# THE ASSESSMENT OF CUMULATIVE EFFECTS IN A DEVELOPING COUNTRY CONTEXT: THE CASE OF SOUTH AFRICA

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## Abstract

Due consideration of cumulative environmental effects is today recognised as an essential feature of the focus on sustainable development and an area that undeniably needs strengthening in EA theory and practice. The importance of this issue is further underlined in developing countries where stressed socio-economic, political and environmental conditions render the livelihoods of communities particularly susceptible to environmental change by cumulative effects.

This paper focuses on the situation regarding the assessment of cumulative effects in South Africa, as an example of a developing country. It explores the approach to and treatment of these effects in two areas, namely in the *environmental law and policy* of South Africa, and in *environmental assessment practice* in the country.

The analytical overview presented in this paper shows that, although there is considerable scope for improvement, decision makers and EA practitioners in South Africa are growing more attentive to the importance of cumulative environmental change and are finding innovative ways to address these effects in EA studies.


## 1. Introduction

In recent years significant progress has been made in the development and integration of the assessment of cumulative effects in environmental assessment, especially in countries such as the USA (CEQ, 1997; Cooper and Canter, 1997), Canada (Baxter *et al*, 2001; Canter, 1999; Heggman *et al*, 1999) and some of the European Union member states (Cooper and Sheate, 2002; Hyder, 1999a, 1999b). In the majority of developing countries, however, the issue of cumulative effects is typically still in a very early stage of development (Ross *et al*, 2001; Gutman, 1997).

Although many reasons could be offered for this, a combination of two main factors contributed to this neglect:

- Firstly, the prospect of increasing poverty, further economic decline and a growing dependence on external sources of aid in developing countries often forces governments to attempt short-term remedies that focus on immediate relief for communities, often at the cost of environmental quality (Ashton, 2002).

- Secondly, environmental assessment in these countries is often burdened by a lack of resources, paucity of data and a lack of institutional capacity to administer EA (see for example Duthie, 2001). To add to this, the assessment of cumulative effects were previously regarded, even in some developed countries, as too costly, or an issue that only becomes important once a certain level of environmental performance has been achieved (Ross *et al*, 2001).

It is therefore not surprising that the issue of cumulative effects was commonly regarded as an unattainable ideal in the context of developing countries.

Nonetheless, the gradual shift towards strategic thinking in recent years (Bonnell and Storey, 2000; Nooteboom, 2000; Therivel and Partidario, 1996), linked to the increasing realisation that cumulative change and resource integrity lie at the very core of sustainable development (Canter and Atkinson, 2000; Cocklin, 1993; Dubé, 2003; Piper, 2002), has significantly raised public awareness of the issue worldwide, including many developing countries. It is now recognised that the combination of stressed socio-economic, political and environmental characteristics in developing countries, renders the livelihoods of communities particularly susceptible to environmental change caused by cumulative effects (see for example Ross *et al*, 2001). More and more, decision makers are acknowledging the importance of this issue as a problem of survival in the developing world, and are beginning to apportion increasing attention to the integration of cumulative effects assessment in their environmental policies, legislation, requirements and practice.

## 2. Overall aim and approach

This paper explores the issue of cumulative effects and their assessment in one developing country, namely South Africa (see Box 1). It reports on the treatment of these effects in two areas, namely in the *environmental law and policy* of South Africa, and in *environmental assessment practice* in the country. The paper offers evidence of the increasing profile of the issue and attempts to identify trends and characteristics in the approach to and treatment of cumulative effects in the country.

The work reported in this paper forms part of a larger research project (PhD study). It was undertaken as preparatory work for a second (ongoing) phase of the research, which involves the in-depth analyses of specific EA case studies. The paper presents only a number of preliminary findings to describe broad trends and characteristics of the approach to and treatment of cumulative effects in South Africa.

**Box 1 The selection of South Africa as case study country**

The selection of South Africa as the case study country was guided by the fact that South Africa offers a unique balance between a developing country context and relatively well-established EA systems and practice, which could be used as the basis for this study. As a leading member of the Southern African Development Community (SADC), South Africa is also generally regarded as an important anchor and platform for development in the southern parts of Africa. Development and progress in the EA systems and practice of South Africa are therefore likely to spread to other southern African countries and thus be of benefit to a wider region. Furthermore, recent legislative developments and a growing number of demands for the consideration of cumulative effects in EA studies indicate that cumulative effects is an emerging issue in South Africa.

The paper does not offer conclusive statistical evidence or answer the question 'to what standard?' cumulative effects are being addressed. The latter issue is addressed in the second phase of the research. The paper also does not offer detailed discussions of the methodology followed in the analyses, but concentrates on the main findings and the conclusions drawn from these analyses. The final results of this research will be published on completion of the PhD study.

## 3. Cumulative effects in South African environmental law and policy

### *3.1 Overview of characteristics: one stimulus and four contexts for cumulative effects*

An early stage of the research project involved a systematic analysis of the past, present and newly proposed environmental assessment and management legislation, guidelines and policies of South Africa. This analysis aimed to identify aspects that facilitate or encumber 'cumulative thinking', and seek out all the direct or implied references to cumulative effects and their assessment in the legislation and policy.

The analysis showed that a common focus on sustainable development in the legislation serves as a strong stimulus for 'cumulative thinking'. An environmental clause in the 1996 Constitution (see Box 2) establishes sustainable development and the integrity of resources as the cornerstones of the approach to the environment in the country. This clause also forms the basis for a set of National Environmental Management Principles in the National Environmental Management Act (107 of 1998) or NEMA (South Africa, 1998).

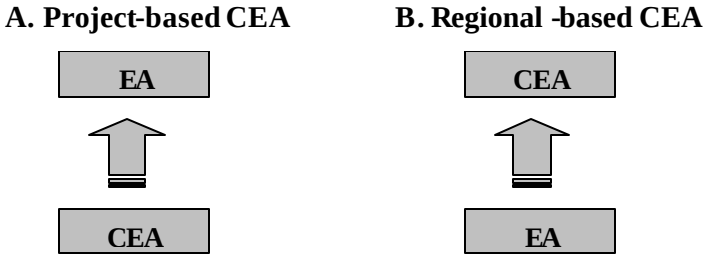
**Box 2 Section 24 of the South African Constitution, 108 of 1996**

Everyone has the right

(a) to an environment that is not harmful to their health or well-being; and
(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that
    (i) prevent pollution and ecological degradation;
    (ii) promote conservation; and
    (iii) secure ecologically *sustainable development and use of natural resources* while promoting justifiable economic and social development.
    (South Africa, 1996, 10, *emphasis added*)

The National Principles have been adopted as the basis for all subsequent legislation, and are supported through comprehensive requirements aimed at, amongst others, protecting the integrity of resources and ensuring that the net effects of activities on the environment are taken into consideration in decision making. In some cases, the legislation, policies and guidelines refer directly to the assessment of cumulative effects as part of environmental assessment activities, offering a foundation for project-based approaches to cumulative effects. In other cases, the legislation establishes environmental management approaches based on concepts such as 'assimilative capacity', 'carrying capacity', 'sustainability yields', 'thresholds of significance' and 'limits of acceptable change', thereby offering a basis for regional-based approaches to CEA (Dubé, 2003) (see also Box 3).

**Box 3 Distinction between Project-based and Regional-based approaches to**




**A.** Project-based approaches view CEA as an extension of the environmental assessment (EA) process for project developments. The focus of this approach is the stressors associated with a development proposal and prediction of how those stressors may interact with the environment.

**B.** Regional-based approaches view CEA as a broader, regional assessment tool to provide scientific information for decision-making related to sustainable development. The focus is on quantifying existing environmental effects first and working retrospectively to identify potential stressors. Regional CEA approaches have largely developed outside of the EA process and emphasize characterization of the environmental response to multiple stressors.
*(Based on a description and figure by Dubé, 2003)*

On the basis of this distinction, four broad contexts for the assessment and management of cumulative effects in the South Africa can be distinguished:

i. *The assessment of cumulative effects as part of EIA* – This traditional project-based approach to the assessment of cumulative effects is supported by requirements in the current South African EIA regulations (DEAT, 1998)[1], requirements in NEMA (although recent suggested changes to this act will do away with this reference[2]), as well as in a set of Draft regulations under the Minerals and Petroleum Resource Development Act (28 of 2002). The role of EIA in assessing cumulative effects is further emphasised in Mitchell *et al* (2001), as well as in several of the 2004 Integrated Environmental Management (IEM) Information documents published by the National Department of Environmental Affairs and Tourism (DEAT), i.e. DEAT (2004a, 2004b, 2004c and 2004d).

ii. *The assessment of cumulative effects as part of SEA* – The South African environmental law and policy strongly supports this approach (see for example DEAT (2000), Mitchell *et al* (2001), as well as DEAT (2004a and 2004e)). Although the assessment of cumulative effects as part of SEA is often applied as a project-based approach to CEA, the South African approach to SEA (i.e. the use of SEA as a tool to establish strategic decision making frameworks based on the *sustainability limits of the environment*) (see DEAT, 2000), offers the foundation for what is essentially a regional-based approach to CEA.

*iii.* *The assessment/management of cumulative effects as part of an approach to resource management* – Approaches to resource management in South Africa, under the new constitutional dispensation (as guided by the National Environmental Management principles) offer a strong basis for regional-based approaches to CEA. Legislation such as the National Water Act (36 of 1998) and the National Environmental Management: Biodiversity Bill (B30 of 2003) takes a holistic approach to the management of resources. It uses the 'sustainability yields' of resources as a framework against which impacting activities and new developments need to be managed and judged. Clearly, these approaches envelop

[1] These regulations and guidelines are currently being revised. New regulations and guidelines are expected to appear soon.

[2] The National Environmental Management Second Amendment Bill (B56 of 2003), suggested the removal of the specific reference to cumulative effects in favour of a wording that makes no reference to the nature of environmental impacts (direct, indirect or cumulative). However, the Bill suggests the addition of a direct requirement for the assessment of cumulative effects where a person has acted in contravention with the act by, for example, proceeding with an activity without the proper environmental authorisation.

all the key characteristics of a regional-based approach to CEA (see for example Clark, 1994; Dubé, 2003), and therefore offer excellent opportunities for the assessment and management of cumulative effects.

iv. *The use of CEA as a stand alone instrument / the undertaking of assessment with the primary aim of assessing cumulative effects* - The assessment of cumulative effects in South Africa is viewed as an integral component of other EA activities (see for example DEAT, 2004a). Although, Mitchell *et al* (2001), as well as DEAT (2004a and 2004f) acknowledge the existence of CEA as an independent instrument, they argue that this form of CEA is not feasible and/or desirable in the developing country context of South Africa, and is, for this reason, not supported.

### *3.2 Opportunities and shortcomings in the South African law and policy*

The most important shortcoming in the legislation and policy is the fact that 'cumulative thinking' has not yet become a *conscious* part of the requirements that guide the day-to-day environmental management activities. EA requirements in South Africa, both at the project and the strategic level, have not yet developed to a level where they can be expected to facilitate consistent or defensible treatment of cumulative effects in all assessments. To add to this, available guidance on CEA was, in the past, not linked to EA processes and requirements and was, as a consequence, not widely used by practitioners. A positive development in this regard is the newly published IEM information document on CEA (DEAT, 2004a), which firmly establishes CEA as a key part of IEM. This document is expected to have a relatively wide circulation under EA practitioners in the country, and will help to promote, especially, project-based approaches to CEA.

In terms of regional-based approaches, the analysis showed that new and emerging approaches to resource management in South Africa offer excellent opportunities to address cumulative effects, while they also have the potential to help solve the problem of data scarcity, which currently still hinders the effective consideration of cumulative effects. Again, however, the lack of a conscious linkage between these approaches and cumulative effects burdens their potential contribution. Furthermore, the potential of these approaches will only be realised once the necessary integration between resource management processes and EA activities is achieved (see Dubé, 2003).

## 4. Cumulative effects assessment in South African EA practice: overview of selected examples

### *4.1 Approach and methods*

A study of 25 EAs was undertaken to gain an overview of the treatment of cumulative effects in South African EA practice. The analysis served as preparatory work for an in-depth analysis of case studies, and facilitated the selection of cases for that analysis.

The 25 EAs covered activities ranging from industrial development, mining activities, and the construction or upgrading of transport infrastructure, to assessments prepared as part of local government planning processes, assessments related to the management of natural resources, and assessments related to conservation and tourism activities. These EAs were selected on the grounds of evidence that cumulative effects arose as a prominent issue somewhere in the course of the assessment or project. Within this selection of 25 EAs, a distinction can be made between assessments where the treatment of cumulative effects in the assessment satisfied all the parties involved (i.e. it was not challenged), and EAs where the lacking or inadequate assessment of cumulative effects had negative ramifications for the project.

The analysis of the 25 EAs explored several issues/characteristics of each assessment. This paper reports some of the findings related to the following five key issues:

1. The *context/approach* (as identified in the law and policy) *to which the assessments belonged*. The aim was to show if/how the different approaches to the issue in the law and policy, is reflected in practice.

The remaining issues aimed to characterise the understanding and treatment of cumulative effects in each case and analysed these against the background of the four approaches identified under the first issue.

2. *Understanding and interpretation of the concept of cumulative effects in the assessment.* The understanding of cumulative effects is widely accepted as a key factor that will determine their eventual treatment in an assessment. Each EA was therefore analysed to determine how the concept of cumulative effects was understood and interpreted.

3. *The introduction of cumulative effects as an issue in the assessment.* Information about how cumulative effects arose as an issue of concern in each case was included to develop a perspective of the factors that prompt practitioners to undertake assessments of cumulative effects as part of EA activities.
4. *The nature of activities included in the assessment of cumulative effects.* The aim with this issue was to provide information about how the understanding of cumulative effects influenced the actual undertaking of assessments. Distinction was made between assessments that included only related and/or activities of a similar nature in the assessment of cumulative effects, and assessments that also took dissimilar and/or unrelated activities into account.
5. *Performance of three main tasks involved in the assessment and management of cumulative effects.* This issue aimed to determine if three main tasks associated with the assessment of cumulative effects (i.e. identification of cumulative effects, assessment of cumulative effects, and the setting of effects within a framework of resources sustainability) was performed in assessments.

The combined results of the analyses of the 25 EAs, in terms of these five issues, are summarised in Table 1.

### *4.2 Discussion of selected findings and conclusions from practice*

#### *4.2.1Contexts/approaches to the treatment of cumulative effects*

Figure 1 presents the results of the analysis of the four contexts/approaches to cumulative effects (see 3.1), as reflected in the 25 EAs.

**Figure 1 Representation of four approaches to cumulative effects in the 25 EAs**

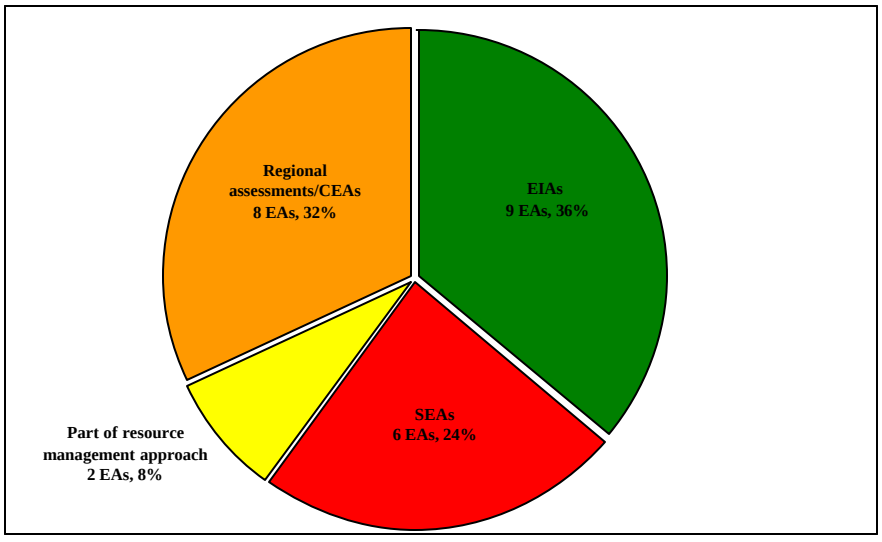


**Table 1 Selected characteristics of the 25 EAs, summarised according to their approac hes to the treatment of cumulative effects**

| | | | Understanding of cumulative effects | | | | How did cumulative effects arise | | | | Nature of development actions considered | | Treatment of cumulative effects | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Total** | Impacts of the development in combination with others tha t affect the same resources | The combined impacts of a defined combination of activities | The net effects of all activities in an area or resource boundary | The combined effects of different components of a project/ development | From the assessment team | Raised by authorities | Raised by the public | Other | Only similar and/or related activities | Various activities, including dissimilar activities | Cumulative effects identified | Cumulative effects assessed | Set against a framework of resource integrity and sustainability | Failed to identify or assess cumulative effects |
| Approaches | EIAs | **9** | 5 | 3 | | 1 | 3 | 6 | 4 | 2 | 4 | 5 | 7 | 6 | 3 | 2 |
| | SEAs | **6** | 2 | | 3 | 1 | 5 | 1 | 3 | | 3 | 4 | 6 | 5 | 3 | |
| | Part of resource management strategies | **2** | | 1 | 1 | | | 2 | 1 | | 1 | 1 | 2 | 2 | 2 | |
| | Regional assessments/ CEAs | **8** | | 3 | 4 | 1 | 7 | 6 | 1 | 2 | 3 | 4 | 7 | 6 | 7 | 1 |
| | **Total** | **25** | **7** | **7** | **8** | **3** | **16** | **15** | **9** | **4** | **11** | **14** | **22** | **19** | **15** | **3** |

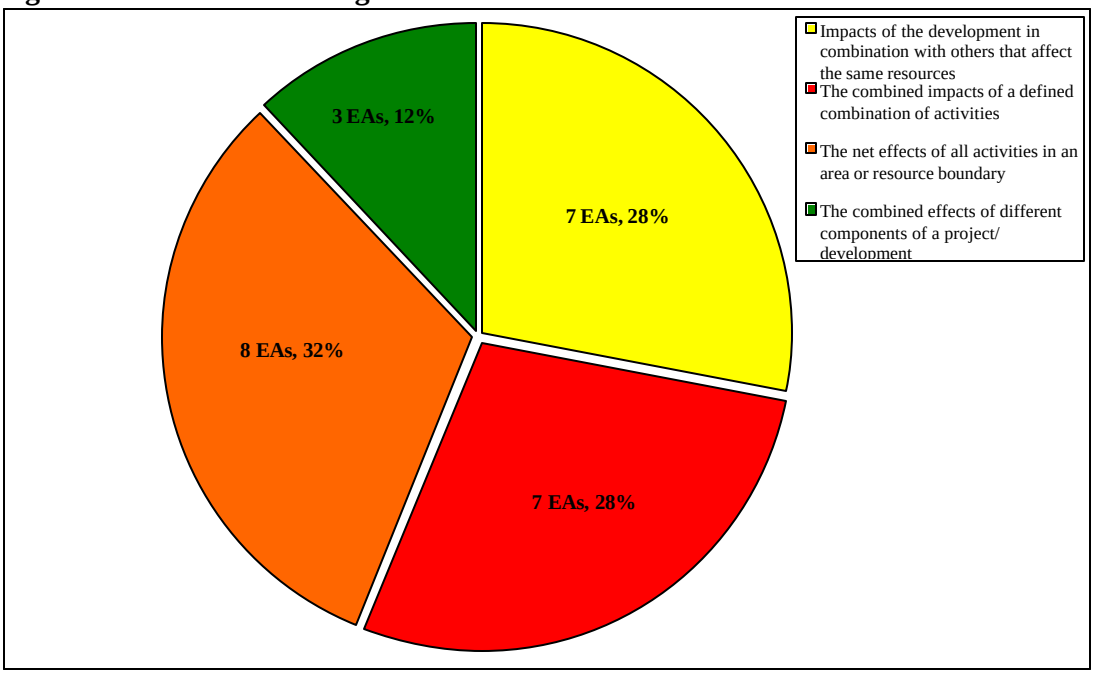
The most important finding from Figure 1 is that an unmistakable *tiered approach* to the assessment and management of cumulative effects is evident in practice. Whereas the South African law and policy emphasises SEA as the most appropriate instrument for dealing with cumulative effects, practice shows that cumulative effects arise, and need to be dealt with at all levels of decision making. An approach that consciously promotes SEA as *the* instrument to assess cumulative effects, creates the impression that its consideration in EIA is perhaps inappropriate or too difficult. This is in contradiction with current practice and will, over the longer term, be detrimental to the consideration of cumulative effects in development decision making.

A second important finding relates to the strong presence of assessments undertaken specifically to assess cumulative effects. This was ultimately regarded as an indication that the use of CEA as a stand alone instrument in the developing country context of South Africa, is perhaps less unfeasible than has been suggested in the past.

*4.2.2 Understanding of cumulative effects*

Four different understandings and interpretations of the concept of cumulative effects emerged from the 25 EAs. Although these understandings and interpretations are not entirely different or mutually exclusive, they vary in emphasis and can result in very different approaches to the undertaking of an assessment of cumulative effects.

**Figure 2 Four understandings of cumulative effects in the 25 EAs**



In seven of the assessments (Figure 2) (five EIAs and two SEAs), cumulative effects were understood to entail *the resultant effects when the impacts of a specific activity are combined with those of other activities that affect the same resources*. This interpretation of cumulative effects is in accord with the accepted definitions in the literature and is regarded as an accurate interpretation of the term. The greater representation of this understanding in EIAs is expected, as these assessments normally deal with single development actions, thus offering a natural situation for this view of cumulative effects to develop.

In seven further EAs (including three EIAs, three regional assessment/CEAs and one assessment related to resource management activities), the concept of cumulative effects was understood to entail *the combined effects of a predetermined combination of activities* (Figure 2). This interpretation of cumulative effects arose where assessments were concerned with a group of similar activities in an area, the introduction of an activity of which more examples already existed in an area, or where two similar or linked activities were planned simultaneously. Although this understanding of the concept is a logical conclusion in these and similar situations, it holds an inherent risk for misinterpretation, as it will be predisposed to place the emphasis on *activities* (rather than on the *affected resources*), and, as a result, will tend to consider only *some* combined effects (rather than the *net* effects on resources).

The third interpretation of the term was where cumulative effects were regarded as the *combined and net effect of all the activities in an area or resource boundary*. The eight EAs in which this view occurred all aimed to study specific areas or the sustainability of specific resources. Therefore, this interpretation of the concept followed almost as a natural conclusion of the context and nature of the assessment. This interpretation of cumulative effects conforms to the accepted understanding of cumulative effects and its underlying principles and is therefore regarded as an accurate interpretation of the concept.

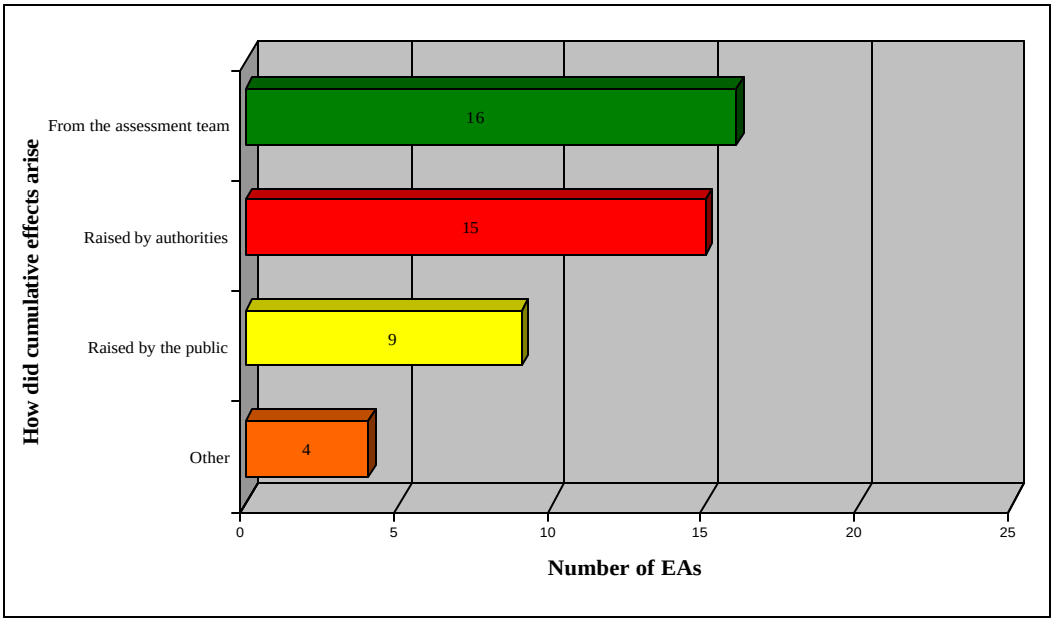
The fourth interpretation of the concept emerged from EAs (three in total) that dealt with complex developments that consisted of various, related components that were planned together and essentially formed part of the same development. In these cases,

the concept of cumulative effects was interpreted as *the sum of effects of all the different components or parts of the development*. The focus of this understanding on project components, rather than on resources, also holds an inherent risk for misinterpretation and holds potential limitations as a foundation for sustainable development.

*4.2.3 Emergence of cumulative effects as an issue in assessments*

The analysis showed that, in strategic level assessment, the developer and/or EA practitioner often plays the most important role in recognising the need to assess cumulative effects, while in EIA the inclusion of cumulative effects is a more direct result of requirements by authorities (see Figure 3). This finding may in part be ascribed to the fact that SEA is essentially still a voluntary process, while EIA is a regulatory process and is subject to review by authorities. However, it may also be regarded as evidence that the pro-active inclusion of cumulative effects, (as currently seen in some SEAs), is likely to disappear when SEA becomes a regulatory process and practitioners start to focus only on 'what is required'.

**Figure 3 Sources from which cumulative effects arose in the 25 EAs**



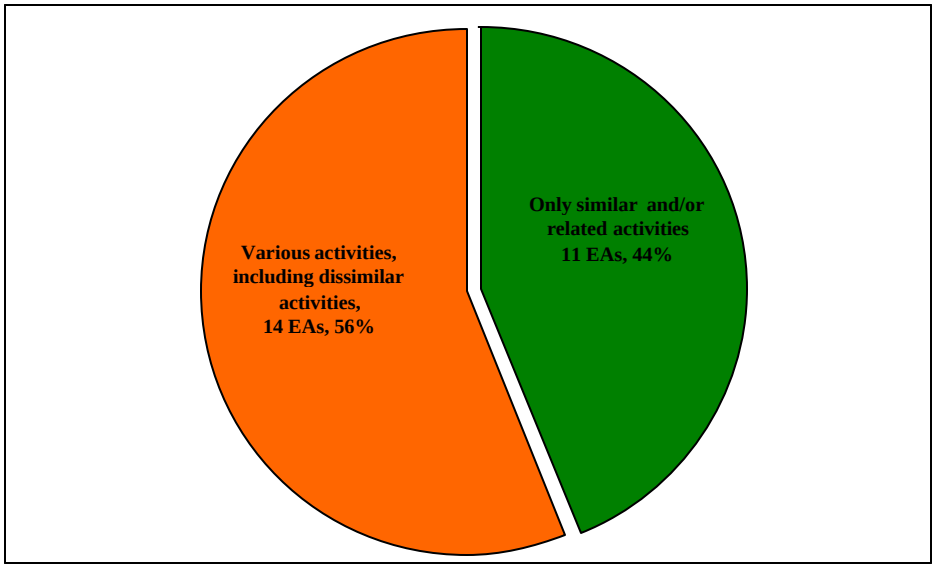

The most important finding, however, is the significant involvement of the public in cumulative effects issues. Especially at the project level (where public participation is a legal requirement) a number of the EAs (4 of the 9 EIAs) contain evidence that

cumulative issues became prominent as a direct result of pressure by members of the public. As public awareness of the concept of sustainability and its linkage with cumulative effects increases in the future, this role of the public can be expected to become more prominent. Even though this is regarded as a positive development, greater public awareness of this issue also holds a potential threat, i.e. cumulative effects has the potential to become an instrument of 'leverage' in legal action by the public and environmental groups who seek to stop 'unwanted' development. In at least two of the 25 EAs, conclusive evidence were found that the failure to assess cumulative effects, as raised by the public, played a key role in decisions by environmental authorities or the court to put a stop the proposed developments. Although, in these cases, the challenges only related to the failure to include these effects, it can be expected that, in future cases, more prominence will also be given to the 'adequacy' of assessments of cumulative effects.

*4.2.4 Nature of activities included in the assessment of cumulative effects*

In 11 of the EAs, the assessment of cumulative effects involved only activities that were directly related to one another and that were similar in nature (see Figure 4). These assessments were typically focused on the *impacts of a certain type of activity*, for example the combined effects of different parts of a pipeline or transport system on resources and local communities.

**Figure 4 Types of activities considered in the assessment of cumulative effects**



This approach was found to have a strong relationship with cases where the term cumulative effects were interpreted as either *the combined impacts of a predetermined combination of activities*, or the *combined effects of different components of a project/ development* (see also Figure 2).

On the other hand, assessments that were primarily concerned with *specific resources or study areas,* and that interpreted the term cumulative effects as either *the effects of an activity in combination with all other activities that affected the same resources*, or as the net *effects of all activities in a specific area or within a resource boundary* (see Figure 2), tended to include a wider range of different and unrelated activities in the consideration of potential cumulative effects. Examples of these assessments included assessments of the sustainability yield of water catchments, or studies undertaken to establish a strategic planning framework within a specific planning/administrative areas.

*4.2.5 Treatment of cumulative effects*

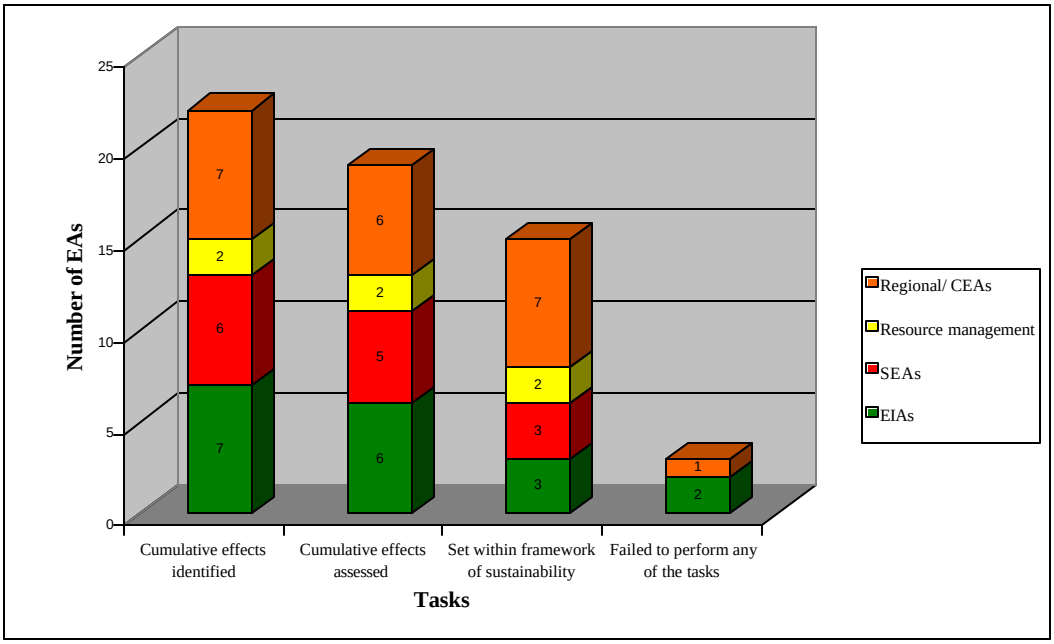
The last issue dealt with the treatment of cumulative effects in each of the 25 EAs and aimed to determine if three main tasks, namely the identification of cumulative effects, the assessment of cumulative effects and the setting of the effects within a framework of resource sustainability, were performed in each EA (see Figure 5).

The analysis showed that in 22 of the 25 EAs, cumulative effects were *identified*. The three remaining EAs, in which cumulative effects were not identified (the right hand bar in Figure 5), involved assessments included in the analysis specifically for the fact that their failure to consider cumulative effects had a negative influence on the eventual continuance and/or public acceptance of the project.

Out of the 22 EAs in which cumulative effects issues were identified, 19 took the subsequent step of performing an *assessment* of these effects. The methods, techniques and approaches that were followed in this assessment of cumulative effects, as well as the extent and depth, to which these effects were assessed, varied widely. However, these issues are not analysed here, as this forms part of the in-depth analysis of cases in the next phase of the research. Despite the clear decline from the first to the second tasks, the analysis showed that the four approaches to cumulative

effects were still equally well represented in the performance of this second task. It was therefore concluded that there existed no significant relationship between the undertaking of the task of assessing cumulative effects, and the approach to cumulative effects and/or level of assessment of the 25 EAs (see 4.2.1).

**Figure 5 Performance of three main tasks according to the approaches to cumulative effects**




A further decline is visible from the second to the third task (i.e. the setting of cumulative effects within a framework of resource sustainability, carrying capacity and/or sustainable development). This task was more consistently undertaken in strategic level assessments than in project level assessments. This could be ascribed to the fact that strategic level assessments lend themselves better to a holistic view and a sustainability approach than project level assessments. Furthermore, where project level assessment were usually driven by specific proposed activities, the strategic level assessments that formed part of this analysis were often concerned with large areas or with specific resources (see also 3.2(ii)), which facilitate the holistic thinking necessary for performing this task and are characteristic of regional-based approaches to CEA. It was therefore concluded that although the identification and assessment of cumulative effects is possible and readily achievable in project level assessment, regional-based approaches may often be necessary to facilitate the setting of these effects within a framework of resource sustainability.

## 5. Concluding remarks

In this paper the issue of cumulative effects was investigated in the developing country context of South Africa. The analytical overview presented in this paper showed that, although there is considerable scope for improvement, EA practitioners in South Africa are growing more attentive to the importance of cumulative environmental change and are increasingly including these effects in EA studies.

Analysis of the South African environmental law and policy showed that a shared commitment to sustainable development and a common focus on protecting the integrity of the country's resources serve as a stimulus for 'cumulative thinking', which materialises in both project-based and regional-based approaches to CEA. Despite certain shortcomings in these requirements, it was concluded that South African law and policy offer a strong basis to facilitate the improved consideration of cumulative effects.

An overview of 25 EAs from South African practice indicated that cumulative effects issues arise, and need to be dealt with, at all levels of assessment and decision making, but that a stronger *tiered approach* to cumulative effects in law and policy may be necessary to facilitate this. It was further concluded that an increased profile of cumulative effects issues can be expected in the future as public awareness increases and EA processes become more regulated. The analysis also showed that EA practitioners in South Africa often hold divergent views of what cumulative effects involve, and that these differences have a significant influence on the undertaking of assessments. Lastly, the analysis offered evidence that although cumulative effects are successfully identified and assessed at all levels of assessment, the setting of these effects within a framework of resource sustainability, may be best achieved in strategic level assessment and through regional-based approaches to CEA.

In the light of the evidence offered in this paper, it can be concluded that the paradigm shift necessary to be able to make cumulative effects an integral part of environmental assessment and management activities, has been made in South Africa. However, in order to achieve sustainable development and protect the integrity of the resources, EA practitioners, government institutions and decision makers will need to capitalise on the available opportunities and overcome many challenges that still burden the effective consideration of cumulative effects.

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