Cumulative Effects in Environmental Impact Assessment (EIA): Durban Harbour case study

by

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Declaration

I declare this research report, apart from the contributions mentioned in the acknowledgements, to be my own unaided work. It is being submitted for the Degree Master of Environmental Management at the North-West University, Potchefstroom Campus. It has not been submitted before for any degree or examination at any other university.

Signature

12 August 2008
Date

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Chapter 1- Introduction

1.1 Problem statement

Harbours house many activities and businesses and are very important assets to their countries. Durban Harbour is strategically located on the world shipping routes and is the busiest port on the African continent but like all other harbours world wide, it has significant impacts on the environment. In South Africa since 2006 environmental impact assessment is enforced i.t.o. the National Environmental Management Act No of 107, 1998, the National Environmental Management Amendment Act No. 8 of 2004, GN 385, GN 386 and GN 387 and Environment Conservation Act 73 of 1989. These environmental impact assessments (EIA), which are project specific, generally tend to consider only first order impacts, and in some cases indirect effects, but rarely how impacts interact. In order to get a true impression of how the environment is affected, the 'in combination effects' need to be taken into account, especially considering the complexity of activities in a harbour.

Recently the consideration of cumulative effects has become more recognised in South Africa and is seen as part of long-term growth (Mitchell and Binedell, 2001:2-2). However, little work has been done concerning cumulative effects. The reason for this is that South Africa has a relative young environmental impact assessment (EIA) system, compared to the more mature systems in developed countries (van der Walt, 2005:27). There are also other reasons for cumulative effects not being considered in EIAs such as the need of a specific

definition of cumulative effects and the lack of specific requirements of how cumulative effects should be addressed (Cooper and Sheate, 2002:417).

Cumulative effects assessment (CEA) is described by Dubé (2003:724) as a process of systematically analysing cumulative environmental change. There are two different CEA approaches. The first approach distinguishes CEA as an extension of the environmental assessment for project development and focuses on the stressors associated with a development proposal and prediction of how these stressors may interact with the environment (Dubé, 2003:724). This is then considered as a project based CEA. The second is viewed as a process to provide scientific information for decision-making related to sustainable development. This can be seen as a broader regional assessment tool. The focus of this approach is to quantify existing environmental effects first and then look retrospectively to identify potential stressors (Dubé, 2003:724). This approach can be seen as strategic and not project specific.

Sustainable development principles are part of environmental legislation in South Africa and in order to achieve this, attention should be given to the management of CE (Piper, 2002:20). The development of CEA in environmental assessment (EA) is very important since in South Africa, which is a developing country, there are stressed social-economic, political and natural environment arenas. This makes the livelihoods of communities susceptible to environmental change cause by cumulative impacts (van der Walt, 2005:19). CEA can be used as a

tool to promote sustainable development but it will have more of an effect at a programmatic or policy level where there will be flexibility to consider alternatives (Piper, 2002:20). This will be the second CEA approach as discussed earlier. However, this study will focus on the consideration of cumulative effects on project level EIAs and therefore the aspect of sustainable principles will be kept in mind but will not be one of the primary evaluation requirements.

The aim of this study is to look at what is cumulative effects and if it was considered in the EIAs done in the Durban Harbour. This study will consist of a main research question and sub research questions.

1.2 Research questions

Main Research Question: Were cumulative effects considered in EIA's done for developments within Durban harbour?

Sub-research questions:

1. What environmental impacts are typically associated with harbours?
2. What are cumulative effects and CEA?
3. What are the CEA requirements reflected in SA legislation?
4. What criteria can be used to determine if cumulative effects were considered in EIAs?

1.3 Research methodology

The methodology used to answer the research questions will differ between each question. Questions 1 and 2 will be an in depth literature study of CEA where question 3 will be an investigation into South African legislation concerning the consideration of cumulative effects in EIAs.

Question 4 will be an analysis of the consideration of environmental cumulative effects in EIAs of Durban Harbour by using a framework consisting of a number of criteria questions (van der Walt, 2005:104). Through the use of the above framework, important features are pointed out which are needed to scope, assess and manage cumulative effects (van der Walt, 2005:105).

1.4 Structure of the mini-dissertation:

Chapter 1: Introduction

Chapter 2: Environmental impacts of harbours

Chapter 3: Cumulative effects and Environmental Impact Assessment: Definitions and principles

Chapter 4: South African legislation considering environmental cumulative effects

Chapter 5: Research methodology consisting of a framework of good practice for CEA

Chapter 6: Single case analysis of EIA reports of the Durban Harbour

Chapter 7: Cross case analysis of results

Chapter 8: Conclusion and recommendations

References

Chapter 2- Environmental impacts of harbours

The aim of this chapter is to describe the role harbours play in the environment and the associated impacts they have.

2.1 Importance of harbours

Harbours can range in size from a small quay to berth a ship to a very busy and large center with many terminals and industries and services. The construction of harbours is mostly a state initiative or is state-controlled in the majority of countries (Peris-Mora *et al*, 2005:1649). Harbours can differ tremendously in their assets, roles, functions and institutional organisations and even within a harbour, activities and services broad in scope and nature can be performed (Bichou and Gray, 2005:76). The functions of harbours are determined through political, geographical, economic and social needs (Bichou and Gray, 2005:77). Durban harbour has various functions and it includes the following: distribution center, industrial zone, mercantile trading centers and maritime leisure center.

Harbours can be seen in two perspectives. The one is a public policy perspective where harbours are seen as economic catalysts, which result in providing socio-economic wealth to a region. The second perception is where harbours are viewed in terms of harbour planning and management that should allow sustainable development (Bichou and Gray, 2005:77). This second perspective is applicable to what is investigated in this study and is important to keep in mind when considering environmental impacts caused by harbours and their activities.

2.2 Impacts of harbours on the environment

Harbours allow countries to trade many commodities, which contribute to various economies. Harbours have special features and this make them complex systems with many environmental impacts. Some of these impacts are releases to water, soil and air, waste production, noise, dredging and introduction of non-native species (Darbra *et al*, 2005; 866; Wooldridge *et al*, 1999:415). Harbours support many activities, which all can have an environmental impact (Table 1). There are also higher risks for environmental accidents because of continuous ship movement in a confined area (Darbra *et al,* 2005:866). Therefore there can be significant environmental impacts from harbours through accidents and steady state pollution.

Table 1. Harbour activities (Peris-Mora *et al,* 2005:1654)

1. Sea traffic
2. Land traffic
3. Storage, loading and unloading of oil products
4. Storage, loading and unloading of bulk liquids
5. Storage, loading and unloading of bulk solids
6. Storage, loading and unloading of general container merchandise
7. Storage, loading and unloading of non-container merchandise
8. Fishing activity
9. Handling and converting perishable bulk solids
10. Port services
Pilotage
Towing
Mooring
Lock conditioning
Waste disposal
Preservation of Installations and Infrastructure
Security
Provisioning of vessels
11. Administrative services
12. Construction and repair of vessels
13. Sanitation services
14. Emergency operations
Fire protection system
Sea rescue
Emergency energy generators
Maintenance and cleaning of the port area
15. Maintenance operations
Buildings, gardens, workshops, roads, docks, reflecting pool
16. Dredging
17. Waste treatment
Oil, noxious liquid substances, harmful substances in packaged form, sewage from ships, garbage from ships
18. Civil works
19. Abandoned or unused installations and merchandise
20. Recreational activities
21. Marinas and yacht clubs
Land area
Sea area

Darbra *et al,* (2005:866) have identified the following key environmental impacts in harbours:

- Emissions to air (gases, solid particles and energy as well as dust).
- Discharges to water (during loading and unloading operations, waste water).
- Releases to soil through industrial activities.
- Releases and disturbance to the seabed (dredging).
- Noise which has a potential impact on human communities and fauna nearby.

- Waste generation and dredging disposal.
- Loss/ degradation of terrestrial habitat.
- Changes in marine ecosystems.
- Odours.
- Resource utilisation.
- Harbour development (Land and sea occupation).

In Table 2 a detailed description is given by Peris-Mora *et al,* (2005:1657) from a study done on a Spanish harbour of the potential environmental impacts and the environmental indicators used to measure these impacts in harbours. The presence and the significance of the potential environmental impacts will depend on the characteristics of each harbour which includes the size, activities, location, and type of coastline.

In 1996 the impacts perceived as significant, were port development, water quality and dredging. This has changed and it was observed in 2003 that the main environmental impacts were port waste, dredging and dredging disposal (Darbra *et al*, 2004:420). Thus a major change has occurred since 1996 where there was a decrease in the importance of water quality and an increase in impacts related to noise and hazardous waste (Darbra *et al*, 2004:421). The above mentioned changes reflect that there is an increase in the environmental awareness in harbours and as a result, action is taken due to evolving

environmental legislation, the need to uphold a good public image and to accommodate stakeholders (Darbra *et al*, 2004:421).

Harbours are usually located close to or are part of city centers thus if any environmental related incident should happen it could have consequences to the population of a greater to lesser degree. Therefore environmental consideration is very important today and harbours is a field where few initiatives have been taken to analyze and assess their environmental management situation (Darbra *et al*, 2004:421).

Table 2. Potential environmental impacts (Peris-Mora *et al,* 2005:1657)

Potential environmental impacts	Environmental indicators
Air Pollution	
Emission of particles from storage, loading and unloading of bulk solids Emission of combustible gasses OC, NO_x, SO_2 and HC from vehicular traffic on land Emission of particles from the handling and transformation of bulk solids Emission of VOCs in loading and unloading combustible materials in activities with oil products	Air quality (atmospheric contaminant emissions: CO, NO_x, SO, O, PM10)
Emission of VOCs in storage tanks from oil product activity Emission of combustible gasses CO, NO_x, SO_2 and HC from maritime traffic Emission of combustible gasses CO, NO_x, SO_2 and HC from loading and unloading machines (cranes, water spouts, ramps, etc.) for containerised merchandise Emission of other gasses which are harmful to human health and/or the environment (VOCs) in building and repairing vessels	2. Atmospheric contaminant emissions: VOCs and particles
Emission of particles from civil works Emission of particles from vehicular land traffic Emission of particles from handling general containerised merchandise Emission of particles from building and repairing vessels	3. Gas emissions with Greenhouse effect (CO_2, CH_4, N_2O)
Noise pollution	
Noise caused by land traffic Noise caused by container loading and unloading machinery Noise caused by civil works machinery Noise caused by vessel construction and repairing machinery	4. Noise pollution
Odour pollution	
Odours from handling and transforming perishable bulk solids Odours from MARPOL V waste treatment Odours from fish handling Odours from water purifiers	
Water pollution	
Spills or leaks from the transfer of oil products from vessel to lorry Spills or leaks from the transfer of bulk liquids from vessel to lorry	5. Inner port water quality
Accidental spills from small vessels in maritime traffic Change in normal dock water conditions in dredging operations	6. Amount and description of accidental spills in inner port waters
Rainwater in bulk storage areas Processed water—with organic waste from fish cleaning	7. Quality of spilled waste water
Soil pollution	
Spills or leaks of dangerous liquids (HC, paints, solvents, oils) from land traffic Spills or leaks of dangerous liquids (HC, paints, solvents, oils) from construction and vessel repair Spills or leaks of dangerous liquids (HC, paints, solvents, oils) in the MARPOL waste treatment	8. High risk areas for soil pollution

Table 2 (*continued*)

Potential environmental impacts	Environmental indicators
Leached material from storage of stock	
Waste creation	
Urban waste	9. Urban and dangerous waste creation
Uncontaminated sludge from dredging	
Scrap from building and repair of vessels	
Non-organic waste: tyres in general containerized merchandise	
Scrap from civil works	
General organic waste from the handling of bulk solids	
Non-organic waste: tyres in port services	
Excesses from bulk solids stock	
Dangerous waste	
Material impregnated with dangerous chemical substances and preparations	
Batteries and fluorescent tubes	
Toxic waste packaging from building and repairing vessels (lubricants, solvents paint, anti-fouling, etc.)	
Toxic waste packaging in marinas (lubricants, solvents, paint, anti-fouling, etc.)	
Chemical preparations and organic solvents used in bulk solid activity	
Contaminated sludge from dredging	10. Creation of sludge from dredging
Sludge with hydrocarbons from MARPOL waste treatment	
Resource consumption	
Consumption of processed water in the manipulation and transformation of perishable bulk solids	11. Efficient water consumption
Water consumption in cleaning and maintaining green areas	
Water consumption in watering carbon heaps when handling bulk solids	
Water consumption in cleaning and maintaining crafts in marinas	
Fuel consumption in land traffic	12. Efficient fuel consumption
Fuel consumption in machinery used for the storage, loading and unloading of containerised merchandise	
Fuel consumption in machinery used for building and repairing vessels	
Electric energy consumption in the storage, loading and unloading of containerised bulk solids	13. Efficient electric energy consumption
Electric energy consumption in the storage, loading and unloading of non-containerised bulk solids	
Electric energy consumption in the storage, loading and unloading of non-containerised merchandise	
Electric energy consumption the handling and pumping of oil-based derived products	
Electric energy consumption in the handling and pumping of bulk liquids	
Other	
Alteration of water currents due to the existence of the port, accretion and erosion phenomena	14. Alteration of sea floor
Alteration of sea floor due to civil works	
Alteration of sea floor due to dredging operations	
Alteration of sea floor at the mooring areas for boats	
Occupation of soil due to civil works	15. Soil occupation efficiency
Impact on landscape and installations that are abandoned or out of use	
	16. Social image of the port
	17. Number of incidents with environmental repercussions

Chapter 3- Cumulative effects and Environmental Impact Assessment: Definitions and principles.

The aim of this chapter is to provide an understanding of what cumulative effects are and the principles which they are based on. The definition and principles provided in this chapter will serve as the foundation on which this study is carried out.

3.1 Defining Cumulative Effects

Cumulative effects create cumulative impacts, but the concept of cumulative effects is often misunderstood and there are many definitions that describe it. The varied interpretations of what is meant by cumulative effects are a limitation as to how in depth cumulative effects are assessed (Cooper and Sheate, 2002:417). Some of the definitions include Dubé (2003:724);

> *A cumulative effect is an effect on the environment that results from the incremental, accumulating and interacting impacts of an action when added to other and past, present and reasonably foreseeable future actions.*

The first legal definition for cumulative effects was given by NEPA in 1978.

> *"...the impact[s] on the environment which result[s] from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of*

what agency...or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (CEQ, 1978).

In the above definitions is it clear that cumulative effects may result from the addition or extraction of materials from the environment as well as from the interaction between man-made and natural stressors. Cumulative effects may also occur from individually minor yet collectively significant actions taking place over a period of time and/or space (Dubé, 2003:724). These definitions are limiting in that they encompass the thought that cumulative effects occur only in the combination of two or more project impacts. On the contrary, cumulative effects can also occur from the combination of impacts from within a project, and moreover, from persistent disturbances from a sole source (van der Walt, 2005:65).

It is important to establish an understanding of the concept of cumulative effects. This will be the foundation on which this study will be done. Therefore, it is accepted that the essence of the cumulative effects concept is the "coming together of impacts" (van der Walt, 2005:65). Thus cumulative effects my result form

- multiple developments
- multiple sources of perturbations
- single development

- persistent perturbations.

It is widely accepted that cumulative effects are

- additive or interactive
- from the past, present or potential future activities
- progressive increase or loss
- a result from individual impact that may be significant or insignificant.

The following definition is proposed by van der Walt (2005:65)

> *Cumulative effects are the resultant effects (positive/negative, significant/insignificant) when human-induced perturbations (which may be significant or insignificant in themselves, and may originate from past, present and/or future activities) on a valued ecosystem component (VECs) combine, in a linear (additive, incremental, 'nibbling') and/or non-linear (interactive, bio-magnification, structural collapse) manner. Perturbations may originate from multiple sources (multiple related/unrelated, similar/different development actions, and/or multiple activities within a single development action), or from persistent perturbations from a single source.*

The above definition acknowledges the following:

- cumulative effects will arise when human-induced disturbances on specific valued ecosystem components combine
- combined impacts may be positive or negative as well as significant or insignificant
- disturbances of the past, present and potential future activities are considered
- the disturbances can follow linear or non-linear pathways
- cumulative effects may be either a progressive loss or increase
- disturbances may originate from
    - multiple sources from similar or different developments
    - from multiple activities within a single development
    - a single source where disturbance is repeated over time.

3.2 Cumulative Effects Assessment - Principles

Sears and Yu (1994:179) define cumulative effects assessment as:

> *"The process of systematically predicting, analysing and evaluating cumulative environmental change. The objective of assessing cumulative effects resulting from a project is to forecast into the future as quantifiable a picture as possible, what the area affected by the project will look like in the presence of the project, as compared to its absence".*

There is a need for decision makers to look at projects in context with other developments. As reflected in the above definition, CEA have a more holistic approach where it looks at not only the consequences of actions but also the causes of the cumulative effects as well as possible management policies.

There is no universal framework for CEA but there are principles that are universally accepted. These principles differentiate CEA from traditional EIA. The following eight principles are proposed by CEQ (1997:8) and supported by van der Walt (2005:67) and Mitchell and Binedell (2001:2-4).

1. Cumulative effects are caused by the aggregate of past, present, and reasonably foreseeable future actions;
2. Cumulative effects are the total effect, including both direct and indirect effects on a given resource, ecosystem and human community of all actions taken;
3. Cumulative effects need to be analysed in terms of the specific resource, ecosystem and human community being affected;
4. It is not practical to analyse the cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful;
5. Cumulative effects on a given resource, ecosystem and human community are rarely aligned with political or administrative boundaries;
6. Cumulative effects may result from the accumulation of similar effects

or the synergistic interaction of different effects;

7. Cumulative effects may last for many years beyond the life of the action that caused the effects; and
8. Each affected resource, ecosystem and human community must be analysed in terms of its capacity to accommodate additional effects, based on its own time and space parameters.

By applying the above principles in project EIA, cumulative impacts will be better considered and a more complete analysis will be achieved (Mitchell and Binedell, 2001:2-5). The following attributes that characterise CEA are suggested by Mitchell and Binedell (2001:2-5).

- CEA places impacts in contexts – EIAs are more complete since a view of multi-impacts is generated.
- CEA is a partial view of the world – Even though CEA looks at a wider view of impacts it still needs to stay with in the borders of reality.
- CEA is holistic.
- CEA is integrative – the environment consists of many causes, which are all integrated. CEA attempts to analyse this integration of causes as to predict the future state of the environment.
- CEA follows a scientific approach to establish impacts.

Chapter 4- South African legislation considering environmental cumulative effects

This chapter's aim is to identify any legal and policy requirements, which have a reference to cumulative effects within South Africa. This review will include legislation and policy at national government level only.

4.1 Constitution of South Africa Act 108 of 1996

The Constitution of South Africa is superior to all other laws and contains duties which are obligatory. The Constitution (1996) does not specifically refer to cumulative effects but it does contain section 24. This section describes the following environmental rights, i.e. the right to an environment that is not harmful to health or well being, and the right to have the environment protected through legislative and other means to prevent pollution and ecological degradation.

This section provides the means to an integrative approach to environmental management, which will have to take cumulative effects in consideration. This section forms the foundation of environmental law and therefore it provides the opportunity to recognise the need for CEA.

4.2 Environment Conservation Act 73 of 1989

The EIA procedures mandated by this act have been replaced with the IEM provisions under the National Environmental Management Act in 2007.

However, this act is still important since all the case studies reviewed in this study were done before 2007. The EIA regulations in the Environment Conservation Act (ECA) 1989 make no mention of cumulative impacts but only require particulars on 'the extent and significance of each identified environmental impact' (s8(a)(i) of R1183).

4.3 EIA Guideline Document 1998

A guideline document for the implementation of EIA regulations was issued under ECA in 1998. This document refers to cumulative impact assessment in two sections.

The first reference is to the content of the scoping report, which must contain a short description of how the environment is affected. In relation to this short description, the guideline indicated that impacts are often viewed in isolation and they should rather be looked at as impacts interacting over space and time. The second reference is concerning the review of the impact report by the relevant authorities and that they need be concerned about cumulative environmental impacts as stated in the following:

'The extent to which the impacts may contribute to any cumulative environmental impact when considered in conjunction with existing impacts of other projects should be considered as a key concern' (DEAT, 1998:30).

However, there is no reference in the guideline document for the need of the applicant to carry out a CEA when describing the contents of the EIA report.

4.4 National Environmental Management Act 107 of 1998

The National Environmental Management Act (NEMA) provides an over arching framework for environmental law in South Africa.

There is no explicit reference made to cumulative effects but there are some tendencies towards CEA. This can be seen in section 2 where the national environmental management principles are set out. This section shows the requirement to prepare Environmental Implementation Plans (EIP) as set out in chapter 3 and the Integrated Environmental Management (IEM) provisions set out in chapter 5 (Peart, 2001:3-2).

None of the environmental principles refer specifically to cumulative effects. However, an assessment of cumulative impacts is implied in the principles that '*development must be socially, environmentally and economically sustainable*' (s2(3)) and '*that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied*' (s2(4)(a)(viii)) (South Africa, 1998). Thus cumulative effects will need to be anticipated if the principles are to be followed correctly.

EIPs are to be used to ensure that all policies, plans and programs comply with the national environmental management principles. To achieve this, it is most likely that a strategic environmental assessment will be needed which again will have to investigate at cumulative effects.

Chapter 5 of the Act describes IEM, which sets out a wide range of tools to be used for environmental assessment. However, the original wording of the act, which included direct reference to cumulative effects, was changed in the amendment of the Act. In the National Environmental Management Second Amendment Act, 2004, these words were removed but were inserted as a new clause in the section dealing with the procedure for 'rectification', where activities were commenced without the proper authorisation under the Act.

The specific treatment of cumulative effects and CEA under NEMA is very vague and does not include them as a requirement for environmental assessment.

4.5 The new EIA regulations of 2006

In 2006 a new set of Regulations was published under section 24(5) of the NEMA (as amended) to replace the 1997 EIA Regulations. These new regulations differentiate between two categories of activities, 1) a basic assessment, and 2) a comprehensive environmental assessment. Previously, there was only one long and cumbersome process to be followed and often time and resources were wasted on small scale and insignificant activities. By having two categories of EIAs, it will improve decision-making, efficiency and time

frames to complete EIAs. In both these categories of EIAs, references are made to cumulative impacts.

The first reference is a definition, which provides for cumulative impacts and states:

> *'the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area'* (South Africa, 2006).

This definition has not changed much from the previous EIA regulations and 1992 IEM guideline series and still shows limitations in understanding the concept of cumulative effects.

The second reference to cumulative effects is in the content requirements of the basic assessment report. These requirements include a description and assessment of any environmental impacts, including cumulative impacts.

The third and forth references made to cumulative effects/impacts are in sections 29(f) and 32(k) of the new EIA regulations. Section 29 refers to the requirement of a scoping report when a comprehensive EIA needs to be done and states:

'a description of environmental issues and potential impacts, including cumulative impacts, that have been identified'

Section 32 explains the requirements for the preparation of an EIA report and it clearly states that:

'an assessment of each identified potentially significant impact, including – cumulative impacts'

It is very clearly stated that potential cumulative effects need to be considered in the new regulations. This does provide greater clarity on the subject of cumulative effects. Even though there is direct reference made to the consideration of cumulative effects, there is no mention of performing a CEA to be obligatory.

4.6 Cumulative effects in other legislation and policies

The following legislation was reviewed:

- The National Environmental Management: Biodiversity Act No10 of 2004
- Draft National Environmental Management: Waste Management Bill of 2007
- Marine Living Resources Act 18 of 1998
- National Environmental Management: Air Quality Act 39 of 2004
- National Water Act 36 of 1998

- National Forests Act 84 of 1998
- Development Facilitation Act 67 of 1995
- Mineral and Petroleum Resource Development Act 28 of 2002

In none of the above legislation was there a direct reference to cumulative effects or CEA. However, all of them make some effort to establish a form of "limits of acceptable change" or "thresholds of significance" and this is a clear trend of how resource management is recognising the integrated nature of resources (van der Walt, 2005:127).

The Mineral and Petroleum Resource Development Act 28 of 2002 is one of the few acts which has regulations published that explicitly require that project level EIA, for licensing and permitting of mining-related activities, must consider cumulative effects.

Chapter 5- Research methodology

The aim of this chapter is to provide background on the EIA case studies which were done in Durban Harbour. A set of criteria questions is proposed against which the consideration of cumulative effects in these case studies is measured.

5.1 Durban Harbour

Durban Bay is situated on the east coast of Kwa-Zulu Natal between 29° 51' to 29° 54' South and 31°03' East (Hay, 1993). It is assumed that Vasco Da Gama was the first European to set foot on "Port Natal" in 1497. The first attempt to modify the bay for use as a harbour was in the mid 1800s (Hay, 1993).

Durban harbour is used in this case study to investigate if cumulative effects were addressed in the EIAs performed in this harbour. The reason for studying Port of Durban is because Durban is the busiest harbour in South Africa in terms of vessel arrivals and container handling and therefore a focal point of economic activity in South Africa. A lot of pressure has been placed on the harbour over the years in order to accommodate the growth and demand of shipping and container handling and therefore a lot of development took place to satisfy this demand.

5.2 Formulation of framework of good practice in CEA

The proposed framework of good practice in CEA will consist of a set of criteria questions. This set of criteria questions will be used to review the EIAs and

establish whether cumulative effects were considered in the studies. This questionnaire will be similar to a checklist, which has the benefits of a very structured approach (Canter and Kamath, 1995:330) to identify whether cumulative effects are being considered in EIA's. Limitations that will be experienced with the checklist are: 1) difficulties to show possible linkages 2) to quantify data (Canter and Kamath, 1995:330).

The set of criteria questions presented in this study is supported by other frameworks and methods used in previous studies (van der Walt, 2005:105; Cooper and Canter, 1997:387, Burris and Canter, 1997:10), that evaluated the identification of cumulative effects.

A short description of the case studies will be given in 5.2.1 and will be followed by the proposed questionnaire to evaluate the cumulative effects in the EIA studies in 5.2.2.

5.2.1 Description of Durban Harbour case studies

The case studies were randomly selected and are from developments which took place in Durban Harbour between 1996 and 2006. In this ten-year period, a lot of legislative changes took place in South Africa, which includes the new EIA regulations. Each case was reviewed on it own to establish if cumulative effects were considered. A cross case analysis was also done to establish some trends over the 10 year period. The review period of ten years should give us an

indication as to whether there was any change in the awareness of the consideration of cumulative effects in the EIAs of Durban Harbour performed.

Case study 1 – Proposed dredging operations in the Congella Basin, Port of Durban.

The proposed project involves the dredging of a channel approximately 35m long and 50 m wide to discharge the dredge spoil onto the surface waters of the Congella Basin. The dredging of a channel is needed to allow the transportation of two oil platforms on separate barges out of the harbour to West Africa. Originally Portnet would have undertaken the dredging work and the dredge spoil would have been moved directly out to sea and dumped. But mechanical problems with their bucket dredger resulted in an alternative where divers would operate a West Coast Dredge Head attached to a sludge pump. There would be no facilities available for the transportation of the dredge spoil out to sea and therefore it was to be pumped in the Congella Basin. For this reason Portnet requested an EIA. The environmental consultant and project manager was IDEAS. A draft EIA report was compiled in 1996.

Case study2 – Proposed dredging of the Floating Dock Basin, Port of Durban.

In this project it is proposed that approximately 60 000m^3 of sediment be dredged from the existing Floating Dock Basin which is situated in the Congella Basin at Bayhead in the western reaches of the Port of Durban. The dredging is to be undertaken by a bucket dredger and the dredged spoil collected and transported

offshore where it would be deposited on the dredge spoil disposal dump. This is an established dumpsite used by Portnet. Weerts, Butler and Bulman Environmental, Planning and Participation Consultants prepared the EIA report in 1998.

Case study 3 – Port of Durban, Proposed container terminal expansion.

The proposed project is to construct additional container facilities in the Port of Durban. The proposed container terminal expansion will involve extending Pier 2 in a westerly direction, conversion of container stacking area from private to a public area, constructing deep water berths on Point side of Bay and the extension of Pier 1 to the east. The reason for the expansion of container facilities is that there has been an increase in container traffic over the past two decades. Common Ground Consulting compiled this EIA report in 1999.

Case study 4 – Proposed Portnet permanent sand by-pass scheme.

Portnet is proposing the establishment of a permanent sand by-pass scheme as a means to keep the entrance channel of the harbour clear. This project will involve the construction of a permanent Sand By-Pass scheme to be installed at Cave Rock Bight and will include the construction of a jetty on piles. Portnet is the owner of the proposed land on which the construction will take place. This is the Remainder of Portion 3 of ERF 686 Bluff – FU, and is zoned as harbour area. It is currently used for operations of this nature and consequently the development will not have a drastic change in land use. A scoping report was

compiled by Environmental Design Partnership (Pty) Ltd in 2000, to determine the likely impact of the proposed project.

Case study 5 – Proposed development of a new access road to the planned Ambrose Park development.

Amborse Park is being developed by the NPA (National Ports Authority) with the assistance of Protekon. Ambrose Park is zoned as harbour area and is located in the greater Durban Harbour Industrial Complex south of the Natal Bay, between Bayhead Road and the SPOORNET's Bayhead marshalling yard. This area is planned for warehousing and goods handling of non-hazardous material to meet the NPA's increasing demand for further development and expansion of the Port of Durban. NPA waived initial plans to make use of existing roads to access Ambrose Park and proposed the development of a new access road, which will connect to Bayhead road. ARCUS GIBB (Pty) Ltd was appointed by the NPA in 2003 to assist with the collation of the documentation and EIA application for the Ambrose Park access road development.

Case study 6 – Maydon Wharf berth upgrade.

The proposed project will involve the upgrading and redevelopment of the existing Maydon Wharf facilities. The upgrade will include the extension of the wharf into the port by up to 10m. There may also be potential dredging adjacent to the quay wall to increase the draft at the wharf from 10 m to between 12.8 and 14.5m. The reason for the upgrade is because the quay walls are reaching the

end of their service life and must be replaced. The berths do not meet the needs of modern shipping anymore and upgrades will meet the long-term growth goals of the harbour, reducing the need for additional new infrastructure elsewhere in the harbour. A scoping report was prepared by WSP Walmsley Environmental Consultants and DMM Environment and Water Resources in 2003.

Case study 7 – Widening and deepening of the Port of Durban entrance channel.
The proposed development includes the widening of the entrance channel of the harbour by moving the Northern pier, including the breakwater, further north, the demolition and removal of obstacles and deepening the channel through dredging. The development is motivated by worldwide trends for the use of bigger ships. To allow these bigger ships called post-panamax container vessels safe passage to the Durban harbour, it is necessary to widen and deepen the entrance channel.

The property set aside for the development belongs to NPA and the widened section falls within a servitude that has been already reserved for harbour widening. However, this development will affect many facilities such as

- a sub-aqueous tunnel housing a number of municipality services
- a sand by-pass scheme which is housed in the channel
- formal businesses operating on the north pier
- small craft dock at the harbour side of the north pier.

The NPA appointed ARCUS GIBB (Pty) Ltd to undertake an EIA for the proposed widening and deepening of the Durban Port entrance channel and they produced a final scoping report in 2004.

Case study 8 – Proposed dredging of the Victoria Embankment yacht basin marina, Durban harbour.

Currently, the Yacht basin marina adjacent to the Victoria Embankment is too shallow to meet the needs of modern deep-keeled craft. Increasing the depth of the basin will increase the attraction as an international yachting venue. It is proposed to dredge the Yacht marina basin by either using a cutter suction dredger or alternatively some form of grab dredger. The desired depth for the basin will be a 4.5m which will require the dredging of 131 000 m^3 of sediment. The three disposal options include backfilling, disposal by land filling and disposal at sea. This project is proposed by eThekwinin Municipality and they have appointed WSP Walmsley to do the EIA. They compiled a final scoping report in 2005.

5.2.2 Criteria questions evaluating the cumulative impacts in the EIA case studies

The framework used to review the EIAs focuses on the understanding of CEA, the methods used to identify and predict cumulative effects and proposals for mitigation and monitoring.

Table 4. Criteria questions for the evaluation of CEA.

Criteria question	Rationale
1. Are cumulative effects addressed in any of the following sections of the report; Abstract, Table of Contents, Executive Summary, Index, Environmental Consequences Section and Appendix?	If cumulative effects are addressed in the sections in the question, it will indicate that CEA was considered through out the EIA.
2. Does the report have a separate section about cumulative effects?	If the report has a separate section on CEA, it will indicate the importance placed on it and it will be easy to find in the report.
3. Is a definition provided for cumulative effects in the assessment?	This will provide the depth of understanding including the extensiveness of the CEA.
4. Are cumulative effects addressed in the scoping section of the report?	When cumulative effects are included in the scoping process, it means that they were already considered early in the EIA process together with other impacts.
5. Are spatial boundaries and possible shortcomings thereof clearly set out to allow the considerations of cumulative effects?	If the spatial boundaries are clearly defined by a map, description or listing of other projects, it will aid in the identification, the extent and the assessment of all cumulative effects.
6. Are the past, present and reasonable foreseeable dimensions set out in the temporal boundaries?	Temporal boundaries should be defined for the same reasons as for spatial boundaries.
7. Are the possible shortcomings and implications of temporal boundaries clearly recognised?	Again, this will allow a better understanding of the extent of cumulative effects.
8. Are cumulative impacts identified for specific resources or environmental factors?	Analysis of all potential affected resources as defined by the assessment will enable thoroughness and ensure that no significant cumulative effects are overlooked.
9. Are efforts made to view impacts of other activities on similar resources or environmental factors of activity under consideration?	If all other projects are considered in the CEA (spatial and temporal) it will identify impacts, which possibly could have been neglected. It is possible that not all the projects in the defined boundaries will contribute to the cumulative impacts of the proposed project.
10. Are specific methods or efforts for CEA described in the assessment?	A description of the methods used for CEA will show the approach taken by the study including the significance of cumulative effects determined.
11. Are specific efforts made to avoid, minimise and/or mitigate identified/assessed cumulative effects?	This will determine if any efforts were made to mitigate identified cumulative effects.

12. Do the monitoring plans include cumulative effects?	If monitoring plans include identified cumulative effects, it will show that it is considered to track cumulative effects and environmental quality over time.
13. Are cumulative effects included in subsequent management plans?	This will indicate that cumulative effects are considered even before the proposed projects are completed.

Chapter 6- Single case analysis of EIA reports of the Durban Harbour

6.1 The analysis of Case study 1 – Proposed dredging operations in the Congella Basin, Port of Durban.

In this case study, the call for dredging arises due to the access needed of two barges to Durban harbour to transport two offshore oil platforms out of the harbour. The EIA done for this project consisted of five components, namely a public participation exercise, scoping and identification of impacts, analyses of the sediment composition and heavy metal content and an ecological assessment.

From first impressions, there is no mention of any cumulative effects assessment in the components of the EIA mentioned above. This is confirmed when the EIA was reviewed against the criteria questions of CEA as set out in Table 4. Except for partial compliance to one criteria question, there was no compliance to any of the other criteria questions considering CEA. Partial compliance was gained concerning temporal boundaries and shortcomings pertaining to the EIA.

In the EIA, time constraints are mentioned due to reservations made in the transportation of the oil platforms. Short cuts have been taken to complete the EIA and the public participation process was used as a socio-economic study. From this it is clear that the EIA was to be completed in a limited time and no time was allocated to neither consider nor do any assessment on possible

cumulative effects. Thus partial compliance was rewarded for the consideration of temporal boundaries because it is clearly mentioned in the EIA that time was limited. Therefore it could be said that no thought was given to the possible cumulative effects, which could occur due to the proposed dredging.

Table 6.1 Summary of results of Case study 1 against the criteria questions of CEA.

Question	Result	Summary of findings
1. Mentioning of cumulative effects in various sections of report		No mentioning of cumulative effects in abstract, table of contents, executive summary, index, environmental consequences section or appendix.
2. Separate description of cumulative effects		No description of cumulative effects.
3. Defining for cumulative effects		No definition provided.
4. Scoping of cumulative effects		No provision made for TOR for cumulative effects.
5. Spatial boundaries and short comings		Boundaries limited to extent of project.
6. Past, present and reasonable foreseeable dimensions used in temporal boundaries		Short time frames which are only applicable to project lifetime.
7. Temporal boundaries and short comings		Limited time constraints are mentioned due to reservations that the client made for transporting the newly built barges. Short cuts were used to complete the EIA e.g. a public participation process also served the purpose of a socio-economic study.
8. Identification of cumulative effects for specific resources		No cumulative effects identified.
9. Review of impacts of other activities on similar resources		Activities limited to the project, which are assessed.
10. Methods used for CEA		No methods described for assessing cumulative effects.
11. Mitigation of cumulative effects		No mitigation measures.
12. Monitoring of cumulative effects		No monitoring of cumulative effects.
13. Cumulative effects included in management plans		Cumulative effects not included in management plans.

Key to final results

Full compliance	Partial compliance	Non-compliance

6.2 The analysis of Case study 2 *– Proposed dredging of the Floating Dock Basin, Port of Durban.*

This case study is another proposal concerning dredging. This dredging will take place in the Congella Basin in order to establish a floating dock. The dredge spoil will be dumped outside the harbour at an established Portnet dumpsite.

The consideration of cumulative effects in this EIA report was poor. The results of the review of the EIA report against the criteria questions in Table 4 showed that there was non-compliance in the majority of the questions. Partial compliance was reached for considering temporal boundaries and limitations, including one full compliance for the review of impacts of other activities on similar resources.

In the EIA report, it is clearly stated that there is a time limitation for the assessment to be completed. This time limitation is due to a reservation which was made for the towing of the floating dock to South Africa. Partial compliance was rewarded for the temporal considerations as it is clearly mentioned in the EIA report, that there was no time to consider a CEA.

Full compliance was reached for the consideration of other activities concerning similar resources and the review of other impacts. In this EIA report, reference is made to the draft EIA report by Weerts in 1998 (Case study 1). Similar issues

were identified and investigated in this EIA other than in the previous Draft EIA report of 1998. Information from the previous EIA was used in this report. This information included results of monitoring undertaken from the previous EIA on similar resources and issues as identified. Thus, there was consideration of the impact of dredging on the same resources although it may have been in the past. Although there was no CEA preformed, the above shows that there was some level of understanding towards the consideration of cumulative effects.

Table 6.2 Summary of results of Case study 2 against the criteria questions of CEA.

Question	Result	Summary of findings
1. Mentioning of cumulative effects in various sections of report		No mentioning of cumulative effects in abstract, table of contents, executive summary, index, environmental consequences section or appendix.
2. Separate description of cumulative effects		No description of cumulative effects.
3. Defining for cumulative effects		No definition provided.
4. Scoping of cumulative effects		No provision made for TOR for cumulative effects.
5. Spatial boundaries and short comings		Boundaries limited to extent of project.
6. Past, present and reasonable foreseeable dimensions used in temporal boundaries		Short time frames which are only applicable to project lifetime.
7. Temporal boundaries and short comings		The clients mentioned limited time constraints concerning reservations made for the transport of the floating dock.
8. Identification of cumulative effects for specific resources		No cumulative effects identified.
9. Review of impacts of other activities on similar resources		Referral made to an EIA done in 1996 (Case study 1). Similar issues were identified and investigated and information in a previous study was used in this EIA.
10. Methods used for CEA		No methods described for assessing cumulative effects.
11. Mitigation of cumulative effects		No mitigation measures.
12. Monitoring of cumulative effects		No monitoring of cumulative effects.
13. Cumulative effects included in management plans		Cumulative effects not included in management plans.

Key to final results

Full compliance	Partial compliance	Non-compliance

6.3 The analysis of Case study 3 *– Port of Durban, Proposed container terminal expansion.*

The activity assessed in this EIA was a four-phase development to extend the container handling facilities in the Port of Durban. This EIA report scored the best against the criteria questions (Table 4) and showed the best awareness of cumulative effects of all the reports.

Full compliance was given in the report for the identification of cumulative effects of specific resources. The identification of potential cumulative effects was limited to only two resources, which were vehicle traffic and the loss of water depth, surface and habitat. It is clearly stated in the report that the traffic impacts were cumulatively assessed. The cumulative loss of water depth, surface and habitat was mentioned. The latter was not very clearly put in the report and there was no mention of a CEA for this resource. This information only appeared in two tables of which one showed the significance of the impacts and the other a summary of the mitigation measures of the identified impacts. Thus, the combined impact of the four phases of the project concerning traffic impacts was assessed, but no clear assessment for the loss of water depth, surface and habitat was indicated. Unfortunately, a CEA was not done on any other resources, which could be an indication of a limited understanding of cumulative effects and how they should be scoped for.

Full compliance was also given to the fact that mitigation measures were provided for the identified traffic impacts and for the consideration of mitigation measures for the loss of water depth, surface and habitat, although the latter was only mentioned in the report.

Two aspects of the report complied partially with the consideration of cumulative effects. There was no mention of cumulative effects in any part of the report except in the sections impact assessment and recommendations. In both these sections, referral is made to the possible cumulative impacts of the vehicle traffic as the project progress. The reason why this was seen as partial compliance was because only two sections of the report mentioned cumulative effects.

A review of impacts of other activities on similar resources was done but this was limited to the use of an IEM (1995-1997) study as background information to this project. There was no evidence of the reviewing of any other EIAs or previously identified similar impacts of previous projects in this report. Thus, the effort to review some past material leads to the partial compliance of this question.

Table 6.3 Summary of results of Case study 3 against the criteria questions of CEA.

Question	Result	Summary of findings
1. Mentioning of cumulative effects in various sections of report		No mentioning of cumulative effects in the majority of the sections in the report. Although cumulative effects were mentioned in the impacts assessment section and the recommendation section concerning traffic, it may occur due to more than one development in the area.
2. Separate description of cumulative effects		No description of cumulative effects.
3. Defining for cumulative effects		No definition provided.
4. Scoping of cumulative effects		No provision made for TOR for cumulative effects.
5. Spatial boundaries and short comings		Boundaries limited to extent of project.
6. Past, present and reasonable foreseeable dimensions used in temporal boundaries		Short time frames which are only applicable to project lifetime.
7. Temporal boundaries and short comings		Time frames limited to project life.
8. Identification of cumulative effects for specific resources		Traffic impacts were assessed cumulatively as the phases of the project progressed. The combined impact of the 4 phases of the projects was assessed which may be a cumulative loss of water depth/surface and habitat.
9. Review of impacts of other activities on similar resources		This EIA use the IEM (1995-1997) study as background information.
10. Methods used for CEA		No methods described for assessing cumulative effects.
11. Mitigation of cumulative effects		Mitigation measures provided for the traffic impacts identified. Mitigation measures of the combined impact of different phases of the project on the decrease in water depth/surface are mentioned.
12. Monitoring of cumulative effects		No monitoring of cumulative effects.
13. Cumulative effects included in management plans		Cumulative effects not included in management plans.

Key to final results

Full compliance	Partial compliance	Non-compliance

6.4 The analysis of Case study 4 *– Proposed Portnet permanent sand by-pass scheme.*

In this case study, an EIA was done to establish what the possible impacts of a permanent sand by-pass scheme, as a means to keep the entrance channel of the harbour clear, might be. This case study received 100% non-compliance to the criteria questions in Table 4. Thus there was no consideration of cumulative effects at any stage of the performed EIA.

Table 6.4 Summary of results of Case study 4 against the criteria questions of CEA.

Question	Result	Summary of findings
1. Mentioning of cumulative effects in various sections of report		No mentioning of cumulative effects in abstract, table of contents, executive summary, index, environmental consequences section or appendix.
2. Separate description of cumulative effects		No description of cumulative effects.
3. Defining for cumulative effects		No definition provided.
4. Scoping of cumulative effects		No provision made for TOR for cumulative effects.
5. Spatial boundaries and short comings		Boundaries limited to extent of project.
6. Past, present and reasonable foreseeable dimensions used in temporal boundaries		Short time frames which are only applicable to project lifetime.
7. Temporal boundaries and short comings		Time frames limited to project life.
8. Identification of cumulative effects for specific resources		No cumulative effects identified.
9. Review of impacts of other activities on similar resources		Activities limited to project, which are assessed.
10. Methods used for CEA		No methods described for assessing cumulative effects.
11. Mitigation of cumulative effects		No mitigation measures.
12. Monitoring of cumulative effects		No monitoring of cumulative effects.
13. Cumulative effects included in management plans		Cumulative effects not included in management plans.

Key to final results

Full compliance	Partial compliance	Non-compliance

6.5 The analysis of Case study 5 *– Proposed development of a new access road to the planned Ambrose Park development.*

A new access road for the planned Ambrose Park development is proposed in this case study. The Ambrose Park development is planned for warehousing and goods handling of non-hazardous material to meet the NPA's increasing demand for further development and expansion of the Port of Durban.

The consideration of cumulative effects in this EIA report was poor. The results of the review of the EIA report against the criteria questions in Table 4 showed that there was non-compliance to the majority of the questions.

Partial compliance was reached for the review of impacts of other activities on similar resources. Reference was made to the Ambrose Park development scoping study but not in connection with cumulative effects. The reason why referral was made to the scoping study of the Ambrose Park development was to support the point of applying for either a limited scoping study or exemption for the proposal for the new access road to Ambrose Park.

Thus, there was no consideration of cumulative effects in this case study. This could be an indication of the following: unawareness or absence of knowledge and understanding of cumulative effects, to save time, resources and money by not performing a CEA.

Table 6.5 Summary of results of Case study 5 against the criteria questions of CEA.

Question	Result	Summary of findings
1. Mentioning of cumulative effects in various sections of report		No mentioning of cumulative effects in abstract, table of contents, executive summary, index, environmental consequences section or appendix.
2. Separate description of cumulative effects		No description of cumulative effects.
3. Defining for cumulative effects		No definition provided.
4. Scoping of cumulative effects		No provision made for TOR for cumulative effects.
5. Spatial boundaries and short comings		Boundaries limited to extent of project.
6. Past, present and reasonable foreseeable dimensions used in temporal boundaries		Short time frames which are only applicable to project lifetime.
7. Temporal boundaries and short comings		Time frames limited to project life.
8. Identification of cumulative effects for specific resources		No cumulative effects identified.
9. Review of impacts of other activities on similar resources		Reference made to Ambrose Park development EIA but not in connection with cumulative effects.
10. Methods used for CEA		No methods described for assessing cumulative effects.
11. Mitigation of cumulative effects		No mitigation measures.
12. Monitoring of cumulative effects		No monitoring of cumulative effects.
13. Cumulative effects included in management plans		Cumulative effects not included in management plans.

Key to final results

Full compliance	Partial compliance	Non-compliance

6.6 The analysis of Case study 6 – Maydon Wharf berth upgrade.

In case study 6, an upgrade and redevelopment of the exciting Maydon Wharf facilities is proposed. This upgrade will include activities such as extensions of the wharf and potential dredging. The consideration of cumulative effects in this EIA report was very poor and 100% non-compliance for the criteria questions (Table 4) was received. Thus, there was no consideration of cumulative effects at all in this EIA report.

Table 6.6 Summary of results of Case study 6 against the criteria questions of CEA.

Question	Result	Summary of findings
1. Mentioning of cumulative effects in various sections of report		No mentioning of cumulative effects in abstract, table of contents, executive summary, index, environmental consequences section or appendix.
2. Separate description of cumulative effects		No description of cumulative effects.
3. Defining for cumulative effects		No definition provided.
4. Scoping of cumulative effects		No provision made for TOR for cumulative effects.
5. Spatial boundaries and short comings		Boundaries limited to extent of project.
6. Past, present and reasonable foreseeable dimensions used in temporal boundaries		Short time frames which are only applicable to project lifetime.
7. Temporal boundaries and short comings		Time frames limited to project life.
8. Identification of cumulative effects for specific resources		No cumulative effects identified.
9. Review of impacts of other activities on similar resources		Activities limited to project, which are assessed.
10. Methods used for CEA		No methods described for assessing cumulative effects.
11. Mitigation of cumulative effects		No mitigation measures.
12. Monitoring of cumulative effects		No monitoring of cumulative effects.
13. Cumulative effects included in management plans		Cumulative effects not included in management plans.

Key to final results

Full compliance	Partial compliance	Non-compliance

6.7 The analysis of Case study 7 *– Widening and deepening of the Port of Durban entrance channel.*

The National Ports Authority is proposing to widen and deepen the existing Port's entrance channel to improve safe handling of vessels and to enable the entry of larger vessels in keeping with international trends.

The consideration of cumulative effects in this EIA report was poor and there was non-compliance to the majority of the questions (Table 4) used to review the EIA report.

Partial compliance was reached for the identification of cumulative effects for specific resources. Although many resources that may be affected by the project have been identified, referral to only two was made concerning cumulative effects. The resources, which are mentioned, were surge in the water caused by larger ships entering the harbour in the future and increased vessel traffic in the harbour. Regarding these resources, the term 'secondary impacts' were used instead of cumulative effects. But this was taken as cumulative effects and therefore a partial compliance to the review questions was awarded.

The use of a different term for cumulative effects is an indication that there is confusion in the understanding and its definition.

Table 6.7 Summary of results of Case study 7 against the criteria questions of CEA.

Question	Result	Summary of findings
1. Mentioning of cumulative effects in various sections of report		No mentioning of cumulative effects in abstract, table of contents, executive summary, index, environmental consequences section or appendix.
2. Separate description of cumulative effects		No description of cumulative effects.
3. Defining for cumulative effects		No definition provided.
4. Scoping of cumulative effects		No provision made for TOR for cumulative effects.
5. Spatial boundaries and short comings		Boundaries limited to extent of project.
6. Past, present and reasonable foreseeable dimensions used in temporal boundaries		Short time frames which are only applicable to project lifetime.
7. Temporal boundaries and short comings		Time frames limited to project life.
8. Identification of cumulative effects for specific resources		Secondary impacts are mentioned concerning water surge caused by larger ships and an increase of vessel traffic in harbour.
9. Review of impacts of other activities on similar resources		Activities limited to project, which are assessed.
10. Methods used for CEA		No methods described for assessing cumulative effects.
11. Mitigation of cumulative effects		No mitigation measures.
12. Monitoring of cumulative effects		No monitoring of cumulative effects.
13. Cumulative effects included in management plans		Cumulative effects not included in management plans.

Key to final results

Full compliance	Partial compliance	Non-compliance

6.8 The analysis of Case study 8– *Proposed dredging of the Victoria Embankment yacht basin marina, Durban harbour.*

In this case study 8, dredging of the Yacht Basin Marina is proposed to increase its depth. This will facilitate the entry and exit of larger vessels thereby increasing its capability and attraction as an international yachting venue.

This study also failed to perform adequately against the review for considering cumulative effects in the EIA. The majority of the criteria questions received non-compliance and only one question had partial compliance.

Partial compliance was reached for the mentioning of cumulative effects in various sections in the EIA report. Cumulative effects were mentioned in the sections of I&APs issues, concerns and queries and Appendices 4 and 6. In both sections of I&APs issues, concerns and queries and Appendix 4 of the report it is noted that an I&AP was concerned about the "Proper disposal of dredge material including potential cumulative effects offshore". It is clearly stated in the EIA report that the scoping study would not perform a CEA unless directed by DEAT.

Appendix 6 of this EIA report is a legislative review. One of the conventions that were mentioned in this review was the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (The London Convention), to

which South Africa is acceded. This convention sets out certain conditions to be adhered to when required to dump certain matter. In this convention, the existence and effects of other dumping, which has been done at the dumping area, is mentioned. Thus this can be interpreted to consider possible cumulative effects if additional dumping is done. Other legislation reviewed in Appendix 6, which mentioned cumulative effects, was the White Paper on Integrated Pollution and Waste Management for South Africa.

Therefore, this case study indicates a higher awareness of cumulative effects from I&APs than from the EIA "specialist" themselves. This resulted in pressure from the public on the EIA consultancy to look at cumulative effects.

Table 6.8 Summary of results of Case study 8 against the criteria questions of CEA.

Question	Result	Summary of findings
1. Mentioning of cumulative effects in various sections of report		Cumulative effects are discussed in the appendix of the legislation review. An interested and affected party mentioned possible cumulative effects concerning the disposal of dredge material at sea.
2. Separate description of cumulative effects		No description of cumulative effects.
3. Defining for cumulative effects		No definition provided.
4. Scoping of cumulative effects		No CEA performed.
5. Spatial boundaries and short comings		Boundaries limited to extent of project.
6. Past, present and reasonable foreseeable dimensions used in temporal boundaries		Short time frames which are only applicable to project lifetime.
7. Temporal boundaries and short comings		Time frames limited to project life.
8. Identification of cumulative effects for specific resources		No cumulative effects identified.
9. Review of impacts of other activities on similar resources		Activities limited to project, which are assessed.
10. Methods used for CEA		No methods described for assessing cumulative effects.
11. Mitigation of cumulative effects		No mitigation measures.
12. Monitoring of cumulative effects		No monitoring of cumulative effects.
13. Cumulative effects included in management plans		Cumulative effects not included in management plans.

Key to final results

Full compliance	Partial compliance	Non-compliance

Chapter 7 – Cross case analysis of results

In this chapter, a cross analysis of all the case studies is performed. The purpose of this analysis is to establish trends, differences and communalities between the cases.

Table 7. Cross case analysis of all eight of the case studies results.

Question no	Case study no							
	1	2	3	4	5	6	7	8
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								

Key to final results

Full compliance	Partial compliance	Non-compliance

7.1 Findings of the cross case analysis.

In the majority of the cross case analyses, poor compliance to the framework of good practice is clearly illustrated. Only three questions received full compliance and seven questions partial compliance. The performance related to the understanding of cumulative effects was poor and 100% non-compliance was received abroad for all case studies in questions 2-6, 10 and 12-13.

Questions 2-4 considered the definition of cumulative effects and how to scope for it. Thus, it is very clear that if the understanding of cumulative effects is

limited, there will be difficulty in knowing how to scope for it. Questions 5-6 described spatial and temporal boundaries and their shortcomings. Recognising and establishing shortcomings of spatial and temporal boundaries was poorly complied with. This confirms how EIA at project level is viewed, namely as an isolated occurrence. Due to the above view the consideration of in combination impacts is not seen as important and only direct impacts are considered.

Question 10 had 100% non-compliance. This refers to the methods used to perform a CEA. There was no CEA performed with any of the EIA case studies. This reflects the lack of knowledge of cumulative effects and how to go about assessing it.

Questions 12-13 also had 100% non-compliance. These two questions are about the monitoring and managing of cumulative impacts and it clearly illustrates the knock-on effect that is created if there is limited understanding of cumulative effects. It can be said that if practitioners do not understand cumulative effects and do not know how to scope for it, how will it be possible to identify this type of impact and therefore monitor and manage it?

Partial compliance was reached, in two case studies in question 1. This question required the acknowledgement of cumulative effects in certain sections of the EIA report. This was not done in the majority of cases and confirms the existing lack of acknowledgement of cumulative effects.

Partial compliance was received in only two case studies for question 7 (recognition of shortcomings of temporal boundaries). Both these case studies were dredging projects in the harbour. The time limit, which was placed on those two projects, is a concern. Dredging is an activity with severe impact on the environment and with temporal limitations placed on the assessment of impacts, will not create a favourable environment to allow for the assessment of cumulative effects.

The identification of cumulative impacts for specific resources or environmental factors is investigated in question 8. Only one case study reached full compliance for this and another case study only partial compliance. Again, poor performance throughout the majority of the cases.

Question 9 preformed the best. It pertained to the efforts made to view impacts of the other activities on the same resources or environmental factors. Only one case received full compliance but two other cases received partial compliance. This is an indication of sustainable thinking and it is a very positive finding. By assessing the impacts of not only one activity on a resource, but any other impacts of similar activities on that same resource indicates a holistic and integrated approach. The holistic approach is one of the characteristics of cumulative effects assessment.

In question 11, only one case study received full compliance for efforts made to mitigate identified/assessed cumulative effects. The reason why they made the effort to provide mitigation measures was because in this particular case study, cumulative effects were identified for a specific resource. In the cases where there was no identification of cumulative effects, there was also a lack of mitigation measures.

In conclusion the following findings were made from the cross analysis:

- Limited understanding of cumulative effects.
- No scoping and identification of cumulative impacts.
- Temporal and spatial boundaries were neglected.
- Limited knowledge on methods to perform a CEA.
- Unsuccessful identification of cumulative impacts would lead to poorly managed mitigation measures and monitoring.

Chapter 8- Conclusion and Recommendations

In this chapter, the main findings of the research, as well as recommendations, will be discussed. Three broad findings were found in this case study; these will be listed and then discussed.

- Insufficient knowledge and understanding of cumulative effects and the assessment thereof.
- Challenges related to developing country context.
- Slow emerging interest in cumulative effects.

8.1 Insufficient knowledge and understanding of cumulative effects and the assessment thereof.

The insufficient knowledge and understanding of cumulative effects and the assessment thereof at project level, is one of the leading problems concerning cumulative effects and its assessment. This was noticeable in this study, where there was a complete lack of awareness in 50% of the cases and a limited awareness in the rest. The lack of awareness can be attributed to the lack of understanding of the concept of cumulative effects and how to measure it at project level. The lack of knowledge is also clearly reflected in the legislation and policies of South Africa and contains only few references to cumulative effects and its assessment. The need to address cumulative effects is expressed in legislation and policy (van der Walt, 2005:277) but there is no clear guidance to the requirements and procedure of the assessment of the cumulative effects.

In the cases where there was a brief consideration of cumulative effects, there was also confusion of how to scope for cumulative effects in an EIA. Even though the consideration of cumulative effects is mentioned in legislation and policy, it is not explicitly stated that a CEA has to be done for a proposed development.

Sustainability of resources has been accepted as a major goal by the South African government and runs through legislation and policy as a golden thread. However, this goal will not be reached if there is not an active effort made in increasing the understanding of the concept of cumulative effects and applying CEA. Efforts have been made to improve the understanding of cumulative effects by providing the 2004 IEM information document on CEA and some requirements stated by the new EIA regulations 2006. Even though it was hoped that these documents would change the situation as stated by van der Walt, 2005:227, it has not made any impact on project level assessment as of yet. The reason for this may be that the release of the new EIA regulations only took place in 2006 and the expected change is yet to take place.

In order to improve the knowledge and understanding of cumulative effects and the assessment thereof, a clearer understanding of the concept will need to emerge from academics and practitioners. It should also be made obligatory to do a CEA as part of an EIA for proposed developments at project level. For the latter to be effective, it should be stated as such in the EIA regulations and strong guidance should be provided to practitioners on the procedural steps of a CEA.

8.2 Challenges related to developing country context.

One of the findings made in the analysis of the case studies, was an external issue to the EIA of a project, which prevented it or limited the assessment of cumulative effects. Even though the case studies reviewed in this study were at project level, the same finding was made by van der Walt (2005:280), which looked at strategic environmental assessment.

There was a time constraint present in 25% of the case studies, which lead to the ineffective or lack of assessment and identification of cumulative effects in the EIA. The time constraints were related to certain costs that were involved with the projects. The time-cost issue became a burden and was the main reason why cumulative effects were not considered. This forms part of some of the fundamental problems of developing countries where there is a great need and pressure for development and increased access to resources. Thus, the time factors mentioned in these studies played an important role in new development and economic opportunities. Unfortunately, in these case studies, the practicality of EIA was defeated (van der Walt, 2005:282) and did not live up to its purpose of guiding development but was merely a legislative process to be completed.

In the cases where cumulative effects were identified, it was not incorporated in the Environmental Management Plan. Thus, no follow up information is gathered to track environmental change over time. This is an indication that there is no

understanding of the link between cumulative effects and the sustainable use of our resources.

The importance of performing a CEA has to be emphasised and the challenges, which are experienced in developing countries, should rather be used as motivation to follow the right environmental assessment approaches to ensure the sustainable use of resources.

8.3 Slow emerging interest in cumulative effects.

Van der Walt (2005:273) has found an emerging interest in CEA at strategic level but the opposite was found for project level. In South Africa, there may be an increase in interest in cumulative effects and the assessment thereof in order to keep up with the first world (van der Walt, 2005:273) but this is purely at academic and political level. There is no interest expressed by EIA practitioners to consider cumulative effects at project level in this study. A finding which was made in this study was that the I&AP's were expressing concern about cumulative effects. This is very positive since they would be able to provide pressure on EIA practitioners to ensure that cumulative effects are considered in the future. Reasons why no interest in CEA was found at project level could be;

- time constraints which are experienced at project level,
- perception that projects are seen as isolated events,

- the limited understanding of cumulative effects which prevents the establishment of the links and extent of cumulative effects between projects,
- it was not stipulated in the old EIA regulations (1997) that a CEA needs to be done.

With the release of the new EIA regulations (2006) and the awareness of the I & AP's, there are indications that the situation will change and that consideration of cumulative effects will be seen as an inevitable part of an EIA.

It is recommended that clear guidance should be given on the New EIA regulations (2006) and the consideration of cumulative effects so as to ensure that project level developments are not seen as isolated incidences.

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Acronyms

CEA	-	Cumulative Effects Assessment
CE	-	Cumulative Effect(s)
DEAT	-	Department of Environment and Tourism
EA	-	Environmental Assessment
ECA	-	Environment Conservation Act
EIA	-	Environmental Impact Assessment
EIP	-	Environmental Implementation Plans
I & AP	-	Interested and Affected Party
IEM	-	Integrated Environmental Management
NEMA	-	National Environmental Management Act
NPA	-	National Ports Authority