11-5-2017

A review of Egypt’s first NDC: using a purpose-made matrix while investigating the need for a maritime component

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A Review of Egypt’s First NDC
Using a Purpose-made Matrix
while
Investigating the Need for a Maritime Component

By
MOHAMED SAID ROWIHIL
Egypt

A dissertation submitted to the World Maritime University in partial
Fulfillment of the requirements for the award of the degree of
MASTER OF SCIENCE
In
MARITIME AFFAIRS
(Maritime Energy Management)

2017
DECLARATION

I certify that all material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me:

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

(Signature): [Signature]
(Date): 25/09/2017

Supervised by: Associate Professor Raphael Baumler

World Maritime University
ACKNOWLEDGEMENTS

In the name of ALLAH The Most Gracious, The Most Merciful; for had it not been for His support and blessings, this work never would have been.

First, I would like to extend my sincere gratitude to the Republic of Korea and the IMO for it was their kind financial support that enabled me to pursue my MSc in WMU.

A heartfelt thanks to the WMU staff who made us feel at home and were most supportive throughout the program.

I would also like to thank the Head of the Maritime Energy Management Specialization, Professor Aykut Olcer, and his outstanding Staff, Professor Momoko Kitada and Professor Fabio Ballini. We enjoyed as much as we learned.

Most importantly, I would like to sincerely thank my Supervisor Professor Raphael Baumler who spared no effort and devotedly allowed me many hours of his precious time.

I would also like to warmly thank my father and mother for their continuous prayers, and my sister and brother for their support. May Allah grant you all a long, prosperous and healthful life.

Finally, I owe everything to my lovely family who could not join me in Sweden; my loving daughter Sara who taught me how to manage my time, my two sons Abdelrahman and Ahmed who taught me how to enjoy my time. Your picture on the wall was the source of my joy! And Last but certainly not least to my lovely wife Salwa who gave me everything without asking a thing! You taught me the meaning of love.
Abstract

Title of Dissertation: A Review of Egypt’s First NDC Using a Purpose-made Matrix while Investigating the Need for a Maritime Component

Degree: MSc

The dissertation is a critical review of Egypt’s first Nationally Determined Contribution (NDC). It is also an investigation of the need for a maritime component in NDCs.

A brief look is taken at the history of climate change instruments including the IPCC, UNFCCC, the Kyoto Protocol, the Paris Agreement and the most significant Conferences of the Parties (COP) leading to the Paris Agreement.

The case is made for the absence of any guidelines on the development of (I)NDCs in the official texts of the UNFCCC and the Paris Agreement. Three guides, developed by international organizations, on the design and development of (I)NDCs are examined in order to develop the review matrix.

Egypt’s first NDC is then reviewed using the developed matrix. Comments and observations on the NDC are provided. Recommendations to enhance the clarity, transparency and ambition of the NDC are proposed. Egypt’s NDC is then inspected for the presence of a maritime context where it was found to contain a fairly high maritime content.

Additionally, the UNFCCC, the Paris Agreement, the three guides and twenty selected NDCs of twenty countries, including Egypt, were subjected to a quantitative analysis to assess the significance of a maritime component within their texts. The results were analysed and observations and explanations are offered.

Finally, the gap between climate change action and ocean sustainability initiatives was investigated. Efforts and initiatives to bridge the gap are discussed and the possibility of using NDCs as a solution is considered.

KEYWORDS: Climate change, Egypt’s NDC, (I)NDC Guidelines, Ocean initiatives, Paris Agreement, UNFCCC
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<td>COP</td>
<td>Conference of the Parties</td>
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<tr>
<td>ICAO</td>
<td>International Civil Aviation Organization</td>
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<td>IMO</td>
<td>International Maritime Organization</td>
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<tr>
<td>INDC</td>
<td>Intended Nationally Determined Contribution</td>
</tr>
<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<td>KP</td>
<td>Kyoto Protocol</td>
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<tr>
<td>NDC</td>
<td>Nationally Determined Contribution</td>
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<td>NREA</td>
<td>New and Renewable Energy Authority</td>
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<td>PA</td>
<td>Paris Agreement</td>
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<td>UNDP</td>
<td>United Nations Development Program</td>
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<td>UNEP</td>
<td>United Nations Environmental Program</td>
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<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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<td>WMU</td>
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Chapter 1

1. Introduction

1.1. Background and Problem Statement

Scientific evidence of climate change, human involvement and the serious impacts it bears on our world has long been indisputable. Yet, the same science tells us that if we act now, we may be able to sustain. However, if we fail to take effective action to mitigate and adapt to the effects of the changing climate, we will not only bear the consequences, but most importantly we will be failing our children and the generations to come.

In 1988, the Intergovernmental Panel on Climate Change (IPCC) was established in reaction to the growing threat of climate change. Two years later, the IPCC published its “First Assessment Report” confirming that emissions induced by human activity was giving rise to increasing greenhouse gasses (GHGs) concentrations within the atmosphere. After two years of international negotiations, The United Nations Framework Convention on Climate Change (UNFCCC) was finally adopted in 1992. The convention, which entered into force two years later, has since then served as the umbrella under which all climate action negotiations and agreements would take place.

Climate change as defined by the UNFCCC is “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods” (UNFCCC, 1992).

In 1997, the first milestone in climate negotiations was reached, the Kyoto Protocol. The Protocol which adopted the UNFCCC principle of “common but differentiated responsibilities” only obliged developed countries, known as Annex 1 nations, to achieve certain emissions reductions. Meanwhile, Non-Annex 1 nations were under
no reduction obligations. Over time, this distinction proved to be problematic and whether the Kyoto Protocol proved successful remains debated.

After many years of negotiations, in 2015, a second milestone was achieved during the twenty first session of the Conference of Parties (COP21) through the adoption of the Paris Agreement. Still acknowledging the “common but differentiated responsibilities” of participating nations, the PA required all nations to commit to Nationally Determined Contributions (NDCs). As a run-up to the PA, Parties were required to submit an Intended Nationally Determined Contribution (INDC). Formulated by the nations themselves, these INDCs were to detail, inter alia, each countries level of ambition to undertake actions in order to mitigate and/or adapt to climate change for the period from 2020 to 2025.

With the entrance of the PA into force in November of 2016, countries have been submitting their first NDC. As of September 23rd 2017, 159 countries have ratified the Agreement and submitted their NDCs. Having ratified the Paris Agreement, the party’s INDC, if no other is communicated, will become its official NDC.

**Egypt; from INDC to NDC**

At the time of proposal of this research, Egypt had communicated its INDC to the UNFCCC Secretariat in November 2015. However, Egypt had yet to ratify the Paris Agreement and submit its official NDC. The research was initially intended to review Egypt’s INDC before being submitted as Egypt’s first NDC.

However, by June 29th 2017 and before the conclusion of the research, Egypt had already ratified the PA and communicated its first official NDC ("NDC Interim Registry," 2017). No change had been made to the previously communicated INDC; it was simply converted into “Egypt’s First NDC” without any alterations or amendments ("Egypt First NDC," 2017). Nonetheless, it is not too late; according to Article 4 of the PA, any Party may at any time make adjustments to its existing NDC in an attempt to improve ambition (Paris Agreement, 2015).

**The Need for Guidelines**
In order to critically review the NDC, there is a need for specific guidelines on the review/audit process of an NDC and its required components. Unfortunately, review of the available literature reveals the partial, if not total, absence of these specific review guidelines.

UNFCCC official documents provide little insight on the procedures for formulating an (I)NDC especially where the oceans are a concern. Only a set of general requirements are identified. Furthermore, no guidelines are provided for the review process. Decision 1/CP.20 encouraged parties to detail their INDCs in a manner to facilitate the clarity, transparency and understanding of the INDC. Parties were encouraged to include…

“as appropriate, inter alia, quantifiable information on the reference point (including, as appropriate, a base year), time frames and/or periods for implementation, scope and coverage, planning processes, assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals, …” (Decision 1/CP.20) (“Lima Call for Climate Action,” 2014).

However, since the Lima Call for Climate Action in 2014, a number of independent and nongovernmental organizations (NGOs) have published a few (I)NDC guides. The aim of these guides was to provide, in some cases, step-by-step advice on how to devise an INDC. Others aimed to give a detailed synopsis of the requirements of an INDC. While other guides only provided general outlines. None of these were made mandatory. However, the UNFCCC official website does recommend a few. Nonetheless, it remains the discretion of the country to choose how to formulate its (I)NDC.

The World Resources Institute and The German Institute for Development Policy (Deutsches Institut fur Entwicklungspolitik) developed two separate mechanisms to explore (I)NDCs, the “CAIT Climate Data Explorer” and the “NDC Explorer” respectively. The purpose of these mechanisms is to summarize and breakdown the (I)NDC in a simple and systematic method to facilitate understanding of the contributions and their levels of ambition towards the global goal of 1.5°C. Nevertheless, they are not concerned with providing advice nor recommending
amendments where needed. Nor are they intended as tools to review or audit an NDC.

Hence, in order to review Egypt’s NDC, the research, in Chapter 3, will develop a review matrix by examining the relevant official texts including the Paris Agreement and its preceding documents. Furthermore, a qualitative analysis of the available guides will be conducted by which a set of review criteria may be developed. Additionally, in Chapter 5 of the research, a quantitative survey of selected texts will be conducted to determine whether or not there exists a need for a maritime context in NDCs.

1.2. Aim and Objectives

The purpose of this study, therefore, is to develop a matrix by which any NDC may be reviewed and to use this matrix to review Egypt’s while investigating the significance and need for a maritime component within NDCs.

Thus, the main objectives of the research are:

- To identify and discuss the relevant guidelines for formulating a detailed NDC,
- To prepare a review matrix based on these guidelines,
- To critically review Egypt’s First NDC according to the developed matrix,
- To investigate the need for a maritime component within NDCs.

1.3. Scope & Limitations

The scope of this research is to develop the review matrix, to review Egypt’s NDC and to determine whether there is a need for a maritime component in NDCs.

Therefore, the texts that will be used are:

- the text of the UNFCCC,
- the texts of the Paris Agreement and UNFCCC documents preceding it, and
- the texts of selected (I)NDC guides endorsed by the UNFCCC official website.

If during the review, discrepancies are found within Egypt’s NDC, the research may apply one or more of the following methods:
• identify the discrepancy and the effect it bears on the NDC,
• provide viable justification if reason is found, and
• provide recommendations that may enhance the NDC.

It is important to note that the “maritime context” intended in the research includes all actions, activities, fields, ecosystems… etc. that directly relate to the ocean and may be influenced by or have influence on climate change. **Shipping, however, both international and domestic is excluded** as the former is regulated by the IMO and the latter is normally implied as part of the transport sector in NDCs.

It is also noted that the field of research is fairly new. Consequently, the data in some cases was quite limited particularly in relation to the availability of NDC guidelines and research on the link between climate change instruments and ocean initiatives.

Attempts made to contact official Egyptian sources were, unfortunately, unsuccessful. Furthermore, up-to-date quantified emissions data for Egypt is extremely limited. The latest official data available is either from 2001 or 2005 depending on the sector (**Egypt Third National Communication Under the United Nations Framework Convention on Climate Change, March 2016**).

For the abovementioned reasons, **the study is unable to:**

• Provide comments *from the authors* of the NDC on issues raised during the review, and
• Provide actual quantified figures as part of the recommendations.
Chapter 2

2. From Climate Concern to Paris Agreement

2.1. A Brief History of Climate Action Leading to the Development of INDCs

Human first scientific awareness of climate change dates to the 19th century when French physicist Joseph Fourier, in 1824, first came across the warming effect of earth’s atmosphere giving rise to the “greenhouse gas effect”. It was at the very beginning of the 20th century that Swedish chemist Knut Angstrom discovered the relationship between the GHG effect and CO₂.

In 1972, witness was given to the world’s first UN environment conference, in Stockholm, Sweden. Nevertheless, there was almost no mention of climate change. Only three years later, scientist Wallace Broecker in a scientific paper introduced the term “global warming” to the public (A brief history of climate change.2013) soon to be followed by the First World Climate Conference (WCC) in 1979.

2.2. The IPCC and Scientific Evidence of Climate Change

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP). The IPCC was first tasked by the UN to:

“prepare a comprehensive review and recommendations with respect to the state of knowledge of the science of climate change; the social and economic impact of climate change, and possible response strategies and elements for inclusion in a
possible future international convention on climate” (IPCC - Intergovernmental Panel on Climate Change.).

The first IPCC Assessment Report of 1990 announced that global warming and climate change is happening and is probably anthropogenic. The IPCC has thus far published five assessment reports, the last being in 2014 providing clear scientific evidence on climate change and the associated effects.

Thus, the need for international cooperation on climate change was undeniable.

2.3. The UNFCCC as the Umbrella for Climate Action

The United Nations Framework Convention on Climate Change (UNFCCC) was created in 1992 during the proceedings of the Rio Earth Summit. The main objective of the UNFCCC is to “stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” (UNFCCC, 1994). Currently the UNFCCC holds a record-breaking number of 197 countries as party to it. It is, therefore, considered to be the most universally accepted treaty/convention thus far.

From its onset, the UNFCCC integrated a number of key principles of which most important are:

- “Sustainable development”; needs of the current generation are considered without compromising those of the generations to come (Article 3.1).
- The “Precautionary principle”; though the science behind the IPCC’s first report of 1990 had not provided sufficient evidence that climate change was anthropogenic, it was agreed that there was an obligation to take action as there existed a probability of irreversible damage to the environment (Article 3.3)
- “Common but differentiated responsibilities”; the burden of addressing climate change was mainly laid upon the shoulders of developed nations while only encouraging developing nations to take part (Ullal, 2013) (Article 3.2).
“Common but differentiated responsibilities’ stemmed from the universal understanding that not only were developed nations the main contributors to the anthropogenic effects being observed but they were also the ones most equipped technologically and financially to confront these effects. Mostly belonging to the Organization for Economic Cooperation and Development (OECD), in addition to twelve countries with "economies in transition", these nations were recognised within the Convention as Annex I countries. Expectations at the time were for Annex I countries to reduce emissions to 1990 levels by the year 2000.

**The Need for a Stronger Commitment**

Successfully assembling all nations under one umbrella for climate action, the UNFCCC nevertheless had its drawbacks. It was widely considered as being too soft with no legally binding provisions; as most countries failed to observe any reduction in emissions (with some actually increasing) without any reprimands what so ever. It had become evident that if any progress was to be achieved, a stronger commitment was needed.

### 2.4. The Kyoto Protocol to commit “Annex I” countries

During the 1997 COP3 in Japan, the Kyoto Protocol which was considered to be the world’s first emissions reduction treaty was adopted. The Kyoto Protocol entered into force seven years later, in 2005, when the required threshold limit of 55 parties consisting of 55% of global total CO₂ emissions was achieved. The Protocol built upon the UNFCCC key principles, such as “common but differentiated responsibilities” (Article 10) and classify countries in Annex I and Annex II.

Moreover, for the first time in the history of climate action, the Kyoto Protocol suggested “internationally binding commitments” for the reduction of GHG emissions
for Annex 1 countries. A collective GHG emissions reduction goal was set; to reach a level at least 5% below the 1990 level by the end of the first commitment period on 31st Dec. 2012 (Kyoto Protocol, 1997). To facilitate this, three emissions reduction mechanisms were introduced; joint implementation, emissions trading, and the clean development mechanism (CDM). Referred to as ‘market mechanisms’, the objective was to allow developed nations some flexibility in choice of method either to mitigate or adapt to climate change whether domestically or internationally (Article 12).

The Kyoto Protocol in Effect

Figure 1 shows that by 2012 a surprising 12.5% emissions reduction was achieved. Meanwhile, deeper analysis of the political and economic circumstances surrounding the Protocol may indicate differently. The year 1991 marked the official collapse of the former Soviet Union (USSR) and socialist block. This led to an abrupt halt of many industries particularly in Russia and Ukraine. Figure 2 is a clear representation of the impact of this on collective emissions reduction of the parties to the Kyoto Protocol (Jones Craig, 2015).

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10 Six GHGs were considered; Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF6) with CO2 accounting for approximately 80% of total emissions.
The United States, although having signed the treaty in 1998, never ratified it due to the Byrd-Hagel Resolution. The resolution which was passed a year earlier, in 1997, prohibited the US from entering into any agreement under the umbrella of the UNFCCC which placed binding commitments only upon developed nations while excluding commitments for developing nations, or... may cause serious harm to the economy of the United states (Byrd-Hagel Resolution, 1997). To date, the US remains the only signatory not to ratify the Kyoto Protocol.

Canada, on the other hand, was early to ratify. Yet, unable to achieve its 6% commitment below the 1990 level by 2012 and fearing penalties, Canada officially withdrew from the treaty in December 2011.

Japan and Russia, also, declared they would not undertake further commitments in the second commitment period starting 2013. China, India and Brazil, being considered developing countries were not given any binding commitments, an area that proved later to problematic.

**Effectiveness of the Kyoto Protocol:**

The Kyoto Protocol aimed to address a number of potential shortcomings of the UNFCCC. It imposed legally binding contributions on developed nations and it attempted to implement a better and more efficient framework for monitoring emission reductions. It also demanded a reduction of global emissions of 5% below the 1990 levels not just to match them. Participants to the Kyoto Protocol were not only the individual nations but also a number of NGOs and international organizations were also involved providing advice, expertise and relevant information. Of these organizations; the UNEP, UNDP, the World Bank and the World Meteorological Organization were in the forefront.
However, the Kyoto Protocol has been accused of “offering the wrong diagnosis” to dealing with climate change; instead of focusing on reducing GHGs which is the indirect result; the direct result being human activities generating these GHGs, the treaty should preferably focus on limiting the activities itself. In other words, a pragmatic shift from fossil fuels to renewables is argued to be the best approach (Blustein, 2011). Therefore, Blustein advocates that, as the Kyoto Protocol stands, it is ineffective as it does not encourage a shift from fossil fuels to renewable sources.

The Protocol has also been deeply criticised for excluding developing nations from any commitments. Before the second commitment phase, in 2012, it was becoming evident that developing nations like China, India and Brazil had now possessed growing economies with a much more significant contribution to GHG emissions. Ullal further questions the practicality of excluding India and China as between 1990 and 1998, figures show an increase in their GHG emissions of 57% and 39% respectively. Another reasoning behind this criticism is that if developed nations are not encouraged to reduce their emissions, this would eventually lead to larger financial burdens in the effort to mitigate and adapt to climate change.

Moreover, many considered the commitments set by the Kyoto Protocol to be decrease extremely lacking in addressing the problems caused by global warming, a fact well iterated by the Kyoto Protocol itself recognizing the need for additional future reductions (Kishkan, 2015). Supporters of the Protocol reason it would have been impractical for the treaty to set a much higher reduction goal when it was more important to have all nations on board; higher emission reductions would have set off many Parties.

Supporters also argue that Kyoto introduced the three well known reduction strategies known as “market mechanisms” which provided flexibility in dealing with the economics of climate change. Contrary to these assertions, critics claim these so called “market mechanisms” have failed to substantiate any real development in the efforts for climate action. Sutter says that there is “a clear tendency for the CDM to deliver likely emission reductions but not to contribute towards the host country’s sustainable development” (Ullal, 2013). He continues that the CDM fails to set criteria for choosing projects to, nor does it provide any standards for the choice of countries.
to develop in. This led to many countries, especially Asian, being flooded with investments receiving approximately 80% of total investments. Meanwhile others, especially African countries, which seemed less attractive, were completely neglected receiving less than 2%. This, in a sense, defeats one of the core principles of the UNFCCC; namely, sustainable development.

Whether or not the Kyoto Protocol was a success is really not an issue. More important is what we have learned from the process. All the criticism the Kyoto Protocol has received is in practice very valuable to developing a more efficient climate regime.

A SWOT\textsuperscript{11} analysis applied to the KP may be found in Annex 1. The aim is to provide a systematic and more comprehensive means of understanding the underlying characteristics of the KP. This may prove beneficial in assessing the effectiveness of future initiatives.

\textbf{2.5. The journey from Kyoto to Paris}

During the first KP commitment period (2008-2012) and the run-up period to the Paris Climate Agreement (COP21) held from 30\textsuperscript{th} Nov. to 15\textsuperscript{th} Dec. 2015, many discussions have aroused. Following is a brief account of the more notable ones.

The Copenhagen Accord

Most notable was COP15 in Copenhagen in 2009 where, according to the Bali Roadmap agreed in 2007, a new legally-binding agreement was supposed to be reached. However, due to arguments between developed nations on one side led by the US, and developing nations on the other led by China no legally-binding issues were agreed to. The US argued that developing countries such as China and India should be required to take on legally-binding commitments, while China, on the other

\textsuperscript{11} Strength, Weaknesses, Opportunities and Threats Analysis
hand, refused such requirement and demanded more emission reductions from developed nations. Consequently, the modest non-binding Copenhagen Accord was reached whereby:

- Annex I countries would commit to quantified reduction targets for 2020 by 31 January 2010,
- Non-Annex I countries were to implement mitigation actions, “Nationally Appropriate Mitigation Actions (NAMAs)”, by 31 January 2010,
- in 2015 an assessment of the Copenhagen Accord’s implementation would take place, and
- the AWG-KP\(^{12}\) and AWG-LCA\(^{13}\) process would continue and negotiations be completed by COP 16 in Cancun in 2010 (Ullal, 2013).

The Green Climate fund was established with a $30 billion fund per year and aiming for $100 billion by 2020.

**The Durban Platform**

The AWG-DPEA\(^{14}\) (Durban Platform) was created during the procedures of COP17 held in Durban in 2011, a year before the conclusion of the first commitment period

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\(^{12}\) Ad Hoc Working Group on Further Commitments for Appendix I Parties under the Kyoto Protocol

\(^{13}\) Ad Hoc Working Group on Long-term Cooperative Action under the Convention

\(^{14}\) Ad Hoc Working Group on the Durban Platform for Enhanced Action
to the Kyoto Protocol. The DP, considered by some to be “an agreement to agree” set the scene for the discussions to take place during COP21 in Paris in 2015.

Doha Cop18

Held in 2012, Parties agreed to embark on a second commitment period for the Kyoto Protocol from 2013 to 2020. Parties, also, agreed to a timetable for a future agreement, aiming for 2015. Unlike the Kyoto Protocol, this new agreement would encompass all nations. It was agreed that upon agreement on a new platform in 2015, the new platform would supersede the agreed upon second commitment period.

The Warsaw Mechanism

Adopted during COP19 in Warsaw, Poland, the function of the Warsaw Mechanism for Loss and Damage is to provide a platform for the aid of developing countries to cope with loss and damage resulting from extreme effects of climate change. Furthermore, decision (1/CP.19) required Parties to develop an INDC well before the COP21 in 2015.

2.6. The Paris Agreement

The Paris Agreement was concluded on December 12th 2015 and entered into force on October 5th 2016. As of September 23rd 2017, 197 Parties have signed the agreement; 159 countries, including the collective European Union, have ratified the agreement. It is considered to be the most universally accepted treaty under the umbrella of the United Nations. The Paris Agreement pledges holding global warming to well below 2°C, by the year 2100 (Paris Agreement. Dec 12, 2015). Furthermore, it encourages Parties to aim for 1.5°C. The agreement’s main tool for achieving this is Nationally Determined Contributions (NDCs). Prior to ratification, each country was required by decision (1/CP.19) to submit an Intended Nationally Determined Contribution (INDC). Bearing in mind the uneven capacities and resources of countries, INDCs allowed each country to develop its own climate action contribution according to its own needs, capacities and priorities. Once the country has ratified the PA, its INDC is automatically transformed into its official NDC unless the country indicates its intention to submit a new NDC.
The following chapter will provide a more detailed discussion on (I)NDCs and the available guidelines/guides.

Chapter 3

3. INDC Guidelines and the Review Matrix

3.1. (I)NDCs as a Tool for Climate Action

Intended Nationally Determined Contributions (INDCs) were a primary outcome of the nineteenth session of the Conference of the Parties (COP19) that took place from 11th to 22nd November 2013 in Warsaw, Poland (Decision 1/CP.20).

All Parties to the UNFCCC were invited to communicate their INDCs to the Secretariat of the United Nations in advance of COP21 in Paris in November 2015. They are voluntary pledges submitted by individual countries detailing the country's plans to address climate change according to its own capabilities, needs and prospects.

INDCs became a central tool for achieving the ambitions of the Paris Agreement and obtaining the consent of all parties. Upon ratification, accession or approval, a Party’s INDC would be transformed into its NDC (Nationally Determined Contributions) (1/CP.21) (Secretariat, 2016). NDCs are intended by the beginning of the first
commitment period (2020-2025) to replace NAMAs\textsuperscript{15} and NAPAs\textsuperscript{16} previously required by the Kyoto Protocol.

Therefore, for the general purposes of this research, the term NDC will be used throughout unless specifically referring to the period prior to ratification of the PA where INDC shall be used. The term (I)NDC will be used when both NDCs and INDCs are applicable.

\section*{3.2. Main Components of (I)NDCs}

A year before the PA, the Lima Call for Climate Action (COP20) in its decision (1/CP.20, par. 2), clearly identified the main components of INDCs:

1. Mitigation,
2. Adaptation,
3. Finance,
4. Technology development and transfer,
5. Capacity-building, and
6. Transparency (Decision 1/CP.20.)

The articles of the PA, in particular articles 4, 7, 9, 10, 11 and 13 further elaborate on these requirements.

\subsection*{3.2.1 Mitigation}

The IPCC defines mitigation as, “A human intervention to reduce the sources or enhance the sinks of greenhouse gases (GHGs)” (IPCC, 2014: Annex II: Glossary). In other words, mitigation involves all actions and measures aimed at reducing the

\textsuperscript{15} Nationally Appropriate Mitigation Actions
\textsuperscript{16} National Adaptation Programs of Action
concentration of GHGs in the atmosphere either by reducing emissions from *sources* or by removing already existing GHGs by means of *sinks*.

**Domestic Measures**

Article 4 of the PA requires each Party to prepare, communicate and maintain successive nationally determined contributions (NDCs) detailing domestic mitigation measures (par. 2) to commence with the launch of the first contribution period from 2020 to 2025 (decision 1/CP.21) (*Paris Agreement*, 2015).

**Differentiated Strategies**

While developed countries are urged to continue adoption of *economy-wide absolute emission reduction targets*, least developed countries and small island developing States are encouraged to prepare *low GHG emissions strategies, plans and actions* in accordance with their special circumstances (Article 4, par. 4 & 6).

**Long-term Strategies**

Furthermore, all Parties are encouraged to formulate and communicate *long-term GHG emission development strategies*, taking into account, once more, their *common but differentiated responsibilities* (Article 4, par. 19).

### 3.2.2 Adaptation

Adaptation is “the process of adjustment to actual or expected climate and its effects” as defined by the IPCC adding, “In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects” (*IPCC, 2014: Annex II: Glossary*).

The UNFCCC website offers a similar definition:

“Adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or
to benefit from opportunities associated with climate change.” ("FOCUS: Adaptation," 2017).

Adaptation, therefore involves all actions and measures taken to reduce the negative impacts of climate change on the different dimensions of life. Though adaptation is essentially a reaction to climate change, it requires nations, societies and individuals to be pro-active in finding and implementing the best means to become prepared.

**Recommendation vs. Requirement**

Article 7 details requirements for adaptation. “Each party *should* as appropriate, submit and update periodically an adaptation communication…” (Article 7, par. 10). Noted is the use of “should” instead of “shall”; it is, therefore, implied that adaptation plans within NDCs are on a voluntary/need for basis. Nevertheless, Parties, especially those most vulnerable and those already affected by the adverse effects of climate change, are highly encouraged to prepare their countries to changes. The Lima Call for Climate Action calls on “all Parties to consider communicating their undertakings in adaptation planning or consider including an adaptation component in their intended nationally determined contributions” (1/CP.20, para 12).

### 3.2.3 Finance

The PA call on developed countries to assist developing countries in fulfilment of their NDCs (Article 4, par. 5 & Article 9) in accordance with decision (1/CP.20, par. 15). Parties agreed that the already available Financial Mechanism of the Convention (UNFCCC) and its operating entities shall serve as the financial mechanism of the PA (Article 9, par. 8) (1/CP.20, par. 15).

During COP 17 in Durban, developed nations had already undertaken a commitment to gradually increase their financial commitments by jointly mobilizing USD 100 billion annually by 2020.

Later at Warsaw, developed country Parties were urged to maintain continuity of mobilization of public climate finance at increasing levels from the fast-start finance period in line with their joint commitment to the goal of “mobilizing USD 100 billion per
year by 2020 from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources, in the context of meaningful mitigation actions and transparency of implementation” (Decision 3/CP.19).

Decision 4/CP.19, “confirms that all developing country Parties to the Convention are eligible to receive resources from the Green Climate Fund” already developed in 2010 to serve a channel for securing and dispensing of funding for the sustainment of the climate.

3.2.4 Technology Development and Transfer

Similarly, the Technology Mechanism of the Convention was agreed upon to serve as that for the PA (Article 10, par. 3) in order to provide support, including financial, to developing countries for technology development and transfer (Article 10, par. 6). The Technology Needs Assessment (TNA), the Expert Group on Technology Transfer, and the Climate Technology Initiative are three different tools provided by the UNFCCC and UNDP to facilitate the development and transfer of necessary mitigation and adaptation technologies to developing nations.

3.2.5 Capacity-building

Article 11 of the agreement details requirements for capacity-building in order to mitigate and adapt to climate change via all possible means including, inter alia; education, training, public awareness and creation of capacities needed for the development of NDCs and its appropriate and timely implementation. All Parties are encouraged to cooperate to facilitate and enhance the capacity-building of developing parties especially those most vulnerable to the adverse effects of climate change (Article 11, par. 3 & 4).

3.2.6 Transparency

Article 4, par. 8 urges Parties to communicate their NDCs, in accordance with decision 1/CP.20, in a clear and transparent manner in order to promote better understanding and to build mutual trust and confidence between Parties.
Article 4, par. 13 sets provisions for the establishment of a “transparency framework” whereby encouraging countries to develop their NDCs in a transparent manner to enhance mutual trust through clarity and better understanding in accordance with the provisions of decision 1/CP.20:

14. Agrees that the information to be provided by Parties communicating their intended nationally determined contributions, in order to facilitate clarity, transparency and understanding, may include, as appropriate, inter alia, quantifiable information on the reference point (including, as appropriate, a base year), time frames and/or periods for implementation, scope and coverage, planning processes, assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals, and how the Party considers that its intended nationally determined contribution is fair and ambitious, in light of its national circumstances, and how it contributes towards achieving the objective of the Convention as set out in its Article 2. (Decision 1/CP.20)

Moreover, in an effort to enhance transparency and to serve as an evaluation platform for collective contributions, the “Global Stocktake” was established (Article 14) as a platform where data from the submitted NDCs will be collected, evaluated and made available for all other nations.

More on transparency will be provided in the next chapter.

3.2.7 Fairness and Ambition

Paragraph 14 of the Lima Call for Climate Action encourages Parties to display fairness and ambition in their INDCs. To date, no definite metrics have been established to assess fairness of a contribution. Yet, it is generally accepted that fairness requires a country to consider its resources and its historic role in the increase of GHGs. To state this in mathematical terms, fairness is directly proportional to both the country’s level of development and its role in increase of GHGs; i.e. a developed country should do more especially if it was a direct and substantial cause of increase of GHGs. However, how much should be done remains a matter of subjective judgement.
**Ambition** is a measure of what the country has pledged to achieve compared to what it can actually achieve. NDCs should reflect the country's *highest possible ambition* within the context of *common but differentiated responsibilities* considering the country’s respective capabilities and national circumstances (Article 4, par. 3). While NDCs are to be communicated every five years (Article 4, par. 9), a Party may at any time make adjustments to its existing NDC in an effort to enhance its level of ambition (Article 4, par. 11).

### 3.3. Review of Guides on the Development of (I)NDCs

It is important to note, in the following context, the difference between “guides” and “guidelines”. A guideline as defined by Oxford Dictionary is “a general rule, principle, or piece of advice.” It is usually an official document or in an official context. While a guide, as defined by the same source, is “a book, document, or display providing information on a subject or about a place”. It is not necessarily an official document. Guides are, therefore supportive in nature, while guidelines have directive nature.

Since the requirement of INDCs, several guides have been developed by different organizations. UNFCCC itself does not provide such guidelines therefore organizations such as the World Resources Institute, UNDP, GIZ\(^\text{17}\) and the NewClimate\(^\text{18}\) Institute developed supporting document to assist countries in preparing INDC. Before moving on to the review of available guidelines, it should be

\(^{17}\) The German Association for International Cooperation is a federal enterprise in support of the German government. [https://www.giz.de/en/html/index.html](https://www.giz.de/en/html/index.html)

\(^{18}\) A limited liability non-profit organization founded in 2014 with offices in France and Germany supporting research and implementation of action against climate change. [https://newclimate.org/](https://newclimate.org/)
noted that the only official reference to INDC are generic and available as Decisions 1/CP.20 and 1/CP.21.

The majority of guides on preparing INDCs emerged prior to COP21. They intend to provide a framework providing recommendations on designing and implementing INDCs.

Nonetheless, the UNFCCC official website does make reference to a few guides developed by other independent organizations. Links to these guides are made available on the UNFCCC website. However, the website does make it clear that these sources are not endorsed by the UNFCCC. They are only provided for reference.

The guidelines referenced by the UNFCCC are the following:

- Guide no. 1 - Designing and Preparing Intended Nationally Determined Contributions
- Guide no. 2 - A Guide to INDCs (Second edition)
- Guide no. 3 - Decoding Intended Nationally Determined Contributions (INDCs): A Guide for Understanding Country Commitments

These guides constitute the core of the documentation to develop the matrix that will be use to analyse Egypt’s NDC? Following is an investigation of these three guides one-by-one. The main focus of this investigation is to identify the criteria to be used in formulating the review matrix.
3.4.1 Guide 1 - Designing and Preparing Intended Nationally Determined Contributions (Levin et al., 2015):

Early 2015, the World Resources Institute (WRI) along with the UNDP, in collaboration with the GIZ and the NewClimate Institute, published Designing and Preparing Intended Nationally Determined Contributions (Levin et al., 2015).

The guideline has been widely supported and praised by governments around the world as is visible on through the endorsements on its last page. Possibly the most inclusive guideline on the development of (I)NDCs thus far, Levin et al., 2015, provide a well-structured comprehensive outline on most aspects related to designing and preparing (I)NDCs.

It is constructed of eight chapters covering various aspects of INDC preparation. It includes, inter alia: the pre-preparation process, mitigation and adaptation options, finance, technology, capacity building and transparency requirements. These processes highlighted in bold appear to be very consistent with the requirements explained by articles 4, 7, 9, 10, 11 and 13 of the Paris Agreement respectively.

Part I (chapters 1 to 5) covers the preparation phases of an INDC. This part details the steps and procedures to be carried out in the preparation phases. It discusses the governance processes such as empowering relevant stakeholders and how to collect data required in the process. This part provides the building-blocks of the INDC while supporting clarity and transparency.

Part II (chapters 6 to 8) provides the more technical information.

Chapter 6 illustrates how a mitigation plan should be composed providing available mitigation options along with convenient visual illustrations as seen in Figure 3.
Furthermore, Part II provides a detailed easy to understand explanation of the different types of targets and baselines for GHG reduction-based mitigation as shown in the table in Figure 4 (Levin et al., 2015).
Chapter 7 is dedicated to adaptation options available while preparing INDCs in accordance with decision 1/CP.20, par. 12. This chapter, also, includes a handy section on the transposition to INDCs from the already present NAPs\textsuperscript{19}.

19 National Adaptation Plans
Throughout the guideline useful examples from the INDC processes of different countries are made available. In addition, a very useful set of tables and figures are made available in the annexes section.

Overall, “Designing and Preparing Intended Nationally Determined Contributions (Levin et al., 2015)” proves to be an appreciated tool provided to countries, especially developing ones.

However, the guideline is focused on mitigation and adaptation within the land sector providing almost no insight on the maritime related sector. To prove this, a keywords text search will be conducted in Chapter 5 when the maritime context is discussed.
3.4.2 Guideline 2 - A Guide to INDCs (Second edition): (Holdaway & Dodwell, 2015)

Developed by CDKN\textsuperscript{20} and Ricardo-AEA\textsuperscript{21}, “A Guide to INDCs” was purposely created for use by the Least Developed Countries (LDCs) and Small Island Developing States (SIDSs). However, it provides an overview that may be used by any country seeking assistance with the development of its (I)NDC.

(Holdaway & Dodwell, 2015) break down INDCs into five main sections:

1) National Context  
2) Mitigation  
3) Adaptation  
4) Planning Process  
5) Means of Implementation:  
   - Financial  
   - Capacity-building  
   - Technology transfer, and  
   - Other types of international support

Similar to Levin et al. (2015), “A Guide to INDCs” provides a set of very illustrative tables and examples. However, while the former provides real-life examples from INDCs of chosen countries, Holdaway & Dodwell provide generic examples not associated to specific cases or identities.

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{20} The Climate Development Knowledge Network (CDKN) is an alliance of organisations funded by a number of governments including but not limited to: The UK, The Netherlands, Sweden, Norway and USA. Its main interest is to support decision-makers in designing and delivering climate compatible development. \url{https://cdkn.org/?loclang=en_gb}
\item \textsuperscript{21} A global strategic engineering and environmental consultancy specialized in the transport, energy and scarce resources sectors. \url{https://ricardo.com/}
\end{itemize}
\end{footnotesize}
“A Guide to INDCs” is well organised.

Each section systematically begins by establishing the basics:

- aim,
- key data sources, and
- relevant UNFCCC reference are clearly pointed out as shown in Figure 5.

![4. Planning process](image)

**Figure 5, Source:** (Holdaway & Dodwell, 2015)

Meanwhile, (Holdaway & Dodwell, 2015) occasionally do make reference to Leven et al. (2015) where further detail may be required.
3.4.3  Guideline 3 - Decoding Intended Nationally Determined Contributions (INDCs): A Guide for Understanding Country Commitments

“Decoding Intended Nationally Determined Contributions (INDCs): A Guide for Understanding Country Commitments” is, yet, another simple and concise guide developed by the WRI. It was meant to complement Leven et al. (2015) reviewed in the previous point. “Decoding Intended Nationally Determined Contributions, 2015” is a short eight-page guide with pointers on how to evaluate an INDC. It breaks down the evaluation process of an (I)NDC into six stages each illustrated by a question that should initially be asked by the assessor:

1) Does the INDC contain a clear statement of intent?
2) Is the INDC in line with science?
3) Is the INDC fair and ambitious?
4) Has the INDC been designed following a strong process?
5) Is the INDC feasible to implement?
6) Is the INDC transparent?

(Decoding Nationally Determined Contributions, 2015)

Additionally, offered at the end of each section are simple to understand tips under the heading “What to look for?” making it possible for the assessor to focus on the more significant issues. The guideline itself is very concise providing a quick overview of the evaluation process and important aspects of (I)NDCs to look for. It is not meant to provide all the details necessary for a thorough evaluation. Nevertheless, if used in conjunction with “Designing and Preparing Intended Nationally Determined Contributions” (Levin et al., 2015), it can definitely become a very helpful easy to use evaluation tool.
3.5 The Review Matrix

Taking into consideration the provisions of decisions (1/CP.20) and (1/CP.21) and in light of the guidelines discussed above, an (I)NDC review matrix can be constructed. The purpose of the Review Matrix is to provide a simple, visual template for the review process of the (I)NDC.

The following approach for reviewing any (I)NDC is suggested:

The assessor should investigate whether the (I)NDC includes the following?

1. A clear statement of national context: If Yes…
   a. Does the statement include all significant information?23
   b. Missing pieces of information should be detailed.
   c. Areas of improvement may be pointed out.
2. A clear statement of mitigation contribution: If Yes…
   a. What is the type of contribution? (outcome/action or both)
   b. Is the nature of the contribution and the sector it is applied to clear?
   c. Is there a clear target and/or a reference baseline identified?
   d. Does the target seem reasonable/ambitious? If not, why?
   e. Are the expected results quantified?
   f. Additionally, does the (I)NDC state a long-term plan?
3. A clear statement of adaptation efforts. If No, why? If Yes…
   a. Has level of vulnerability (vulnerability profile) been stated clearly?
   b. Does a statement of national long-term goals or vision exist?
   c. Are short-term plans of action clearly identified?
   d. Are adaptation gaps and barriers well defined?
   e. If any, is extra support needed well defined?

22 Templates provided in Appendix 2.
23 For details see Appendix 3, Figure 15.
4. What means of implementation are defined, if any?
   a. Financial support:
      i. Is there an estimate of total cost of (I)NDC implementation?
      ii. If external funds are required, is the required amount clearly stated and justified?
   b. Technology development and transfer:
      i. If needed, is it clearly specified and for which sector/purpose?
   c. Capacity-building:
      i. If needed, are needs and for how long clearly indicated?

5. Does the (I)NDC appear to be **fair and ambitious**? If not…
   a. Why?
   b. What can be done differently?

6. Overall, does the (I)NDC seem to be communicated in a clear and **transparent** manner? If not… How can transparency be enhanced?

This matrix should allow the review process to be conducted in a systematic yet concise manner. It is not intended to be all inclusive. Other aspects of the (I)NDC may be reviewed such as the planning process and level of stakeholder involvement. However, for the purpose of this research the concern is with the effectiveness of the final product, the NDC itself. Therefore, processes in the pre-planning and planning phases are excluded.
Chapter 4

4 Egypt’s First NDC and the Review Matrix

4.1 Introducing Egypt’s First NDC

Egypt, in response to Decision 1/CP.19, submitted its INDC well before the commencement of the Paris Agreement in November, 2015. The INDC was officially communicated to the UNFCCC by The Egyptian Ministry of State for Environmental Affairs. Technical support for the development of the INDC was provided by Germany through the UNDP, while financial support was delivered by the EU.

On June 29th, 2017, Egypt submitted its first official NDC. In reality, no change whatsoever was made to the previous INDC which was simply converted into the new NDC. In fact, the one currently available on the UNFCCC NDC Interim Registry still holds the title “Egyptian Intended Nationally Determined Contribution” (“Egypt First NDC,” 2017). The NDC is a 13-page black and white document written in 1.5 line spacing. The document is only available in the English language on the UNFCCC NDC Interim Registry site.

It may be argued that Egypt, a developing country experiencing a particularly difficult time, with only a 0.52% contribution to total global emissions (“Egypt Profile, CAIT Climate Data Explorer,” 2017) does not have the resources nor the motivation to take serious climate action. However, being one of the more susceptible countries to the adverse effects of climate change, it is in the general security interest of Egypt as a
nation to show commitment to climate action and to strongly support the forces driving worldwide climate initiatives.

Yet, Egypt’s NDC is unfortunately not in line with this view. It is too general and therefore lacks clarity and does not convey enough ambition. Although significant effort is put into its development, more can be done to enhance and elevate it to its true level of importance and to correctly display Egypt’s long-standing commitment to climate change efforts.

The purpose of this chapter is to critically review Egypt’s NDC in an effort to analyse its strengths, weaknesses and potential areas of improvement. In order to accomplish this, the review matrix developed in chapter three will be used as reference.

In review of Egypt’s NDC; firstly, the matrix requirement will be indicated within a text box. Secondly, a brief overview and initial remarks will follow. Thirdly, the NDC will be investigated in accordance with the matrix requirement; each section will be numbered alphabetically to match the respective requirement of the matrix. Finally, the chapter will be concluded with a brief conclusion to help sum-up and clarify the main outcomes of the review process.

4.2 Review of Egypt’s NDC Using the Matrix

From its onset, Egypt’s first NDC demonstrates a clear understanding of what an INDC is and what contents should be included. It provides the following abridged definition of an INDC: “Measures determined and intended to be applied by the country to face climate change in terms of adaptation (to climate change impacts) and mitigation (reducing greenhouse gas emissions)” (“Egypt First NDC,” 2017). Furthermore, it clearly indicates within the very first paragraph intention of clarity and

24 For the full NDC, see Appendix 4.
transparency; "the report provides information which enhances clarity, transparency and understanding of Egypt's INDC."

The elements the NDC claims to include are quite consistent with the developed review matrix; national context, efforts for both adaptation and mitigation of climate change and required implementation mechanisms.

In the following sections, the matrix requirement will be enclosed within a box followed by the critical review of the NDC.

1. Matrix Requirement: National Context

   Does the (I)NDC include a clear statement of national context: If Yes…
   a. Does the statement include all significant information?

Review:

Egypt’s NDC includes the national context under the section “2. National Circumstances” which in turn includes four subsections:

2.1 Population Growth,

2.2 Economic Conditions,

2.3 National Objectives and Priorities, and

2.4 Political and Social Context. ("Egypt First NDC," 2017) (Appendix 5)

Detailed review according to the matrix:

a. Significant information:

   This section of the NDC starts off with article 2.1 which demonstrates Egypt's demographic population, estimated at 89 million (Aug. 2015) ("Egypt First NDC," 2017) and currently experiencing a growth rate of 2.2% annually, imposes “huge pressure” on economic, social and environmental sustainable
development. A high population density further adds to this effect, according to the NDC.

The NDC continues with elaboration upon economic conditions. A review of fiscal year 2014/2015 is provided. According to the NDC, although economic indicators do show slight improvement in performance, it makes it clear that Egypt’s economy remains well challenged. The primary causes being the “high inflation rate” which the NDC does not provide and the subsequent “trade deficit” the country is experiencing (“Egypt First NDC,” 2017).

The NDC further provides a look into Egypt’s “Sustainable Development Strategy; Egypt’s Vision 2030” which, according to the NDC is in line with the UN Global SDGs (Sustainable Development Strategy; Egypt's Vision 2030, 2015).

Article 2.3 (p. 3) of the NDC illustrates current national objectives, priorities, and near future projects. These include among others, an assortment of economic, social, educational, demographic and legal reforms within the context of sustainable development. Yet, throughout this section, there is no mention of any environmental or climate related objectives or priorities.

Finally, the NDC covers the political and social context of Egypt at the time of submission in November, 2015. The NDC does provide a range of significant information pertaining to national context.

However, ...

b. Missing information:
   A few pieces of important information are missing within Egypt' national context. Following are examples:
   - There seems to be no mention of environmental and climate action as national objective or priority. It can be understood that with the current economic status of Egypt, which is challenging for the least to say, environmental and climate concerns may not be of top priority, yet with Egypt’s exposure to adverse climate effect it should not be entirely missing. Failing to include this may be a reflection of less commitment.
• Although there is some mention later in the NDC, no illustration of the level of exposure of Egypt to the adverse effects of climate change is made in this section. A general mention of the level of vulnerability, had it been made, would serve to introduce the reader to the context. It would also enhance clarity and highlighting the urgency of the actions and requirements within the NDC while showing a higher level of commitment. Egypt’s Second and Third National Communications to the UNFCCC include very detailed reports and studies on the level of vulnerability of Egypt to climate change \((\text{Egypt Second National Communication, 2010})\) & \((\text{Egypt Third National Communication Under the United Nations Framework Convention on Climate Change, March 2016})\).

• Although the use of renewables is mentioned later, there is reference to national reports on Egypt’s Renewable Energy Sector such as the 2014 annual report by Egypt’s New and Renewable Energy Authority (NREA). It may be noted, in this context, that Egypt plans to generate 20% of generated electricity from renewable sources by 2020 \((\text{New and Renewable Energy Authority (NREA) Annual Report, 2014})\). This may have been easily projected for the period from 2020 to 2025.

c. Areas of improvement

Egypt’s INDC was submitted to the UNFCCC Secretariat in November, 2015. On June 29, 2017, the exact same plan was communicated as Egypt’s first NDC with no alterations or adjustments made. Consequently, some of the information within the national context may be slightly outdated; e.g. the devaluation of the Egyptian Pound (EGP) in November, 2016, without doubt had significant impact on Egypt’s economy and its social status.
Review:

Egypt’s NDC includes mitigation under article 3.2 Mitigation Policies and Measures, which further includes two subsections:

3.2.1 Mitigation Policies

This subsection illustrates the different methods of mitigation being considered by the Egyptian Government. These include options both focused on reduction of CO$_2$ emissions and increase of energy efficiency. The NDC makes it clear that international support is required both financially and technologically.

3.2.2 Mitigation Actions.

This subsection only provides two tables in order to present the mitigation measures considered. Figure 6 shows the first table which is dedicated to measures for different energy subsectors. Meanwhile, Figure 7 shows the second table which is dedicated to measures for non-energy subsectors.
While detailing the sectors subject to mitigation actions, the above two tables only give broad strategies, no specific plans, goals or timelines as most guidelines would clearly recommend. Following is a review of this section of the NDC in accordance with the developed matrix.
Detailed review according to the matrix:

a. Type of contribution:
   The NDC specifies only actions as contributions.
   NO outcomes based contributions are suggested.
   The specified actions are mainly in the form of policies concerning:
   - energy efficiency,
   - reduction in use of fossil fuels and
   - integration of renewable energy sources within the energy mix.

b. Nature of contribution:
   The NDC clearly defines the two major sectors for mitigation actions; the energy sector (Figure 6 above) and the non-energy sector (Figure 7 above). Each sector is divided into a number of subsectors as detailed in the abovementioned figures. Each subsector is designated a subsequent action in the form of a policy or general strategy. Therefore, it appears that the nature of the contributions and the sectors they are to be applied to are clear to a reasonable extent.
   However, ...

c. Target and/or baseline:
   The NDC does not, in any case, provide a clear target and/or reference baseline. All the indicated contributions are generic and broad statements of intent with no specific details. This is certainly one significant area where there is much room for improvement.
   Figure 8 provides a flow-diagram for the steps involved in choosing action based contributions.

Choose sectors and gases to be targeted
Choose & describe the actions
Identify the objectives & timeframe
Quantify the anticipated emissions reductions

Figure 8: Steps for employment of Action-based Contributions in (I)NDCs, adopted from (Levin et al., 2015) & (Holdaway & Dodwell, 2015).
In order for the NDC to be more specific and transparent, the objective of the action applied should be clearly stated while a specified timeframe should be well identified.

For example, Table 2, page 11 of the NDC (Figure 6 above) states the mitigation measure applied in the electricity subsector to be “Renewable energy use for power generation” which is a very general strategy providing no specific objective or timeframe. A more specific target should be provided. For example; “to generate 20% of generated electricity from renewable sources by 2020” as stated by NREA in its 2014 report keeping in mind that this first NDC should involve the period 2020-2025.

d. Level of ambition:
   No quantifiable target is set. Therefore, no level of ambition can be assumed.

e. Results:
   No quantified results either. It is always good practice to calculate and quantify emission reductions as this serves a few important goals. Quantified results serve as a gauge for measuring the progress of the action. They also aid in assessing how well cumulative NDCs contribute towards the Paris Agreement goal of maintaining global warming at no more than 1.5°C. Quantified emission results are also a strong indication of commitment.

The table in Figure 9 is proposed as a modification to the tables provided in the NDC. The proposed table is set up in order to show the four main steps/requirements shown in Figure 8.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Mitigation measure</th>
<th>Objectives/Timeframe</th>
<th>Expected Emissions Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>Increase use of renewable energy sources in electricity production.</td>
<td>Generate 30% of total electricity output from renewable sources (20% wind + 10% solar) by 2025.</td>
<td>xx Mt CO₂ eq.</td>
</tr>
</tbody>
</table>

*Figure 9: Proposed table format for action-based contribution.*
f. Long-term plan:

No long-term plan is provided. A long-term plan is one that extends well beyond the time period of the NDC. For example, a mitigation plan with a timeframe extending to the year 2050. A long-term plan helps put the country’s strategy in perspective and can be a measure of the contribution of the NDC to the overall strategy. It also serves to reflect ambition and commitment. Some guidelines consider a plan up to 2030 as a long-term plan. In this sense, Egypt’s SDS 2030 may qualify as a long-term plan.
Review:

Egypt’s NDC includes adaptation under article 3.1 Egypt’s Adaptation Efforts, which further includes three subsections:

3.1.1 Adaptation Challenges

3.1.2 Egypt’s Intended Actions to Promote Resilience

3.1.3 Adaptation Action Packages

Detailed review according to the matrix:

a. Level of exposure:
   This section of the NDC starts off with an overview of the vulnerability of the different sectors in Egypt. The sectors mentioned are:
   - Agriculture sector including crops and livestock,
   - Fresh water,
   - Coastal zones including sea level rise and the related adverse effects,
   - Tourism sector including coral reefs and coral life, and national heritage (ancient monuments).
   - Health sector,
   - Energy sector.
This section does cover most areas affected by climate change. Yet, it lacks the presence of indicative numbers and figures which in turn makes associating with the level of vulnerability quite difficult. Available guidelines suggest that additional support with quantitative figures would enhance clarity and transparency. In fact, *Egypt’s Third Communication, 2016* contains an 80 pages chapter on “Vulnerability and Adaptation to Climate Change” with an abundance of quantitative numbers, figures and tables.

b. Long-term plan:

Unfortunately, no statement of long-term goals exists in the NDC.

c. Short-term plans:

The NDC does offer a very wide range of adaptation actions, measures and policies for the different sectors discussed. The list is quite comprehensive. Nonetheless, similar to the section on mitigation efforts, no details are provided in this section either. Consequently, this section lacks both short and long-term action plans.

d. Gaps and barriers:

The main adaptation barriers are identified in paragraph b. on page 7 as:

- Limited scientific information,
- Limited strategic visions, and
- Lack of financial support.

Additionally, a few more may be implicitly understood:

- Lack of public awareness; e.g. the NDC states “public awareness is being raised on the need for rationalized water use…” (p. 7). However, from my own experience, there is a general lack of public awareness to the level of vulnerability of Egypt’s many sectors to the adverse effects of climate change. The public may notice a change in weather patterns, but they have little understanding of the causes and effects implied.
- A need for the development of institutional capacities; although not directly mentioned as a barrier, capacity building is stated as a requirement for a few sectors; e.g. the coastal zones (p. 8), the tourism sector (p. 9), and the energy sector (p. 9).
Lack of stakeholder involvement and awareness; e.g. the NDC states “increasing awareness of stakeholders for energy and water utilization” as one of the focuses of Egyptian authorities (p. 8).

e. Extra support:

Support needed for the purpose of adaptation is not defined in this section. It is defined later as part of the collective support needed for the implementation of the NDC.
4. Matrix Requirement: Means of Implementation

What means of implementation are defined, if any?

a. Financial support:
   i. Is there an estimate of total cost of (I)NDC implementation?
   ii. If external funds are required, is the required amount clearly stated and justified?

b. Technology development and transfer:
   i. If needed, is it clearly specified and for which sector/purpose?

d. Capacity-building:
   i. If needed, are the needs and for how long clearly indicated?

Review:

The required means of implementation is briefly stated in the final article of the NDC, article 6. Financial support, technology development and transfer, and capacity-building are mentioned.

**Detailed review according to the matrix:**

a. Financial support:
   i. The NDC provides an estimate of the total cost of implementation at approximately 73.04 billion USD (p. 13). This amount, however, is clearly indicated to be required for the period from 2020 to 2030. This is quite controversial as this first NDC is for the first five-year period 2020-2025 and there is no reference to a longer-term plan. No further details or breakdown for this figure is provided.
   ii. It is made clear that the full amount of 73.04 billion USD is required as financial contribution. No local funding towards this budget is indicated. The justification given is, “Thus, Article 4 of the UNFCCC, which states that developed parties shall provide support to developing countries in applying their liabilities, should be enacted” (p. 13). It then follows, “Hence, Egyptian national efforts alone will not be able to fulfil the State aspirations...
in contributing to the international climate change abatement efforts” in a clear statement that Egypt is unable to fulfil the actions outlined in the NDC without international support.

b. Technology development and transfer:
   
i. The need for transfer of technology is clearly stated but without detailing the type and the sectors it is required for. The NDC only states, “relevant to local context” which may be understood from the previous sections of the plan.

c. Capacity-building:
   
i. Similar to the case with technology transfer, capacity-building requirements are mentioned but not detailed. They, also, may be understood from the previous sections.

The suggested approach to be used when indicating requirements for support would be to construct a table. Such tables are usually very informative as they offer a number of co-related details in an easy to read format. The table in Figure 10 is offered as an example.

<table>
<thead>
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<th>Adaptation/Mitigation Activity</th>
<th>Support Required</th>
<th>Budget</th>
</tr>
</thead>
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<tr>
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<td>(Financial, Technology transfer, Capacity-building)</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Description/Sector</td>
<td>Type</td>
</tr>
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</tr>
</tbody>
</table>

*Figure 10: Support Requirements for National Climate Initiatives, adopted from (Levin et al., 2015) & (Holdaway & Dodwell, 2015).*
Review:

As previously discussed in chapter 3, whether or not Egypt's NDC can be considered fair is a question of how much Egypt has contributed to the increase of GHGs and what Egypt can do in return.

CAIT’s Climate Action Explorer estimates Egypt's total GHG emissions from 1990 to 2013 at 272.4 MtCO$_2$e, while total world emissions for the same period is estimated at 45,261.3 MtCO$_2$e ("CAIT: WRI's Climate Data Explorer - Historic Emissions," 2017). Thus, during the evaluated period, Egypt contributed approximately 0.6% of total worldwide GHG emissions. Compared to the United States (13.9%), China (25.9%) and many other industrial nations, Egypt’s contribution to GHGs is considered marginal.

Detailed review according to the matrix:

a. Fairness and ambition:

Taking this fact into consideration along with the current economic status of the country, it is practical to say that Egypt’s NDC, while needing revision in some aspects, is fair enough.

Meanwhile, while striving to convey a high sense of ambition by covering all sectors affecting or affected by climate change through, Egypt’s NDC lacks quantified goals and targets. This makes it quite difficult to assess the level of ambition.
Furthermore, the fact that the NDC is completely conditional\textsuperscript{25} is another reason the NDC may seem less ambitious.

Yet, it should be noted that any country’s potential is dependent on the capabilities it poses mainly economic and technological; both of which are currently constraining Egypt.

b. Although the full realisation of the NDC may require international financial support, it should be clear what actions the country is capable of funding on its own (see Figure 10 for a proposed form). When indicated in the NDC, the presence of national funding, even if very little, shows a higher level of commitment. Meanwhile, the requested support may demonstrate the required sense of ambition.

\textsuperscript{25} An NDC is conditional if implementation is subject to availability of international support. Conversely, an NDC is non-conditional when no support is required for implementation. NDCs may be conditional, non-conditional or a combination of both.
6. Matrix Requirement: Transparency

Overall, does the (I)NDC seem to be communicated in a clear and transparent manner? If not…

How can transparency be enhanced?

Review:

The authors of the NDC have made considerable effort for the NDC to be transparent. Nevertheless, transparency may still be enhanced through a number of approaches:

- A clear **statement of commitment** in the beginning indicating the current level of emissions and the envisioned level,
- **Quantified** emissions reduction goals or actions or both, and
- Information on the parties involved in preparing the NDC for further reference if needed.
4.3 Summary of the Review

The following may be concluded from the review of Egypt’s first NDC:

- The NDC submitted is the exact same INDC submitted almost two years earlier without any alterations. Review of some of the information may have been needed due to the rapidly changing economic and social circumstances in Egypt.
- The NDC is completely conditional; meaning the fulfilment of the NDC is totally dependent on international financing. The inclusion of details for national funding, however limited, may enhance the sense of commitment and offer better chances for securing the international funding required.
- The primary focus of the NDC is the adaptation component. This is well understood considering Egypt’s exposure to the adverse effects of climate change and its current economic situation which is a limiting factor on its mitigation potentials.
- There is a clear need for quantification throughout the NDC especially with respect to mitigation actions including quantifying emission reductions and expectations, and details of projected costs. The evident absence of up-to-date emissions data undoubtedly was the reason for this clear lack of quantified data.
- Had updated data been available, the NDC may have appeared differently involving more quantified data. This certainly would have enhanced the clarity and transparency of Egypt’s NDC.
- No indication is made of involvement of any other than the Egyptian Government. The NDC does not provide the name of the author, nor the publisher, nor any involvement of stakeholders or parties other than the Egyptian Government. There exists an obvious need for other stakeholders including the private sector to be involved. Involvement of all stakeholders conveys consensus and overall commitment throughout the country which is essential for the successful implementation of the NDC. As with most other guidelines, (Levin et al., 2015) stresses “Consultation with key stakeholders is
critical to ensure that the INDC responds to the needs of affected stakeholders and has long-term support” (p. 20).

- Although seemingly fair, a few adjustments may make the NDC a little more ambitious. It is important for Egypt to show commitment and ambition as an encouragement to other countries whom can offer more mitigation potential.

- Transparency may easily be enhanced as previously explained.

4.4 The Maritime Component of Egypt’s NDC

Egypt is a coastal nation where the seas and related activities are of great importance. It is, therefore, no surprise that its NDC does not fail to take into consideration various components within the maritime context. The NDC specifically makes mention of the following:

✓ Sea level rise,
✓ Coastal zones and erosion,
✓ Increasing sea water temperature and salinity,
✓ Coral reef life, and
✓ Fish stock distribution.

This shows that the maritime component although lacking sufficient mention in the UNFCCC and its subsequent agreements, including Paris, and in any of the available guidelines is an important and critical element of any NDC, needless to mention that the majority of countries in the world happen to be coastal nations where the effects of climate change are predominant.

The following chapter is a discussion on the importance of the maritime component in NDCs.
Chapter 5

5 Discussion on the Maritime Component in NDCs

5.1 Realization of the Importance of the Oceans

After years of research and assessment, the IPCC in its Fifth Assessment Report concludes, “In recent decades, changes in climate have caused impacts on natural and human systems on all continents and across the oceans” ("IPCC, 2014: Annex II: Glossary," 2014). What is notable about this statement is the fact that the IPCC now included all forms of climate change impacts into two domains; on continents and in the oceans. This reveals how we have come to realize the importance of our oceans and that we finally understand the massive effects climate change has on them.

The oceans cover approximately 75% of the surface area of the globe and at least 153 out of 197 countries party to the UNFCCC are either coastal or island states ("The World Factbook," 2017). Sea-level rise, acidification, temperature rise, redistribution of fish-stock, coral bleaching, coastal erosion and displacement of population are all ocean-related effects of climate change, just to name a few.

According to the IPCC, the ocean absorbs more than 90% of heat energy added to the atmosphere. The rising temperature of the oceans is in turn effecting biodiversity, causing redistribution of marine species, loss of coral reefs, and melting ice glaciers thus intensifying sea level rise. The IPCC (2014) further estimates that about 70% of the coastlines worldwide are projected to experience sea level change within 20% of the global mean sea level change. It is estimated that a half meter rise in sea level by
the end of the century would displace nearly one billion people ("Worldwatch Institute: Study Says 1 Billion Threatened by Sea Level Rise," 2017). In addition, increased acidification of the oceans caused by CO₂ absorption will “pose substantial risks to marine ecosystems” (IPCC, 2014) effecting all marine organisms from phytoplankton to fish species.

The IPCC, therefore, makes it very clear that if nothing is done to mitigate the effects of climate change upon the oceans, not only will marine life be effected, but human life as we know may well be changed.

Despite the extent of credible evidence on the importance of the ocean, climate action under the umbrella of the UNFCCC remains focused on the atmosphere with little attention given to the oceans.

As a reminder to the reader, the maritime component when indicated in this chapter refers to the impact of climate change on the marine ecosystem as well as on human interaction with the oceans. It does not, however, involve shipping neither international nor domestic as explained earlier in Chapter 1. Ever since the Kyoto Protocol, emissions from international shipping have been delegated to the IMO as with international aviation and ICAO26. The Paris Agreement, in this regard, follows suit. Hence, when general emissions reductions are applied to the transport sector, it is implied that emissions from domestic shipping are included as well.

5.2 Significance of Oceans in International Climate Change Texts and (I)NDC Guides

The Paris Agreement is considered to be a breakthrough in climate initiative. However, the PA only acknowledges the oceans on one occasion by, “Noting the importance of ensuring the integrity of all ecosystems, including oceans...” (Paris

26 The International Civil Aviation Organization
Agreement, 2015). No other reference is made to the oceans or any maritime context throughout the whole text. This may seem odd as the text of the UNFCCC, the umbrella under which the PA falls, has 10 occurrences for maritime issues. Despite the higher number of occurrences, the UNFCCC still does not give appropriate consideration to the oceans. It only superficially mentions climate change effects on coastal areas including sea-level rise while briefly promoting sustainable management of marine ecosystems among many other areas of interest.

Table 1: Number of Maritime Related Words in Selected Official Texts and (I)NDC Guides

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<thead>
<tr>
<th>Guide</th>
<th>No. of Pages</th>
<th>Maritime</th>
<th>Sea</th>
<th>Coast/Shore</th>
<th>Ocean</th>
<th>Coral/Reef</th>
<th>Marine</th>
<th>Fish/Aquaculture</th>
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</table>

As with the Paris Agreement, available guides also make little reference to the oceans and maritime context. Figure 11 illustrates the number of occurrences for maritime (ocean) related words in the UNFCCC, the Paris Agreement and the three (I)NDC guides used in Chapter 3 to develop the review matrix.

Maritime related words appear 14 times in “Designing and Preparing INDCs”, with the word “coastal” appearing 6 times in one text box. Therefore, practically speaking, the guide still does not give enough attention to the oceans and related climate action. The guide when addressing climate change in a maritime context is mainly concerned with sea-level rise and coastal erosion.
As it appears, there is a tendency to only generalize when referring to the oceans. It is also notable that both official texts and guides only consider the effects of climate change on human activities relating to the oceans. The opposite is usually neglected; i.e. the negative effects of human activities on the oceans.

5.3 Significance of Oceans in National NDCs

When investigating the maritime component and the significance of the oceans in NDCs, we find a contrasting yet comparable picture. Egypt’s NDC, for instance, as seen in chapter 4, unlike the official texts and the available guides reflects quite a significant amount of consideration to maritime aspects. However, it too only addresses these maritime aspects from an adaptation point of view. Meaning; likewise, the NDC is only concerned with those climate changes which directly impact human life and activities.

A similar survey of the occurrences of maritime related words in Egypt’s NDC and 19 other countries reveals a number of observations. Figure 12 provides a summary of the quantified findings. The words chosen for this survey are: maritime, marine, ocean, sea, coast or coastal, shore, coral, reef, fish, aquaculture, and port. The list of words is, of course, non-exhaustive. However, through consultation, these words
were found to be adequately inclusive. The words were grouped as shown in Table 1 and Table 2 and underneath the graph in Figure 12. It should be noted that although the number of pages of the NDCs clearly varies, this does not affect the results of the survey as assessment is based on the rate of occurrence; i.e. number of words per page of NDC.

![Figure 12: No. of Maritime Related Words in National (I)NDCs](image)

The countries embodied in the above graph were chosen to represent three different categories of coastal or island nations:

- **Group 1:**
  Egypt, Tunisia, Algeria, Morocco, Sudan and Indonesia representing developing countries with a mix of conditional and non-conditional NDCs.

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27 An NDC is **conditional** if implementation is subject to availability of international support. Conversely, an NDC is **non-conditional** when no support is required for implementation. NDCs may be conditional, non-conditional or a combination of both.
Indonesia was chosen as an example of an archipelagic state. The remaining five countries along with Saudi Arabia and Israel (from the next group) were, also, specifically chosen to represent the MENA\textsuperscript{28} region. This may provide insight on the extent of maritime context in Egypt's NDC.

- **Group 2:**
  Saudi Arabia, Turkey, The EU, China, Japan, The USA and Israel representing countries with non-conditional NDCs.

- **Group 3:**
  The Maldives, Fiji, Saint Vincent and the Grenadines, and The Cook Islands representing small island states (SIDs) with conditional NDCs.

Figure 13 shows the rate of occurrence; i.e. the number maritime related words per page of NDC for each country.

\textsuperscript{28} Middle East and North Africa (MENA)
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<tr>
<th>Group</th>
<th>State</th>
<th>No. of Pages</th>
<th>Maritime</th>
<th>Sea</th>
<th>Coast/Shore</th>
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<th>2.0 and above</th>
<th>Fairly High</th>
<th>1.0 - 1.9</th>
<th>Low</th>
<th>0.5 - 0.9</th>
<th>Very Low</th>
<th>0 - 0.4</th>
</tr>
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<td></td>
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<td>18</td>
<td>36</td>
<td>10</td>
<td>6</td>
<td>22</td>
<td>8</td>
</tr>
</tbody>
</table>

58
Figure 13: No. of Maritime Related Words Per Page in the (I)NDCs of Respective Countries

From the graphs in Figures 12 and 13, a number of observations can be made:

- With the exception of Algeria, all countries from groups 1 and 2 show a fairly high to high occurrence of maritime related words.
- The Cook Islands, though having a seemingly low occurrence of 5 words, yet, considering that the NDC consists of only 3 pages, the average is therefore fairly high.
- Group 1 displays a fairly high average occurrence of 1.6 words per page, while group 3 shows the highest average of 2.6 words per page.
- Saint Vincent and The Maldives show the highest occurrences, both with a very high average of 3.6 words per page.
- All countries from group 3 show very low occurrences with a very low average of 0.4 word per page. The USA and The EU show no occurrences whatsoever.
- The word with most occurrences is “coast” or “coastal” (represented yellow on the graphs) with 118 occurrences which is 37.5% of the total 315 occurrence for all words (Figure 14). In second place is the word “sea” which was mostly associated with sea-level rise in most cases.
Examining the NDCs of these countries, a number of explanations may be given:

- Firstly, the countries with very little maritime context, judging from the rate of occurrences, are those with non-conditional NDCs. In other words, these countries are all capable of implementing the actions detailed in their respective NDCs on their own, without the need of any international support.

- The NDCs of these countries, with the exception of China and Japan, are noticeably much shorter in text size. They are all around five pages long. The reason mainly being that these countries all choose to implement economy-wide absolute emission reduction targets as recommended by the Paris Agreement (*Paris Agreement*, 2015).

- Thus, they state generally applicable GHG reduction methods with no specific details for individual sectors.

On the other hand, countries that express fairly high to high maritime concern have a few items in common:

- The NDCs of these countries all have a conditional component; i.e. they require international support (whether it be financial, technological or capacity building) to achieve the mitigation and adaptation actions detailed in their NDCs.
Therefore, to support their claims, their NDCs need to be as clear and as transparent as possible. Most countries achieve this by providing as much detail as possible.

Being coastal or island states, they all experience a level of risk especially associated with their coasts and surrounding waters. They, therefore, include a fairly large section in their NDCs on adaptation measures relating to the oceans. We have seen that Egypt’s main concern is adaptation to climate changes, many of them relating to the coasts and marine environment.

Sea-level rise causing erosion of coasts and inundation of inhabited lands, as is the case with Egypt, is the major concern for most countries (as displayed by Figure 14).

The above analysis demonstrates that maritime context within NDCs varies greatly from one country to another. Some countries demonstrate great attention to maritime context. Others, on the other hand, show very little interest.

The PA and the guides developed by third parties fall short of showing enough consideration for the ocean and maritime related climate action. Yet, this fact does not seem to deter countries from including a maritime context as they deem necessary.

The problem no longer appears to be that NDCs are missing appropriate maritime context. The real problem is that climate efforts and ocean efforts are fragmented due to the absence of an all-encompassing harmonized system. The United Nations Convention on the Law of the Sea (UNCLOS) is the main governing treaty for the seas and oceans, yet it has never addressed the issue of climate change. The fact that UNCLOS encourages nations to take measures necessary to prevent pollution to the ocean from the atmosphere (UNCLOS United Nations Convention on The Law Of The Sea, 1982) has nothing to do with climate efforts and should not be confused with so.
5.4 Conferences and Initiatives on Oceans and Climate

Ocean Conferences

Climate action has long been conducted under the umbrella of the UNFCCC. Meanwhile, the First Global Conference on Oceans and Coasts was held in Paris, only in 2001 ("The Global Conference on Oceans and Coasts (2001)," 2001). Many conferences and “Ocean Days” have since been held; many attempting to make the link between the oceans and climate change.

In March 2017, the World Maritime University and the Government of Sweden sponsored the 2017 Save our Oceans Conference, in relation to SDG 14, in Malmo. A few months later, in August 2017, WMU, the University of California and the Korea Institute of Ocean Science & Technology sponsored a three-days seminar titled “Oceans + Climate Change Governance; Integrating Regulatory Initiatives & Addressing Governance Gaps”. A number of diverse stakeholders representing industry, governance and academia gave a series of presentations on the importance of integrating climate and ocean initiatives in an effort to bridge the present gaps. Among the esteemed presenters was the Indonesian Ambassador to Sweden who shared the experience of his country. According to His Excellency, in reaction to the vast effects on the ocean and related human activities, the Government of Indonesia developed the “Indonesian Ocean Policy”, in 2017. The policy is built upon 7 main pillars:

1. Marine and human resources development,
2. Maritime security, law enforcement and safety at sea,
3. Ocean governance and institution,
4. Maritime economy development,
5. Sea space management and marine protection,
6. Maritime culture, and

It is clear that the need for a strong maritime component within climate efforts was among the motivations driving the development of Indonesia’s Ocean Policy. This seems to well attested for in Indonesia’s NDC. Six out of the eight words used for the
survey described previously were found in Indonesia’s NDC adding up to a total occurrence of 23 times with a fairly high rate of 1.2 occurrences per page.

The latest United Nations Ocean Conference was held in New York in June, 2017. The Parties to the conference acknowledged “the need to address the adverse impacts that impair the crucial ability of the ocean to act as climate regulator, source of marine biodiversity and as key provider of food and nutrition, tourism and ecosystem services and as an engine for sustainable economic development and growth.” The parties, furthermore, recognized the importance of the Paris Agreement as a regulator for climate action under the UNFCCC (Report of the United Nations Conference to Support the Implementation of Sustainable Development Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development, 2017). The conference further noted the need to develop a roadmap on oceans and climate action. This roadmap would provide a long-term policy for the oceans and climate action. Currently there are a few initiatives that aim to achieve this roadmap.

**Ocean-Climate Initiatives**

Ocean-Climate initiatives are initiatives sponsored by Nongovernmental Organizations (NGOs) with the aim of linking both ocean sustainability efforts and climate action. Two of these initiatives stand out:

The International Blue Carbon Initiative is a global program focused on mitigating climate change through the conservation and restoration of coastal and marine ecosystems. The initiative is sponsored by the Intergovernmental Oceanographic Commission of the United Nations Educational, Social, and Cultural Organization (IOC-UNESCO), the International Union for Conservation of Nature (IUCN) and Conservation International (CI). According to its website, “83% of the global carbon cycle is circulated through the ocean, while coastal habitats cover less than 20% of the total ocean area, but account for approximately half of the total carbon sequestered in ocean sediments” ("The Blue Carbon Initiative," 2017).

The Global Ocean Forum (GOF) was launched in 2001 to aid the world’s governments in placing issues related to oceans, coasts, and small island developing States (SIDS)
on the agenda of the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa. It has since been functioning as an international, independent, non-profit organization dedicated to promoting good governance of the ocean, sustainable development for coastal and island peoples around the globe, and healthy marine ecosystems ("Global Ocean Forum," 2017).

5.5 The Gap between Oceans and Climate Action

Many conferences and initiatives have been held since the first ocean conference in 2001. Similarly, many initiatives including the oceans and climate have also been launched throughout the years. Yet, the gap between the sustainability of ocean resources and maritime activities on one side and climate action on the other still remains. It is problematic how a climate agreement reached in 2015 almost makes no mention of the ocean or any ocean related activities except on one account. This fact alone surely calls for questioning the scope of the current international climate regime.

Could this be the weak link that may undermine the ambitions of the Paris Agreement? Or is it the missing link that if found may bring the fragmented segments of the climate-action chain together? Yet again, can NDCs be the tool used to bridge this gap?

Many possibilities lay beyond the horizon. We only need to venture further. One thing, though, is for sure; as long as there exists a distinction between the primary drivers behind ocean initiatives and climate action, the gap will certainly prevail. Ocean initiatives and climate action need to be better harmonised. Provisions should be made within climate agreements to strongly encourage addressing the sustainability of the oceans, not only from an adaptation point of view but also with mitigation in mind.
Chapter 6

6 Conclusion

The purpose of this research was: to review Egypt’s First NDC by means of a purpose-made matrix, to discuss the significance of a maritime component, and to investigate whether there is a need for such a component within NDCs.

In doing so, it was found that the texts of the UNFCCC, the Paris Agreement and relevant documents such as the “Lima Call for Climate Action” all lacked specific guidelines on how to develop an (I)NDC. Nor did these texts provide information on how to review or audit (I)NDCs. Furthermore, the texts very seldom gave mention to the ocean and maritime context.

A set of (I)NDC requirements were extracted from the official texts mentioned above. These requirements formed the core for the investigation conducted on three selected (I)NDC guides in order to produce the review matrix.

Once the matrix was prepared, Egypt’s First NDC was critically analysed using this matrix. The following observations were made:

- The NDC does not give evidence of stakeholder involvement other than the Egyptian Government.
- The NDC is action oriented; general energy efficiency and emissions reduction policies are the focus. No GHG reduction targets are provided.
- Adaptation to the effects of climate change is the main area of concern. Mitigation priorities are second to adaptation.
• The NDC generally lacks quantified data. For example, there is no data on the emissions profile of Egypt or any of the sectors identified by the NDC. There are, also, no quantified targets be they GHG targets or reduction policies.

• The NDC is conditional in nature. In order to fulfil its NDC, Egypt expects a $73.04 billion from international funding as well as technological and capacity-building support. No domestic financing is mentioned.

These observations lead the researcher to believe that there is much room for enhancement of clarity, transparency and ambition in Egypt’s NDC. Fortunately, the Paris Agreement, does allow countries to make adjustments to the NDC, at any time, if it wishes to do so.

As expected, some limitations were experienced. No detailed guidelines on the review of (I)NDCs were found; only a few guides on the preparation and development of (I)NDCs were available. The researcher, therefore, had to work with the guides to develop the review matrix.

Furthermore, the researcher originally intended on providing practical solutions with actual figures where necessary. However, this was not possible due to the absence of up-to-date GHG emissions data for the different sectors in Egypt. The researcher was also unable to contact any official in Egypt to obtain any feedback on the development process of the NDC.

In assessing the significance of the maritime component in NDCs, the following observations were made:

• It was found that Egypt’s NDC involves a fairly high level of maritime context as it discusses the following impacts of climate change:
  o Sea level rise,
  o Coastal zones and erosion,
  o Increasing sea water temperature and salinity,
  o Coral reef life, and
  o Fish stock distribution.
NDCs of developing nations and SID which are conditional or partially conditional in nature tend to have a fairly high to high presence of maritime context.

The NDCs of these developing and SID states usually prioritize adaptation to climate changes.

On the other hand, nations with NDCs of non-conditional nature (mostly large industrial economies); their NDCs tend to be very short, not exceeding a few pages, and almost completely lacking any maritime context.

These industrial economies mostly choose to implement economy-wide absolute emission reduction targets as recommended by the Paris Agreement.

Despite the absence of a guideline on the inclusion of a maritime component in NDCs, nations include it in their NDCs on an "need to" basis.

The hindrance, therefore, is not that nations fail to include a maritime component in their NDCs; it is the existence of a gap between climate action and ocean initiatives. Many organizations and initiatives have been attempting to bridge this gap with little success so far. Yet, a solution will always present itself as long as nations are committed and enthusiasts are persisting.

In this respect, NDCs may provide a solution. With the inclusion of a maritime component, NDCs may encourage nations to become more proactive rather than being reactive. Not only should nations view the ocean as a climate threat, thus focusing on adaptation, but also as a climate solution with vast mitigation possibilities.

Moreover, the purpose-made review matrix may be used to assess any NDC irrespective of its nature. However, if NDCs are to be employed as a link between climate change instruments and the ocean, an additional maritime requirement may be easily supplemented to the review matrix. Furthermore, in addition to being a tool for reviewing and assessing NDCs, the matrix can simply be used as an abridged guide to the requirements for the development of a clear, transparent and ambitious NDC.
Finally, climate action and ocean initiatives should be viewed as two propellers of the same vessel. It is particularly difficult to maintain course and speed with only one, especially when the journey is far and the seas are rough, and the stakes are high.
References


Blustein, S. (2011). From the Bottom-Up: Redesigning the International Legal Response to Anthropogenic Climate Change [Article]


*Indonesian Ocean Policy.* (2017). Republic of Indonesia Coordinating Ministry for
Maritime Affairs.


Appendix 1 SWOT Analysis applied to the Kyoto Protocol

From the background research conducted throughout Chapter 2, the following characteristics of the KP may be identified:

**Strengths:** inherent characteristics of the Protocol that have in a way contributed to its success.

- The KP falls under the UNFCCC, arguably giving it wide acceptance,
- Was legally binding,
- Displayed greater ambition than the UNFCCC,
- Adoption of a monitoring framework,
- The core principle of “common but differentiated responsibilities”,
- Inclusion of six GHGs for the first time,
- Adoption of “market mechanisms”.

**Weaknesses:** inherent characteristics which have contributed to any shortcomings of the Protocol.

- No official involvement of NGOs,
- The distinction between developed and developing nations with regard to commitments,
- Criteria for ratification,
- Not ambitious enough,
- Low emphasis on renewable energy sources,
- Unclear definition of “developing nations”,
- Short-term; no long-term goals,
- Inadequate “monitoring processes”,
- No true means of penalization for Parties whom failed to meet their pledges.

**Opportunities:** are those circumstances external to the agreement which may have had positive influence on its performance and outcomes if capitalized upon.

- Collapse of the Soviet Union,
- Increase in prices of fossil fuels,
- Innovation and availability of new abatement technologies,
- Maturity of renewable energy technologies,
- The near universal acceptance of the treaty.

**Threats:** external circumstances that may have negatively influenced the agreement if not managed correctly.

- Refusal to ratify by major emitters,
- Withdrawal of significant emitters,
- Lack of substantial involvement of Parties,
- Decrease in prices of fossil fuels.
- Not claiming to be exhaustive, the above-mentioned strengths, weaknesses, opportunities and threats are stated for the purpose of identifying the most relevant.
**Appendix 2 Example Review Matrix Template**

<table>
<thead>
<tr>
<th>1. Does the (I)NDC include a clear statement of national context?</th>
<th>Y / N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aspects/Details</strong></td>
<td><strong>Remarks</strong></td>
</tr>
<tr>
<td>Good</td>
<td>Room for Improvement</td>
</tr>
</tbody>
</table>

For details see Annex 4, Figure 1.
Appendix 3 Template for National Context

1 Template for national context

Country X's national context is characterised by [include any or all of the following information]:

- national development objectives, including how climate change and related concepts (green growth, increased access to sustainable energy, etc.) have been reflected in development plans and other relevant documents;
- national, subnational and sectoral climate change priorities on both mitigation and adaptation, national and subnational strategies/plans, national legislation;
- climate change impacts – temperature distribution, annual temperature variations, precipitation distribution, climate variability (trends, averages, extremes), extreme events;
- budgetary allocations towards climate change activities;
- previous or existing climate change pledges or commitments (voluntary or legislated) or actions to date.

Existing documents (such as those listed above) are likely to contain detailed information on a country’s national context. Hence, it may be possible to summarise key points from these existing documents and refer back to them for further detail.

Countries may consider closing this section with a short bullet summary outlining the overall structure and content for the INDC. For example, this bullet point summary could include:

- mitigation contribution: summary of long-term goal, headline contributions, sectoral focus, etc;
- adaptation component;
- implementation plans;
  - planning process (e.g. implementation of national plans, Monitoring, Reporting and Verification (MRV) system);
  - means of implementation including international support needed to implement the INDC (e.g. finance, technology transfer, capacity building). An illustrative example of a completed national context section of the template is provided below.

Figure 15, Source: (Holdaway & Dodwell, 2015)
Appendix 4 Copy of Egypt’s First NDC

Arab Republic of Egypt

EGYPTIAN INTENDED NATIONALLY DETERMINED CONTRIBUTION
The Arab Republic of Egypt

Intended Nationally Determined Contributions as per United Nation Framework Convention on Climate Change

1. PREAMBLE

In accordance with Decisions 1/CP.19 and 1/CP.20, the Arab Republic of Egypt hereby submits its report on the Intended Nationally Determined Contributions (INDCs) towards achieving the objectives of the United Nations Framework Convention on Climate Change (UNFCCC) set forth in Article 2 thereof. The report provides information which enhances clarity, transparency, and understanding of Egypt’s INDC.

INDC Definition:

Measures determined and intended to be applied by the country to face climate change in terms of adaptation (to climate change impacts) and mitigation (reducing greenhouse gas emissions).

The INDC Report includes the following elements:

1. National circumstances that address general economic conditions, including economic and population growth rates, major sustainable development goals, and political circumstances.
2. National efforts implemented to combat climate change in Egypt, in terms of treating impacts in different sectors (agriculture, water resources, coastal zones, etc.) or efforts made to reduce GHGs emissions in different sectors (energy, transportation, industry, etc.).
3. Required implementation mechanisms to achieve the objectives of the plan (funding, capacity building, and technology transfer).

Summary of Intended Nationally Determined Contributions are presented in the following sections.

2. NATIONAL CIRCUMSTANCES

The Egyptian environment is influenced by many national, regional, and global factors. National factors include, but are not limited to, the following:

2.1 Population Growth

Globally, Egypt ranks 16th in terms of population estimated at 89 million (August 2015). Between 1990 and 2015, the population grew by 30 million inhabitants, with an annual growth rate of 2.2%, and a total increase of 30% compared to 1990 census. UN population prospect reports anticipate that the annual growth rate will remain over 2% until 2040, where The Egyptian population is estimated to reach 116 million
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As per the World Bank, the population density was estimated at 82.43 inhabitant/km². In 1990, the population density was 58.1 inhabitant/km². Rural population, as a percentage of total population, was 56%, 57% and 57%, in 1990, 2000, and 2010 respectively.

High population growth rates and densities impose huge pressure on the economic, social, and environmental dimensions of sustainable development.

2.2 Economic Conditions

- **Economic Situation during FY 2014/2015**

2014/2015 Fiscal Year (FY) witnessed a significant improvement in the real economic growth rate, which increased during the first nine month of this year to reach 4.7%. The growth rate is expected to reach 4% by the end of FY 2014/2015 with a major contribution from the service sector. The net direct foreign investment reached $6.4 billion during FY 2014/2015 compared to about $4.1 billion last year, which represents an increase of approximately 55%. Moreover, the recent efforts and reform simpliciter the government were successful in improving and stabilizing the credit rating of Egypt. In addition, the unemployment rate has fallen in the period April-June 2015 from 13.3% to 12.7% compared with the same period during the two previous years. The foreign debts decreased by the end of July 2015 to $47.1 billion compared to $48.1 billion in June 2015. Despite the noticeable improvement in the economic indicators, the Egyptian economy is still facing certain ongoing challenges. These challenges include the high inflation rate and the trade deficit caused by the decline in petroleum exports as a result of the falling world oil prices, along with the increase in the balance of payments on commodity imports.

- **Planned Economic Situation during FY 2015/2016**

The Economic and Social Development Plan for FY 2015/2016 aims at increasing the real economic growth rate to reach 5.5% and puts special emphasis on national mega projects.

- **Planned Economic Situation up to 2030**

In light of the current global trend towards the adoption of post-2015 sustainable development goals, Egypt has developed the "Sustainable Development Strategy: Egypt’s Vision 2030" which serves as a roadmap for the country to achieve its desired sustainable development goals during the next 15 years. This strategy promotes the optimum use of available resources, enhancement of Egypt’s competitiveness and revival of its historic leading role in the region. Moreover, such strategy aims at fulfilling the aspirations of the Egyptian people regarding their right to a decent standard of living. The goals outlined in the strategy are in line with the global sustainable development goals (SDGs).
2.3 National Objectives and Priorities

- Create an enabling and favorable environment for local and foreign private investment, redistribute investments in a manner, which ensures geographical balance, develop the State’s administrative apparatus and fight corruption.
- Improve the living standards of citizens, empower the youth through the provision of decent and productive job opportunities and build their skills in order to keep up with the demands of the competitive labor market.
- Create an enabling infrastructure for the development of Micro, Small and Medium Enterprises (MSME) and provide substantial support to vocational education and training.
- Focus efforts on controlling population growth.
- Support the current production base and remove barriers.
- Focus on marginalized social groups, and those mostly affected by economic reform policies.
- Combat all forms of corruption, apply required restructuring measures, and enforce the new Civil Service Law no. 18/2015.
- Implement economic structural reforms to increase productivity, provide job opportunities, and generate income for different community sectors.
- Provide protection to the poor, the low-income groups and the middle class.

National Mega Projects Planned in the Near Future:

- Development of Suez Canal Axis Project
- Reclamation of One and a Half Million Feddan Project as part of a long-term plan to reclaim 4 million Feddans
- One Million Housing Units Project, within the framework of social housing program
- New Development Axis
- Mega Storage and Logistics Centers
- Golden Triangle of Mineral Wealth in South Egypt
- Fourth and fifth phases of the underground metro
- Development of priority areas including Sinai/the Western North Coast and its desert hinterland/South Egypt
- Construction of the new administrative capital

National Objectives and Priorities are further elaborated in the “Egyptian National Strategy for Sustainable Development” and include the following:

- Competitiveness and diversity
- Expanding the scope of sustainable growth
- Activating Egypt’s role in the global economy and improving its ability to adapt to global changes
- Increasing the real per capita GDP to reach the same level of middle-income countries
- Improve the legislation and legal frameworks promoting the dynamics of sustainable and decentralization development.
2.4 Political and Social Context

- Egypt has witnessed many positive developments during the past year with regards to political stability. In January 2014, a new constitution was adopted and in May 2014 President Abdel Fattah El-Sisi was elected as President of the Republic. Moreover, holding the parliamentary elections set for October and November 2015 is the final step in the implementation of the country’s political roadmap.
- Concerning social justice, the government seeks to achieve the following goals:
  - Expand social security allocations to include self-employed farmers who own more than one Feddan and expand their medical insurance.
  - Launch a cash transfer programme and increase the number of beneficiaries.
  - Establish logistic centers for grain trade and storage to achieve food security.
  - Replace traditional ration books with smart cards, adopt a new rationing system and apply the new bread supply system.
- Upon assuming office, President Abdel Fattah El-Sisi announced a wide range of projects and reform plans. During Egypt Economic Development Conference (EEDC) that was held 13-15 March 2015, the Government launched its economic reform program designed to restore fiscal stability, drive growth rates, and attract domestic and international investors in key sectors.
- Egypt has witnessed significant improvement in a number of social indicators over the past two decades. However, Egypt still seeks to increase human development rates. Children death rates and malnutrition cases have been reduced by 50%. In the meantime, life expectancy has risen from 64 to 71 years during the same period.

3. NATIONAL EFFORTS in ADAPTATION AND MITIGATION

3.1 Egypt’s Adaptation Efforts

3.1.1 Adaptation Challenges (Climate Change Risks)

The vulnerability of Egypt’s water resources to climate change depends on Nile flows, rainfall, and ground water.

In the agricultural sector, climate change studies expect that the productivity of two major crops in Egypt — wheat and maize — will be reduced by 15% and 19%, respectively, by 2050. Losses in crop productivity are mainly attributed to frequent temperature increase, irrigation water deficit, and pests and plant disease. In addition, 12% to 15% of the most fertile arable land in Nile Delta is negatively affected by sea level rise and salt water intrusion.

In terms of livestock production, current evidence shows that temperature rise leads to harmful heat stress, which negatively impacts livestock productivity. New animal
diseases have emerged in Egypt, which have strong negative impacts on livestock production. These include bluetongue disease and rift valley fever, which are both attributed to significant changes in the Egyptian climate.

Climate change is expected to increase seawater temperature, shifting fish distributions northwards to live in deeper waters. In addition, increased water salinity in the coastal lakes in Egypt is expected to negatively affect fish species.

Coastal zones are expected to suffer from climate change direct impacts. These include sea level rise and the overflow of low-level land. Estimations indicate that sea level rise by 50 cm leads to serious impacts on low-level lands in Delta and adjacent highly populated cities such as Alexandria and Port Said. Consequently, this will result in a more significant challenge, which is the migration of people from the affected areas to other areas, thus affecting the efficiency of different services and increasing the financial cost required for their development.

As forth tourism sector, coral reefs which constitute a major attraction in Red Sea resorts are highly vulnerable to climate change. In urban areas, heat islands\textsuperscript{1} formed by hot air arising from the increasing use of energy in buildings represent the main concern in hot and arid climates.

In addition, one of the most significant potential negative impacts of climate change is the harm inflicted on national heritage as result of temperature rise, sandy winds and ground water. However, this is not just a national concern. Instead, it is a global challenge since this heritage is part of the human heritage.

In health sector, climate change increases direct and indirect negative impacts on public health in Egypt. For example, in 2015 the negative impacts are represented in higher death rate due to heat stress.

In the energy sector, the increase in temperature negatively affects the efficiency of conventional power plants and photovoltaic cells. Moreover, the sea level rise threatens the electric power plants and networks located along the coasts. Also, the negative impact of climate change on rainfall rates and rain distribution across different regions negatively affects power generation from hydropower plants. This, of course, is in addition to the increased electricity consumption rates as a result of the use of air conditioners.

\textsuperscript{1} Heat island is a meteorological phenomenon which happens in cities. Spaces between high buildings from different sides traps heat, which affects weather in cities.
3.1.2 Egypt's Intended Actions to Promote Resilience

a. Water Resources

Several measures are currently being considered to adapt to decreasing water resources or increasing Nile flows. These primarily include:
- Maintaining water level in Lake Nasser
- Increasing water storage capacity
- Improving irrigation and draining systems
- Changing cropping patterns and farm irrigation systems
- Reducing surface water evaporation by redesigning canal cross sections
- Developing new water resources through upper Nile projects
- Rain water harvesting
- Desalination
- Treated wastewater recycling
- Increased use of deep groundwater reservoirs

In addition, public awareness is being raised on the need for rationalizing water use, enhancing precipitation measurement networks in upstream countries of the Nile Basin, encouraging data exchange between Nile Basin countries, and developing Circulation Models to predict the impact of climate change on local and regional water resources.

b. Agricultural Security

Changing sowing dates and good management practices are among the important adaptation measures oriented to mitigate climate change. Changing cultivars to those that are more tolerant to heat, salinity and pests, and changing crop pattern are the most promising adaptation measures at the national level. Moreover, using different multi-level combinations of improved surface irrigation systems and applying deficit irrigation are successful means of increasing surface irrigation system capacity in traditional lands to overcome the negative impacts of climate change.

Concerning livestock, improving the current low productivity of cattle in addition to improving feeding programs are being considered. No clear adaptation options are defined for fishery wealth.

There is a dire need for further studies on the impacts and adaptation to climate change in the agricultural sector in order to develop an adaptation strategy, which overcomes the barriers to implementing adaptation measures. These barriers include limited scientific information and strategic visions, and lack of financial support.

c. Coastal Zones

Adaptation options for coastal zones are highly site-dependent. However, changes in land use, integrated coastal zone management, and proactive planning for protecting coastal zones are necessary adaptation policies. Providing job opportunities in safe areas (in locations that are not impacted by climate change) is an important priority to successfully absorb affected population.
d. Additional Adaptation Policies and Measures

Egyptian authorities are currently focusing on the following additional policies and procedures:

- Building institutional capacities of comprehensive collection and analysis of monitoring and observations and geographic data;
- Identifying indicators and conducting full assessment of vulnerable sectors and stakeholders;
- Enforcing environmental regulations;
- Identifying and applying protection measures of vulnerable touristic and archaeological sites and roads against extreme natural phenomena such as floods, dust storms and extreme weather conditions;
- Building capacities for using regional water circulation models
- Proactive planning and integrated coastal zone management
- Risk reduction; and
- Increasing awareness of stakeholders for energy and water utilization

3.1.3 Adaptation Action Packages

Coastal Zones:
1. Reduce climate change associated risks and disasters.
2. Capacity building of the Egyptian society to adapt to climate change and associated risks and disasters.
3. Enhance national and regional partnership in managing crises and disasters related to climate change and the reduction of associated risk.

Water Resources and Irrigation:
1. Increase investments in modern irrigation systems.
2. Cooperate with Nile Basin countries to reduce water evaporation and increase river capacity.
3. Develop national policies to encourage citizens on water use rationalization.

Agricultural Sector:
1. Build an effective institutional system to manage climate change associated crises and disasters at the national level.
2. Activate genetic diversity of plant species with maximum productivity.
3. Achieve biological diversity of all livestock, fishery, and poultry elements to protect them and ensure food security.
4. Develop agro-economic systems and new structures to manage crops, fisheries and animal production, which are resilient to climate changes.
5. Increase the efficiency of irrigation water use, while maintaining crop productivity and protecting land from degradation.
6- Review of new and existing land use policies and agricultural expansion programs to take into account possibilities of land degradation in Delta and other affected areas resulting from Mediterranean Sea level rise.

7- Develop systems, programs and policies to protect rural community and support its adaptive capacity to the expected trend in land use change, plant and animal production, and internal migration due to climate change.

**Health Sector:**
1- Identify potential health risks as a result of climate change.
2- Raise community awareness about climate change risks and means of adaptation.
3- Increase the efficiency of healthcare sector and improve the quality of health services in dealing with climate change.
4- Support Ministry of Health efforts to improve the social and economic status and population characteristics.

**Rural Areas, Population, and Roads**
1- Draw a baseline scenario for the optimal regional distribution of population and economic activities within the geographical boundaries of Egypt up to the year 2100, taking climate change into consideration.

**Tourism Sector**
1- Reduce climate change risks in touristic areas.
2- Engage users in supporting the proposed strategy.
3- Support periodical monitoring and observations systems and follow-up bodies.
4- Raise environmental awareness.
5- Cooperate with international bodies.
6- Incorporate disaster risks within the plans to promote sustainable tourism in Egypt.
7- Capacity building of local communities in touristic areas.

**Energy Sector**
1- Conduct comprehensive studies to assess the impact of climate change on the energy sector, propose appropriate adaptation measures, and estimate the economic cost of the proposed adaptation measures. In addition, these studies should determine the safe locations for the construction of power generation projects.
2- Build institutional and technical capacities of different units in the energy sector in climate change issues.
3- Support research and technological development to enable the electricity sector to deal properly with climate change.
3.2 Mitigation Policies and Measures

3.2.1 Mitigation Policies

The key for Egypt to mitigate GHGs emissions is to provide appropriate foundations for the development of low carbon energy systems.

Pathways to achieving high CO2 mitigation levels comprise the following:

- Widespread diffusion of locally-appropriate low-carbon energy production technologies, with substantial reductions in energy intensity
- Comprehensive mitigation efforts covering all major sources of emissions
- Locally-appropriate technology transfer and financial flows from industrialized countries (Annex I countries) to support carbon emission abatement according to the UNFCCC principles, which acknowledges that developed countries should provide required support to developing countries in this regard.

Policies targeting development that is more sustainable rely upon five main pillars:

1. More efficient use of energy, especially by end users;
2. Increased use of renewable energy as an alternative to non-renewable energy sources;
3. Use of advanced locally-appropriate and more-efficient fossil fuel technologies, which is less-emitting, in addition to new generations of nuclear power;
4. Energy efficiency is the cornerstone to be targeted by policy makers to decouple demand on energy and economic growth; and
5. Reform energy subsidies. This policy is implemented using four pillars, namely: set different prices for petroleum products based on energy generation efficiency; increase the efficiency of energy use; provide support to certain sectors to promote switching from conventional energy sources to clean energy sources; and apply the fuel subsidy smartcard system to ensure that subsidies are received by target beneficiaries.

The degree to which efficiency improvements can limit energy demand growth is one of the main distinguishing characteristics of greenhouse gas reduction pathways. Energy efficiency could be improved radically through a combination of behavioral changes and rapid introduction of stringent efficiency regulations, technology standards, and environmental externality pricing, which mitigates rebound effects.

Renewable energy technologies, which are relevant to the local context, will play a very important role in reducing GHG emissions, but they would not suffice to keep climate change manageable. However, renewable energy may provide a number of opportunities since it also addresses sustainable and equitable economic development, energy access, secure energy supply, and reduced local environmental and health impacts.
In addition, efforts in Egypt should focus on replacing or upgrading obsolete infrastructure e.g. upgrading old fossil fuel power plants with locally appropriate technologies to increase its capacity. This needs increased financial support from Annex I parties in addition to technology transfer and local capacity building.

There are four key technology-related requirements essential for transformation: (i) continued support of energy conversion efficiencies, (ii) carbon capture and storage "CCS" as a technology alternative that can be used in the future if proven economically feasible, (iii) co-utilization of fossil fuel and biomass in the same plants, and (iv) utilization of co-generation plants.

Using advanced generations of nuclear reactors could be important to fill the gap between reducing fossil fuel dependence and the deployment of renewable energy. In addition, nuclear energy can be an important contributor in the future energy mix to stabilize CO₂ levels as energy demand continues to grow.

Additional mitigation measures include the increase of the country’s CO₂ absorptive capacity through plantation, maintaining suitable types of trees along road sides, the middle-island of inter-city and urban roads, and on irrigation and drainage canal banks. In addition, wood forests should use treated wastewater for irrigation.

3.2.2 Mitigation Actions

The two following tables present the most important mitigation actions across different sectors at the national level.

Table 2. Greenhouse Gas Mitigation Measures in Different Energy Sub-Sectors

<table>
<thead>
<tr>
<th>Sector</th>
<th>Mitigation measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>Energy efficiency improvements</td>
</tr>
<tr>
<td></td>
<td>Utilization of solar energy for water heating</td>
</tr>
<tr>
<td>Transportation</td>
<td>Energy efficiency improvements</td>
</tr>
<tr>
<td>Passengers</td>
<td>Increase Share of Railways Pass. Transport</td>
</tr>
<tr>
<td></td>
<td>Increase Share of Buses Pass. Transport</td>
</tr>
<tr>
<td></td>
<td>Increase Share of Microbuses Pass. Transport</td>
</tr>
<tr>
<td></td>
<td>Cairo metro (Line 3 phase 3 &amp; 4 + Line 4)</td>
</tr>
<tr>
<td>Freight</td>
<td>Improve transport efficiency</td>
</tr>
<tr>
<td></td>
<td>Switch from road to river transport</td>
</tr>
<tr>
<td></td>
<td>Switch from road to rail transport</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Energy efficiency improvements</td>
</tr>
<tr>
<td>Res.&amp; Comm.</td>
<td>Energy efficiency improvements</td>
</tr>
<tr>
<td></td>
<td>Utilization of solar energy for water heating</td>
</tr>
<tr>
<td>Electricity</td>
<td>Energy efficiency improvements</td>
</tr>
<tr>
<td></td>
<td>Nuclear energy use for power generation</td>
</tr>
<tr>
<td>Petroleum</td>
<td>Energy efficiency improvements</td>
</tr>
</tbody>
</table>
Table 3. GHGs Emissions Reduction Actions in Non-Energy Sectors

<table>
<thead>
<tr>
<th>Sector</th>
<th>Mitigation Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>Enteric fermentation</td>
</tr>
<tr>
<td></td>
<td>Manure management</td>
</tr>
<tr>
<td></td>
<td>Rice cultivation</td>
</tr>
<tr>
<td></td>
<td>Agricultural soils</td>
</tr>
<tr>
<td></td>
<td>Field burning of agricultural residues</td>
</tr>
<tr>
<td>Waste</td>
<td>Solid waste</td>
</tr>
<tr>
<td></td>
<td>Wastewater</td>
</tr>
<tr>
<td></td>
<td>Incineration</td>
</tr>
<tr>
<td>Industrial Processes</td>
<td>Encourage waste management and recycling</td>
</tr>
<tr>
<td></td>
<td>Optimize the production of cement, lime, iron and steel, ammonia not used in urea,</td>
</tr>
<tr>
<td></td>
<td>nitrogenous fertilizers and nitric acid.</td>
</tr>
<tr>
<td>Oil and Natural Gas</td>
<td>Production and processing</td>
</tr>
<tr>
<td></td>
<td>Venting and flaring (waste heat)</td>
</tr>
</tbody>
</table>

4. NEW MARKET MECHANISMS

A national market for carbon trading may be established. This national market may further be developed into a regional market, which can attracting foreign direct investment in national carbon credit transactions, especially in the Arab and African region.

5. NEED FOR STRONG ECONOMIC APPROACH

Within this context, Egypt needs to develop and implement a strong economically feasible mitigation program in the near future, which would achieve the proposed emission reduction for 2030 at the lowest cost to the national economy.

Hence, an Egyptian comprehensive emission reduction program should be based on three main initiatives:

1. Stimulate mitigation actions through a portfolio of strong and coordinated policies for the efficient reduction of GHGs across industry sectors and different geographic areas.

2. Pursue energy efficiency and low-cost options through the following:
   • Fast development of the infrastructure required for low-carbon energy systems; and
• Encouraging research and development in promising technologies, which are suitable for the local context and stimulate their deployment.

3. Develop a national monitoring, reporting, and verification system.

The initial total estimated cost of implementing adaptation measures aiming at mitigating the negative impacts of climate change and the national endeavors aiming at contributing to the efforts made by the international community to reduce GHG emissions during the period 2020-2030 is estimated at USD 73 billion. This figure is adapted to inflation rates and change in currency exchange rate for this period.

6. MEANS OF IMPLEMENTATION

Implementation of INDCs requires sustainable international support from reliable resources through financial flows, capacity building, and technology transfer as relevant to the local context.

Preliminary estimates of the financial contributions required for implementing the INDCs for both adaptation and mitigations estimated at approximately 73.04 billion USD can be increased. In addition, transfer of technology appropriate to the local context and national capacity building are needed. Thus, Article 4 of the UNFCCC, which states that developed parties shall provide support to developing countries in applying their liabilities, should be enacted. Hence, Egyptian national efforts alone will not be able to fulfill the State aspirations in contributing to the international climate change abatement efforts. Depending only on local financial resources, along with the large development aspirations of Egypt, will limit this contribution.