America alone has enough storage capacity for over 900 years of CO₂ at present output rates.³¹⁷ Nevertheless, like all other strategies for mitigating climate change, CCS is not a panacea. First, similarly to nuclear waste, there are safety concerns about the storing of CO₂ waste in underground geological formations. For example, a serious incident occurred in 1986 when a massive explosion of CO₂ stored under Lake Nyos in West Cameroon killed more than 1700 people from asphyxiation in a perimeter of 25km.³¹⁸ Second, the IPCC underlines that the process of capturing and storing CO₂ would increase energy needs by 25% to 40%. While the extra CO₂ emissions would be captured and stored, global use of CCS risks significantly exacerbating natural primary resource scarcity. More importantly, enhanced energy requirements could increase the cost of energy production from anywhere between 21 to 91%, making it economically uncompetitive.³¹⁹ While new technologies

³¹⁴ Moxley M. (2010), “China's great green wall grows in climate fight”, *The Guardian*. See: <http://www.theguardian.com/environment/2010/sep/23/china-great-green-wall-climate>

³¹⁵ Luoma J. R. (2012), *China’s Reforestation Programs: Big Success or Just an Illusion?*, Yale Environment 360. See: http://e360.yale.edu/feature/chinas_reforestation_programs_big_success_or_just_an_illusion/2484/

³¹⁶ Metz B. *et al.* (editors, 2005), *IPCC special report on Carbon Dioxide Capture and Storage*, Prepared by working group III of the Intergovernmental Panel on Climate Change, Cambridge University Press.

³¹⁷ National Energy Technology Laboratory, *North American Carbon Atlas Partnership*. See: <http://www.netl.doe.gov/research/coal/carbon-storage/cs-global/nacap>

³¹⁸ Maslin M. (2009), p.160.

³¹⁹ Metz B. *et al.* (editors, 2005), *IPCC special report on Carbon Dioxide Capture and Storage*, Prepared by working group III of the Intergovernmental Panel on Climate Change, Cambridge University Press.

have the potential to lower costs in the future, the price is currently prohibitive and prevents the widespread global application of CCS.

One of the best ways of making CCS techniques economically competitive is to rely on market tools involving carbon emission trading. The “Livre Vert” strongly supports carbon trading schemes, but owing to its neglect of “low politics” strategies based on market management, it does not suggest any ways for improving carbon trading, nor does it analyse in detail its potential advantages. By contrast, climate experts such as Mark Maslin underline that “the electricity produced will always be more expensive if you have to capture and store the carbon emitted, unless you can then trade the carbon saved on an international stock market to make a profit.”³²⁰ Thus, carbon trading also represents a viable strategy for reducing the cost of renewable energies and making them more competitive.³²¹ Carbon trading relies on exchanging emissions rights between either nations or private groups that have agreed on a legally binding overall cap or maximum emissions rate. Countries and private groups that pollute less than the overall cap can sell their surplus emissions rights to others which are polluting above it. The objective is to decrease overall emissions by providing a financial incentive for countries or private groups to pollute less.³²²

The first, and so far the only international carbon emission trading system was established by the 1997 Kyoto Protocol for developed countries only. In order to meet their reduction targets, several countries such as Australia, New Zealand, Japan and, more surprisingly, China since 2012, have established their own internal emissions trading systems. However, the largest one was launched by the EU in 2005, which became the world’s first and so far only supranational emissions trading system.³²³ While the implementation of the first phase from 2005-7 proved to be highly problematic with the collapsing of the price of carbon, the second phase from 2008-12 and the third

³²⁰ Maslin (2009), p.162.

³²¹ *Ibid.*

³²² “Definition of Carbon Trade”, *Investopedia*. See: <http://www.investopedia.com/terms/c/carbontrade.asp>

³²³ By 2013, the EU’s “Emissions Trading Scheme” (ETS) included over 11000 power plants, factories and other types of carbon emitting installations across all 28 EU member states plus Norway, Iceland and Liechtenstein, accounting for about 45% of its total greenhouse gas emissions. European Commission - Climate Action (2014), *The EU Emissions Trading System*. See: http://ec.europa.eu/clima/policies/ets/index_en.htm

phase since 2013 have been much more successful. The EU Commission has predicted that: “in 2020, emissions from sectors covered by the EU ETS will be 21% lower than in 2005. By 2030 (...) they would be 43% lower”.³²⁴ The European Commission recommends extending the ETS to cover new sectors, reinforce and harmonize regulatory mechanisms to ensure that private actors comply with obligations to cut emissions, and link it with other comparable systems in other countries around the world.³²⁵ Nevertheless, carbon trading schemes have been criticized for allowing individuals, companies and governments simply to purchase carbon rights in order to meet emission targets. Mark Maslin argues that even if it can yield good results, there is no incentive to change behaviours and adopt new policies based on achieving sustainable development.³²⁶

d) Conclusion of the second section

Overall, it is apparent that none of the strategies aimed at mitigating the impact of resource scarcity or climate change will be wholly effective on its own. Each strategy outlined above has great potential, but each one also contains several weaknesses that prevent it from becoming a global panacea. The IEA’s 2010 “Energy Technology Perspectives” underlines that an optimal strategy is to combine different types of policies for mitigation according to the local context. For example, renewable energies are not technologically ready to completely replace fossil fuels, so they must be combined with strategies to reduce greenhouse gas emissions, such as CCS mechanisms. However, one of the only ways of making the latter economically competitive is to combine it with a market for carbon trading. With such an approach, there is great potential for mitigating the impact of resource scarcity and climate change. The IEA’s 2010 “Energy Technology Perspectives” estimates that if the international community made a concerted effort by investing large sums into all the strategies described above, global CO₂ emissions could be cut in half by 2050. Under this scenario, renewable energies would account for 48% of global power generation, civil nuclear energy would

³²⁴ *Ibid.*

³²⁵ *Ibid.*

³²⁶ Maslin M. (2009), p.163.

provide 24% (up from only 6% today), fossil fuel power plants equipped with CCS would provide 17% and only 11% would still come from conventional fossil fuel emissions.³²⁷ While this may seem like an idealistic scenario, the IPCC has underlined that only by halving global CO₂ emissions by 2050 can the worst effects of climate change be successfully mitigated.

3) Conclusion of the third chapter

The strategic framework outlined in the “Livre Vert” presents us with a paradox. On the one hand, the strategies it proposes are comprehensive because they focus on policies at the national, European and international level, both over the short and long run. Moreover, many of the strategies it recommends go much further and are more ambitious than those found in other policy papers on environmental security, to the point that some aspects of the book can be considered idealistic. On the other hand, while there are no panaceas, we have seen how the combination of different types of “low politics” strategies aimed at mitigating environmental degradation can be just as effective as the “high politics” strategies of adaptation outlined by the “Livre Vert”. Given the range of promising strategies to achieve sustainable development, it is apparent that the strategic paradigm of the “Livre Vert” is incomplete. The concept of a “green defence” should be broadened to include “low politics” strategies for mitigating the impact of environmental threats, and combine them together with “high politics” strategies of adaptation involving the creation of new military and governance structures. The two are compatible and mutually reinforcing since the notion of preventive action, a core element in the strategic framework outlined by the “Livre Vert”, opens the possibility to expand the concept of a “green defence” to incorporate economic and social policies that address the root causes of environmental degradation.

The idea of a “green defence” as it is presented is unusual and does not fit into any conventional political category. It does not correspond to a typical “high politics” perspective, since

³²⁷ International Energy Agency (2010), *Energy Technology Perspectives: Scenarios & Strategies to 2050*.

realist scholars, while sharing the same concern for political and military strategies, have traditionally neglected environmental matters, which are not considered to have any bearing on national and international security.³²⁸ At the same time, however, it does not resemble a standard environmental policy analysis, which tends to focus more on “low politics” strategies that rely on economic and social tools to achieve sustainable development. Therefore, the strategic paradigm of the “Livre Vert” can be seen to represent an unusual hybrid that is best described as a form of “green high politics”, an attempt to reconcile and bring together the usually separate fields of defence and environmentalism. Such a strategic framework fits into the perspective from which environmental threats were analysed in the previous chapter. It should come as no surprise that since the “Livre Vert” looks at environmental security from a “hard security” standpoint, underlining the risk of conflict, the policies proposed to address this threat rely on “high politics” strategies for reinforcing military and governance structures. Nevertheless, it is doubtful that a strategic paradigm focused on “green high politics” is comprehensive enough to address the danger of systemic crisis stemming from environmental degradation. Only a holistic approach to environmental security that synthesises “hard” and “soft” security, “high” and “low” politics strategies, can successfully address the systemic risk posed by climate change. This will be analysed in the conclusion of this thesis, which will recapitulate the findings and main arguments developed throughout the three chapters in order to answer the three research questions.

³²⁸ Floyd R. (2013), *Environmental Security Studies: An Introduction*.

V: Conclusion

We saw in the second chapter that climate change risks becoming a systemic crisis by spreading to impact all elements in society. There is a danger it could become a simultaneous political, economic, and social crisis, as well as a security and military crisis, both at the micro and macro level. It has the potential to generate both inter-state and civil conflict, exacerbate social tensions and inequalities, and damage the economy, possibly costing up to 20% of global GDP each year. Climate change represents a crisis of interdependency, given that the “hard” and “soft” security dimensions are interconnected and mutually reinforcing. There is also a risk that a wide range of threats, such as terrorism, crime, cyber security and nuclear proliferation, will be exacerbated by environmental degradation.

As a result, the potential breadth of threats and risks deriving either directly or indirectly from climate change is so substantive that the strategies mobilized to address them must be equally comprehensive. This is why the one-sided focus of the “Livre Vert” on “high politics” strategies for adapting to environmental degradation is not just incomplete; it is inadequate to successfully address the potential for systemic crisis stemming from climate change. At all levels, there is a need to adopt a holistic approach by synthesizing “high politics” strategies of adaptation for creating new military and governance structures, together with “low politics” strategies of mitigation relying on sustainable development. Relying only on one without the other is bound to fail.

The strategies of adaptation outlined in the “Livre Vert” will help to absorb the shock of environmental degradation, but will do little to address its underlying causes. This is because the heart of the problem lies in the fact that the Earth’s resources are finite, and that current global economic and demographic growth is straining them faster than they can regenerate. The Earth’s carrying capacity is gradually being exceeded, as humans deplete both vital and primary natural resources. Since the industrial revolution, the capitalist system has relied on fossil fuels to meet an ever-growing global energy demand. This is leading to huge quantities of greenhouse gases being

emitted into the atmosphere each year, which is warming up the planet at a dangerous pace. The key is therefore to find mechanisms to cut greenhouse gas emissions, develop alternative sources of energy that are renewable and non-polluting, and rely on sustainable methods for enhancing the supply of water and food.

In the third chapter, we have seen that an optimal strategy is to combine different types of policies for achieving sustainable development, depending on local circumstances; this has the potential to significantly mitigate the impact of climate change. In order to address the heart of the problem, it is essential to develop solar, wind, hydropower and biofuel energies, and combine them with desalination and drip irrigation techniques, carbon capture and storage technology, as well as carbon trading systems. Such policies are vital for carrying out the ecological transition of society, the only way of addressing the root causes of environmental degradation. By relying only on the “high politics” strategies outlined in the “Livre Vert”, global environmental problems will continue to worsen up to the point where, no matter how much the world adapts by reinforcing military and governance structures, it will become impossible to handle the systemic risk posed by climate change.

At the same time, relying only on “low politics” strategies of mitigation is equally problematic. This is because even if the international community succeeds in launching far reaching policies for achieving sustainable development, most scientists are in agreement that, unless all global greenhouse gas emissions are stopped tomorrow, it is already too late to stop the Earth’s climate from changing.³²⁹ It is too late to prevent the sea level from rising, global temperatures from increasing, extreme weather events from becoming more destructive, vital and primary resources from becoming scarcer. The question is now one of degree, and that will depend on the extent to which countries around the world are able to implement policies for mitigating the impact of environmental degradation over the coming decades. Even the most optimistic predictions from the IPCC anticipate that it will be extremely difficult for global temperatures to stay below the 2°C

³²⁹ Maslin M. (2009).

threshold over the course of the 21st century. This threshold is considered by most scientists as the limit beyond which every person on the planet is likely to suffer, although at varying degrees, from the effects of climate change. The best estimates from the 2007 IPCC report predicted global mean surface temperatures would rise anywhere between 1.8 °C to 4°C by 2100, with an average at 2.9°C.³³⁰ Climate experts such as Mark Maslin underline that a global warming of this magnitude would have very negative consequences on resource supplies, sharply increase the frequency of extreme weather events and raise sea levels by as much as 74 cm.³³¹

However, many leading climate scientists such as Professor Jim Hansen from Columbia University have argued that IPCC reports up until now have systematically under-estimated the impact of climate change, revising their predictions upward with every new report.³³² Thus, the real effects of climate change could end up being much worse than current IPCC predictions, especially since the latter rely on a linear relation between rising temperatures and the Earth's climate system. There is indeed growing concern within the scientific community that climate change may not occur in a linear manner, but that there may be certain thresholds, beyond which it accelerates very fast and its impact becomes global, abrupt and irreversible. This is linked to new scientific discoveries, which have revealed that many past climatic changes have occurred at a startling pace, with huge changes sometimes taking place in less than a decade.³³³

As a result, the “high politics” strategies outlined by the “Livre Vert” are likely to become increasingly vital to help society adapt to the impact of climate change. Any strategy that relies only on mitigation policies will leave the world defenceless against potentially severe environmental risks that scientists are increasingly convinced will occur in the not too distant future. By reinforcing military and governance structures at all levels, the “Livre Vert” provides a strategy to protect society and absorb the shock stemming from environmental degradation.

³³⁰ IPCC (2007), Fourth Assessment Report.

³³¹ *Ibid*, p.79.

³³² Scherer G. (2012), “Special Report: IPCC, assessing climate risks, consistently underestimates”, *The Daily Climate*. See: <http://www.dailyclimate.org/tdc-newsroom/2012/12/ipcc-climate-predictions>

³³³ Maslin M. (2009).

Therefore, the validity of the hypotheses outlined in the introduction is confirmed, and it is now possible to conclusively answer the three research questions:

- 1) The threats and strategies identified in the “Livre Vert” present a paradox. On the one hand, the analysis is comprehensive as it looks in detail at all the main environmental risks and presents them as primary threats, underlining how they interact and mutually reinforce one another. It proposes policies at the national, European and international level, both over the short run and over the long run, which are more ambitious and far reaching than those of most other policy papers. On the other hand, the focus of the “Livre Vert” is on matters of “hard security” involving civil or inter-state conflict, while neglecting “soft security” or the equally significant economic and social impact. Likewise, the “Livre Vert” relies on “high politics” strategies of adaptation involving the creation of new military and governance structures, while neglecting “low politics” sustainable development strategies for mitigating the impact of climate change.
- 2) As a result, the threats and strategies identified by the “Livre Vert” do not fit into any conventional categorization. They represent an unusual political undertaking that can be labelled as a form of “green hard security” and “green high politics”, an attempt to reconcile the usually separate fields of defence and environmentalism.
- 3) Nevertheless, a policy paper that focuses primarily on “green hard security” and “green high politics” is not comprehensive enough to successfully address the potential for systemic crisis resulting from environmental degradation. It must be combined with an analysis of the ways in which the “hard” and “soft” security dimensions interact and are mutually reinforcing, issues at the heart of the systemic risk posed by climate change. A holistic approach is required, which synthesizes “high” and “low” politics strategies. Adaptation and mitigation are indivisible, and can be seen to represent two sides of the same coin. Therefore, while the “Livre Vert” provides many insightful contributions to the field of environmental security, the analysis is incomplete and represents only half of the picture.

There is great potential for expanding the concept of a “green defence” by synthesizing the two approaches. For example, the focus of the “Livre Vert” on preventive action represents an ideal structure to carry out mitigation strategies for achieving sustainable development. We saw in the second chapter that the poorest regions in the world, such as sub-Saharan Africa or parts of the Middle East, are likely to be the worst hit by future environmental challenges, partly because they lack financial means and technical expertise to develop the required infrastructure. The “Livre Vert’s” proposal to create institutions dedicated to preventive action at the national, European and international level can be mobilized to implement economic and social policies that address the root causes of environmental degradation. This can be done through the sharing of technical expertise or development aid that would fund infrastructure projects, such as desalination centres, wind farms, large hydropower dams, as well as carbon capture and storage mechanisms, helping to mitigate local resource scarcity and cut greenhouse gas emissions.

Another way of synthesizing strategies of adaptation and mitigation would be to rely on the civil engineer corps of the military for interventions abroad. Many armies include a corps of officers made up of professional engineers, technicians and architects, who are responsible for designing, constructing and maintaining military facilities. In the United States, the civil engineer corps is part of the US Navy’s “Construction Battalion” that works on the military’s coastal and offshore facilities.³³⁴ In France, the civil engineer corps is known as the “g nie militaire”, and each section of the French military has its own “g nie” unit. The civil engineer corps could be mobilized to play a very important role within the paradigm of a “green defence”. An effective preventive strategy could be to dispatch them on civilian missions in parts of the world exposed to environmental tensions in order to build sustainable infrastructure where local authorities lack expertise and financial means. In countries exposed to water and food scarcity, the civil engineer corps would build drip irrigation systems for agriculture and plant new types of crops that are less wasteful and more resistant.

Likewise, in coastal areas or small islands exposed to sea level rise and extreme weather events, the

³³⁴ Also known as the “Seabees”, this unit was instrumental during WWII, where they assisted the war effort by building many military bases, bridges, airstrips and roadways.

civil engineer corps would construct higher and stronger dikes, shelters, and help make the local infrastructure more resistant and waterproof. The civil engineer corps could teach populations how to mitigate and adapt to the various environmental hazards they are exposed to, so that they are informed and equipped to protect themselves once the mission is over.

For all these reasons, it is apparent that environmental security and climate change offer strong examples of why the classical distinction between “high” and “low” politics, introduced by Morgenthau at the beginning of the Cold War, is becoming inadequate to explain the changing context of world politics. EELV’s concern for environmental security is justified, and the topic is likely to become increasingly relevant as the impact of global warming accelerates over the coming decades. Scientists are concerned that, given that the international community is failing to significantly reduce greenhouse gas emissions, climate change is bound to become one of the main challenges of the 21st century. In such a context, the concept of a “green defence” will become vital for allowing countries to manage the impact of environmental degradation.

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