

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

7.1 General

LBMP is the most important source of marine pollution and it represents a real risk to sustainable development due to its social, economic and environmental impacts.¹⁹²⁹ LBMP is not a new environmental issue and various legal interventions have taken place over the last thirty five years at the international, regional and national level in an attempt to manage and regulate it.¹⁹³⁰ The international and regional approaches have been initially favoured, with the goal of assisting individual states in developing their own national regulatory instruments to address LBMP.¹⁹³¹ However, national regulation of LBMP continues to be a regulatory challenge, mainly due to the complex and cross-sectoral nature and scope of LBMP.¹⁹³² The sources of LBMP and the associated contributing factors are diverse, which makes their regulation inevitably complex and in some instances fragmented.¹⁹³³ The aim of this study was to conduct a critical analysis of the South African regulatory framework pertaining to LBMP in comparison with international best practice and the French regulatory framework in order to identify the key South African challenges in this regard and to make recommendations to address them. South Africa was selected because it has an opportunity to ensure pro-active regulation of future LBMP related to its future economic and social development over the next twenty years. The government has also demonstrated in 2008 its willingness to take the necessary regulatory interventions to address LBMP, with the development of the first edition of the *South Africa's National Programme for Action for Protection of the Marine Environment from Land-Based Activities (NPA)*. Unfortunately nothing has happened to this date and therefore this study could assist in the development

1929 See 1.2.1.

1930 See Appendix 1.

1931 See Appendix 1.

1932 See 2.2.

1933 See 2.3.

and implementation of such regulatory interventions. International best practice regarding LBMP management provides useful guidance regarding the development and implementation of a national regulatory framework to address LBMP,¹⁹³⁴ providing specific guidance on the regulatory characteristics and importance of key regulatory features, namely law principles, regulatory scope, regulatory objectives, regulatory instruments, national institutional structure, and regulatory priorities. This thesis argues that alignment with such international guidance should assist LBMP regulation at the national level. The international best practice and abovementioned regulatory features were used to develop a methodological framework¹⁹³⁵ to conduct the legal analysis of the South African and French regulatory frameworks pertaining to LBMP. It was decided to add France (including relevant EU law) within the scope of this comparative legal study to determine if regulatory lessons could be learnt from a country like France which has a long history in terms of LBMP regulation, especially in comparison with South Africa. France was also selected due its specific regulatory and institutional frameworks pertaining to environmental regulation, especially regarding water management, which were regarded as sophisticated and to some extent innovative.¹⁹³⁶

7.1.1 A definition of LBMP

The definition, scope and nature of LBMP are not always clear and uniformly approached and understood. There does not seem to be a commonly agreed definition of LBMP in international and regional legal frameworks.¹⁹³⁷ Based on a critical analysis of some of the main international and national definitions of LBMP and taking into consideration the existing South African environment law framework,¹⁹³⁸ the following definition for LBMP is therefore proposed:

1934 See 1.8, 2.3 and Appendix I.

1935 See Chapter 2, especially 2.3.

1936 See 1.8.

1937 See 2.1.

1938 See 2.1.

- (1) Any change in the marine and/or coastal environment directly or indirectly caused by any:
- a. substances;
 - b. radioactive or other waves;
 - c. noise, odours;
 - d. heat;
 - e. energy; or
 - f. any other factors (including contributing factors) generated by land-based activities
- (2) and where that change has or is likely to have adverse effects on the coastal and/or marine environment, associated living resources and marine life, human health, marine and coastal activities, including fishing; other legitimate uses of the coastal and marine environment; related amenities; and the suitability for use of sea water.

It is argued that such a definition provides a wide and comprehensive regulatory scope for LBMP regulation, which would include climate change¹⁹³⁹ and the introduction of alien species and GMOs as sources¹⁹⁴⁰ of LBMP, but which would exclude dumping at sea from vessels¹⁹⁴¹ and pollution from offshore facilities.¹⁹⁴² "Any other contributing factors" can refer, for example, to land-use, coastal urbanisation, habitat destruction, or dune degradation, which contribute to LBMP.¹⁹⁴³ "Any changes" is less limiting than the common reference to "the introduction of a substance",¹⁹⁴⁴ a formulation which is often used in the definition of pollution. The proposed definition would include erosion (which might not always be qualified as pollution) which is caused by land-based activities as a source of LBMP.

1939 See 2.1, 2.2 and 2.3.2.

1940 See 2.1, 2.2 and 2.3.2.

1941 See 2.1, 2.2 and 2.3.2.

1942 See 2.1, 2.2 and 2.3.2.

1943 See 2.1, 2.2 and 2.3.2.

1944 See 2.1, 2.2 and 2.3.2.

In South African law, the current definition of "pollution" given in the NEMA is comprehensive enough not to be an obstacle to the regulation of LBMP.¹⁹⁴⁵ However it might not cover the introduction of alien species and climate change as sources of LBMP. It might be useful and appropriate to include a definition of LBMP in the existing environmental regulatory framework, either in the NEMA, the NWA (preferably once the act has been amended to extend its regulatory scope to the coastal and marine waters) or the NEM:WA.

7.1.2 LBMP: a regulatory challenge

LBMP is a complex phenomenon which is influenced by different factors. The following elements should be considered in the design and implementation of a regulatory regime:

- The existing national environmental regulatory (including legal) and institutional framework;¹⁹⁴⁶
- direct and indirect sources of and factors that contribute to LBMP;¹⁹⁴⁷
- the location and nature of the sources of LBMP;¹⁹⁴⁸
- the point sources and non-point sources of LBMP;¹⁹⁴⁹
- the production, handling, use and disposal (especially) of substances involved in LBMP;¹⁹⁵⁰
- the transmission of pollution from one medium to another, e.g.: from fresh water or the atmosphere to marine waters;¹⁹⁵¹
- LBMP "pathways";
- the impacts associated with LBMP;¹⁹⁵²
- the prioritisation of actions in terms of the main pollutants, sources, and impacts;¹⁹⁵³

1945 See 2.1.1.

1946 See 2.3.5.

1947 See 2.2.

1948 See 2.2.

1949 See 2.2.

1950 See 2.2.2.

1951 See 2.2.

1952 See 2.2.3.

- influencing/contributory factors in terms of LBMP;¹⁹⁵⁴ and
- the identification and protection of particularly vulnerable marine ecosystems.¹⁹⁵⁵

This thesis argues that a good understanding and knowledge of the above elements will assist in the determination of the most suitable regulatory framework for LBMP. It is argued that the abovementioned elements will influence the scope, type and nature of the regulatory instruments to be developed and implemented to address LBMP from a national perspective. For example, the regulation of LBMP from point sources will not require the same regulatory approach as the regulation of LBMP from non-point sources.¹⁹⁵⁶

7.2 Key regulatory features: guidance derived from international best practice

Through an extensive legal review and a thorough legal analysis of international best practice related to LBMP management,¹⁹⁵⁷ it has been possible to identify key regulatory features of a regulatory framework pertaining to LBMP. International best practice provides specific guidance for each of its regulatory features, and such guidance has been used in assessing the French (including the European) and South African regulatory frameworks pertaining to LBMP regulation.

7.2.1 Law principles

In terms of international best practice in the context of LBMP regulation, certain principles are regarded as being conducive to the effective regulation and

1953 See 2.3.6.

1954 See 2.1.1.

1955 See 2.3.6.2.

1956 See 2.3.4.3.

1957 See 2.3.

management of LBMP and they should therefore be incorporated in the regulatory framework pertaining to LBMP.¹⁹⁵⁸ The following law principles have been identified as being the most important:

- General environmental law principles: the precautionary principle, integrated management, the polluter-pays principle, sustainable development, adaptive management, flexibility, measurability, the participative approach, equity, predictability, prevention, proportionality and accountability.
- Environmental law principles related to sustainable resources management: community-based natural resources management, the rational-equitable-efficient-sustainable use of natural resources, integrated river basin/watershed management, the integrated ecosystem-based approach, cost-integrated water resources management, multi-use management, and the integrated territorial approach.
- Specific environmental law principles related to coastal and marine management: integrated coastal area/zone management, the large marine ecosystem approach, and ocean-land-atmosphere connections.¹⁹⁵⁹

This thesis argues, based on guidance from international best practice, that the incorporation of these law principles in national environmental regulatory frameworks should assist LBMP regulation.

7.2.2 Regulatory scope

In the context of LBMP, the question of the extent of the regulatory scope depends on the determination of two main matters: where should the regulatory framework apply (the geographical scope), and, what should be regulated (the material scope)? This thesis supports the position that the determination of the regulatory scope will directly affect the effectiveness of the regulatory framework, especially of the regulatory instruments related to LBMP. It was therefore

1958 See 2.3.4.3.

1959 See 2.3.1.

important to determine the most suitable regulatory scope to facilitate effective LBMP regulation.¹⁹⁶⁰

In order to determine the geographical scope, the following matters needed to be ascertained: the geographical scope of the (marine/coastal) environment to be protected and its geographical delimitation,¹⁹⁶¹ and the geographical scope of the sources of LBMP pollution to be regulated.¹⁹⁶² Based on a consideration of international best practice,¹⁹⁶³ this thesis argues that the environment to be protected should include as a minimum the following components: the seashore; internal waters; relevant coastal watersheds/ catchments/river basins including watercourses (up to the fresh-water limit); territorial seas; the EEZ; estuaries; coastal lagoons; coastal wetlands; the sea-bed and the sub-soil of these waters; the environment (the living resources, ecosystems and such) associated with these marine and coastal areas, and if possible the high seas.¹⁹⁶⁴ In terms of the geographical scope of the sources of LBMP which should be regulated, all sources and contributing factors based on land within the state territory should be included, even if they are located far inland,¹⁹⁶⁵ but it is argued that it should not include LBMP from marine sources like activities from vessels (i.e. dumping at sea)¹⁹⁶⁶ or from offshore installations or other man-made structures at sea.¹⁹⁶⁷

Regarding the material scope, it is important to clarify the exact nature and extent of the LBMP sources which need to be regulated.¹⁹⁶⁸ Based on guidance from international best practice this thesis argues that direct and indirect sources, point and diffuse sources need to be regulated. The different types of sources of LBMP should include land-based activities, products, substances, emissions/ discharges, installations, activities, and other contributing factors (i.e. land-use

1960 See 2.3.2.

1961 See 2.3.2.1(a).

1962 See 2.3.2.1(b).

1963 See 2.3.2.

1964 See 2.3.2.

1965 2.3.2.2.

1966 2.3.2.3.

1967 See 2.3.2.2 and 2.3.2.3.

1968 See 2.3.2.3.

and climate change) which pollute or might contribute to the pollution and/or degradation of the coastal and marine environment.¹⁹⁶⁹ The pathways used by LBMP to reach the coastal and marine environment also need to be included in the regulatory scope, including air (atmospheric pollution), water (watercourses, groundwater, and storm-water) and man-made installations.¹⁹⁷⁰

7.2.3 Regulatory objectives

The regulatory objectives are important as they will influence the various regulatory features, especially the selection and design of the regulatory instruments to achieve such objectives.

In terms of LBMP, this thesis argues on the basis of a review of international best practice that there are four main types of regulatory objectives, which relate respectively to pollution management, environmental protection, the protection of human health and the management of the use of resources.¹⁹⁷¹ This thesis argues that land- and marine-based uses should be managed in an integrated way, as both of them represent pressures and impacts (including the generation of LBMP) which have the potential to have cumulative effects on the marine and coastal environment. This thesis argues that an environmental regulatory framework should encompass the abovementioned regulatory objectives, which should assist LBMP regulation.

7.2.4 Key regulatory instruments

The review and legal analysis of international best practice pertaining to LBMP regulation enabled the identification of key regulatory instruments commonly used to regulate LBMP. Such instruments can be categorised as direct or indirect instruments.¹⁹⁷² Direct regulatory instruments are the instruments which are

¹⁹⁶⁹ See 2.2.

¹⁹⁷⁰ See 2.2.

¹⁹⁷¹ See 2.3.3.

¹⁹⁷² See 2.3.4.

primarily aimed at the control and management of LBMP.¹⁹⁷³ Indirect regulatory instruments can be regarded as instruments in support of direct instruments, used to facilitate the regulation and management of LBMP.¹⁹⁷⁴ Direct and indirect regulatory instruments are not exclusive from each other. On the contrary, they are interdependent and should be combined in a regulatory framework pertaining to LBMP. In this context, international best practice advocates that the regulatory framework should implement the most efficient combination of direct and indirect regulatory instruments.¹⁹⁷⁵

Due to the cross-sectoral and multi-disciplinary character of LBMP regulation, a wide range of regulatory instruments and integrated tools needs to be incorporated in a legal framework.¹⁹⁷⁶ International best practice suggests that such incorporation should be conducted taking into consideration the current legal system in the country.¹⁹⁷⁷

7.2.4.1 Direct regulatory instruments

In accordance with international best practice, the effective regulation of LBMP requires the combination of three categories of direct regulatory instruments, namely instruments based on the resource-directed approach, instruments based on the sources-directed approach, and instruments based on planning management.¹⁹⁷⁸

The formulation of instruments based on the resource-directed approach entails using a regulatory approach based on marine environmental quality objectives and standards.¹⁹⁷⁹ Such an approach is primarily focused on the quality of water, biota or sediments that must be maintained for a desired level of quality and intended use. Such regulatory instruments might involve the determination of

1973 See 2.3.4.1.
1974 See 2.3.4.2.
1975 See 2.3.4.3.
1976 See 2.3.4.3.
1977 See 2.3.4.3.
1978 See 2.3.4.
1979 See 2.3.4.1.

quality objectives, standards based on current ambient quality, standards based on the dilution capacity/rate, loading allocation, ambient quality objectives, the determination of a classification system, a reserve and/or other similar instruments.

Instruments based on the sources-directed approach commonly strive to directly regulate pollution at source, and are especially relevant for point sources.¹⁹⁸⁰ Regulatory instruments based on the sources-directed approach might involve the development of technology-based standards like BAT, BEP, emissions standards, authorisations or permit processes for discharges, guidelines, codes of practice, technical standards, certification, product controls (phasing out, regulated specifications or use requirements), emission limits, bans or the phasing out of the use of substances, requirements for the discharge of effluent, and the creation of a list of priority substances and activities.

Finally, regulatory instruments based on planning management encompass specific planning tools which are aimed at regulating development, activities and uses of the environment (especially the coastal and marine environment) in order to regulate LBMP proactively.¹⁹⁸¹ Such regulatory instruments enable an approach to the management of particular land use, development and the protection of particular environments. Such an approach can be divided into three distinct sub-categories: (a) activity management, (b) use designation and management and (c) areas planning, which involves the implementation of coastal zone management, watershed or drainage basin planning, and the delimitation of specifically protected areas.

International best practice provides useful guidance regarding specific regulatory direct instruments which have been used in this thesis in the assessment of the French and South African regulatory frameworks.¹⁹⁸²

1980 See 2.3.4.1.

1981 See 2.3.4.1.

1982 See 2.3.4.

7.2.4.2 Indirect regulatory instruments

In terms of international best practice, the following indirect regulatory instruments are regarded as essential to support the effective regulation of LBMP, and this thesis argues that they need to be provided for in national regulatory frameworks pertaining to LBMP: ecological status assessment; monitoring programmes; data/information management (including research, reporting and notification); performance/effectiveness assessment; capacity building; enforcement and compliance; public participation; and financial management. All of these instruments are regarded as essential to support LBMP regulation, most commonly by providing the information necessary to facilitate informed decision making. International best practice provides specific guidance on the nature, functions and specificities of the identified key indirect regulatory instruments, which has been used in the assessment of the French and South African regulatory frameworks.¹⁹⁸³

7.2.5 Institutional structure

The phrase "institutional structure" refers to the various governmental/state institutions, national and sub-national, involved in the regulation of LBMP, including their interrelationships, taking into consideration their respective mandates, powers and functions. Considering the cross-sectoral nature of LBMP, the institutional structure has to be effectively integrated and co-operative governance is regarded as essential.¹⁹⁸⁴ International best practice does not provide detailed guidance on this matter, but suggests that a "national focal institution" would be preferable to undertake the overall responsibility in terms of LBMP management and regulation.¹⁹⁸⁵ The need for efficient, integrated and co-operative governance is also internationally recognised, especially at the

1983 See 2.3.4.2.

1984 See 2.3.5.

1985 See 2.3.5.

watershed/catchment level.¹⁹⁸⁶ The same is true of the need for the decentralisation of the operational functions in terms of LBMP to the municipal and/or local level (in a specific area like a bay). International best practice also advocates delegated/shared responsibilities and partnerships among government, civil society, the private sector and other key stakeholders, to facilitate the regulation of LBMP. Specific factors are recognised as having an influence on the most appropriate institutional structure, including financial constraints (affordability and financial capacity), institutional capacity constraints, a lack of institutional technical capacity, the need for clear agency mandates, the lack of agreed responsibility for the implementation of activities, the rationalisation/harmonisation of relevant legislation, the identification of jurisdictional overlaps, the resolution of statutory ambiguities, and compliance and enforcement capabilities.¹⁹⁸⁷

7.2.6 Regulatory priorities

In terms of international best practice, regulatory priorities (priority areas) in terms of LBMP should be determined, informing the development and implementation of the regulatory frameworks and more specifically the specific regulatory instruments. Regulatory priorities can encompass substances¹⁹⁸⁸ or activities¹⁹⁸⁹ which are identified as the main sources and/or contributing factors of LBMP or specific environments¹⁹⁹⁰ which most need protection from LBMP due to their localisation, environmental status or vulnerability to LBMP. International best practice provides specific guidance to determine such regulatory priorities.

7.3 Comparative analysis and the main findings

7.3.1 The state of LBMP in France and South Africa

1986 See 2.3.5.

1987 See 2.3.5.

1988 See 2.3.6.

1989 See 2.3.6.

1990 See 2.3.6.

Both France and South Africa are currently experiencing LBMP.¹⁹⁹¹ However, France has been significantly more affected by historic LBMP than South Africa, especially in the Mediterranean Sea.¹⁹⁹² In the South African context, the following main sources of LBMP have been identified: climate change, freshwater abstraction and flow modification, municipal and industrial wastewater, the refining of oil, mining, the generation of power, agricultural activities, urban storm-water, the operation of ports and harbours and off-road vehicles, solid waste disposal, atmospheric deposition, the introduction of alien vegetation, the harvesting of living resources, aquaculture, and the operation of fish processing plants, pulp and paper mills, fertiliser plants, petroleum refineries, fruit and vegetable processing plants, textile mills and aluminium production plants.¹⁹⁹³ By international standards the current state of the coastal and marine waters resource around South Africa is considered to have very low levels of pollution.¹⁹⁹⁴ However, considering the potential increase of LBMP over the next twenty years, which will mainly be related to the country's social and economic development,¹⁹⁹⁵ this thesis argues that if the current environmental regulatory framework does not regulate LBMP effectively, the pollution and disturbance of the coastal and marine degradation might go beyond the adaptive and assimilative capacity of the coastal and marine environment. Such a situation could jeopardise sustainable development in the country.

A consequence of the current state of LBMP in France is that the French approach might be regarded as more reactive than the South African one in that most sources of LBMP in France have already impacted on the environment and therefore existing LBMP and associated impacts need to be managed and remediated. While this might also be the case (to a lesser extent) in the South African approach, it is anticipated that the current state of development (social

1991 See 2.4.

1992 See 2.4.2 and 3.1.

1993 See 2.4.1.

1994 See 2.4.1.

1995 See 5.1.2 and 5.1.3.

and economic) of South Africa is going to generate new sources of LBMP or increase the quantity of existing LBMP. Planning-based regulatory instruments are therefore going to be important to assist in the proactive regulation of LBMP.

In France, the *Code de l'environnement* contains the main legal provisions relevant to LBMP regulation. Of particular importance are the statutes related to water and littoral management. In the South African context four key statutes, namely the NEMA, the NEM:WA, the NEM:ICMA and the NWA, have been identified as being the most relevant in the context of LBMP regulation.

7.3.2 Law principles

Both the French and the South African¹⁹⁹⁶ regulatory or policy frameworks incorporate most of the law principles advocated by international best practice in this context. The main difference is that in France most of the law principles are embedded in the legislation (the *Code de l'environnement*)¹⁹⁹⁷ whereas in South Africa most of them are encompassed only in the policy framework, not in the regulatory framework.¹⁹⁹⁸ It is submitted that the fact that these principles are integrated only in policy documents might limit their legal status and effects such as enforceability. Although this is not regarded as a major deficiency in the South African regulatory framework, it is recommended that all of the law principles be incorporated in the NEMA or other relevant statutes like the NWA and the NEM:ICMA, to give them a higher legal status.

7.3.3 Regulatory scope

In terms of the analysis conducted in this thesis, the regulatory scope of the French (and European) regulatory framework¹⁹⁹⁹ is regarded as comprehensive and mostly aligned with international best practice regarding LBMP regulation. This study demonstrates that the French regulatory scope encompasses all land-

1996 See 3.3.1 for France and 5.2 for South Africa.

1997 See 3.3.1.

1998 See 5.2.

1999 See 3.3 for France and 4.2 for the EU.

based sources of pollution, including contributory factors, with a focus on development and activities on the littoral.²⁰⁰⁰ The overall geographic scope of the environment to be protected against LBMP encompasses basin districts, the sea-shore, the littoral, internal waters, wetlands, estuaries and the territorial seas.²⁰⁰¹ The fact that the exclusive economic zone and high seas are excluded from the scope can be regarded as a limitation of the regulatory regime, as in terms of international best practice a larger marine geographical scope is recommended to ensure the coherent protection of the coastal and marine environment from LBMP.²⁰⁰²

It is argued here that the regulatory scope of the South African framework is not as comprehensive as the French, and is not aligned with international best practice regarding LBMP regulation.²⁰⁰³ The South African regulatory framework presents some limitations and inconsistencies which can affect LBMP regulation. The regulatory scope of the NWA (which is restricted to the protection of water resources, excluding most coastal and marine waters) is one of the major limiting factors of the regime, especially in terms of the resource-directed instruments (the reserve, the classification system and the water quality objectives) that it prescribes.²⁰⁰⁴ Such an approach is also not conducive to integrated water management, which should take into consideration the essential interdependence between fresh/inland waters and coastal/marine waters.²⁰⁰⁵ The fact that coastal and marine waters are not included in the scope of the NWA is regarded as a critical regulatory gap in the attempt to ensure effective LBMP regulation in South Africa.²⁰⁰⁶

The imprecise regulatory scope of the NEMA and the NEM:WA is also regarded as a limiting factor, as the way in which they (and their associated regulatory

2000 See 3.3.2.

2001 See 3.3.2 and 4.2.

2002 See 2.3.2.

2003 See 5.2.

2004 See 5.3.1.2.

2005 See 2.3.2.

2006 See 5.8.2.

instruments) apply to the coastal and marine environment is currently not completely clear. This is regarded as a potential regulatory gap.²⁰⁰⁷ Most of the provisions of the NEM:ICMA are limited to the protection of the coastal waters, which excludes the EEZ. This exclusion is not aligned with international best practice. Then the regulated land-based activities in terms of the NEM:ICMA are limited to those taking place on the coastal zone rather than including all of the land-based activities which might affect the coastal zone.

This thesis also argues that the legal discrepancies between the respective regulatory scope of the NEM:ICMA and the NWA in terms of estuaries and coastal wetlands (which are included to some extent in the regulatory scope of both acts) might also impair LBMP regulation. Certainly, the separation between the legal regimes established by the NWA and the NEM:ICMA is not conducive to integrated water resources management.

This thesis argues that the existence of two parallel legal regimes regarding pollution management for inland/fresh and coastal/marine waters impairs the effective regulation of LBMP.

7.3.4 Regulatory objectives

Both the French and the South African²⁰⁰⁸ regulatory frameworks set out objectives which are aligned with international best practice, including pollution management (proactive or reactive), environmental protection, the protection of human health, and the management of the uses of marine, coastal and terrestrial natural resources. This research argues that the South African framework seems

2007 See 5.2.

2008 See 3.3.3 for France, 4.2 for the EU and 5.2 for South Africa.

to place more emphasis on the protection of human health from pollution, including LBMP, than the French system, especially according to the definition of pollution prescribed by the NEMA. It is submitted that the South African regulatory approach is more anthropocentric than the French one. This might impair effective regulation of LBMP which, according to international best practice, requires the implementation of an effective ecosystem-based approach.²⁰⁰⁹ This thesis argues that a too anthropocentric regulatory approach might not enable the sustainable use and protection of the coastal and marine environment from LBMP.

While both regulatory frameworks refer to uses management,²⁰¹⁰ it is submitted that their regulatory instruments, especially with respect to planning management, do not always address the issue coherently. The management of the uses of the environment is a challenge, and different approaches are possible.²⁰¹¹ It is argued in accordance with the legal analysis conducted for this thesis that the regulatory frameworks in terms of LBMP should assist in the identification of the legitimate uses of natural resources and in the sustainable management of such uses, and should give guidance on the prioritisation and arbitrage between legitimate uses,²⁰¹² having the ultimate goal of sustainable development.²⁰¹³ In this context, the French environmental law refers to the need to maintain an "ecological equilibrium".²⁰¹⁴

It is also important to note that the French regulatory framework strives to valorise the water resource as an economic resource.²⁰¹⁵ This is regarded as a sophisticated approach which could assist LBMP regulation, especially the management of use (taking into consideration the economic aspects of the uses and the natural resources used).

2009 See 2.3.1.

2010 See 3.3.3 for France, 4.2 for the EU and 5.2 for South Africa.

2011 See 2.3.4.1(e).

2012 See 2.3.4.1(e) and 2.5.

2013 See 2.3.4.1(e).

2014 See 3.2.

2015 See 3.3.

7.3.5 Key regulatory instruments

7.3.5.1 Key direct regulatory instruments

a. Resource-directed instruments

Most of the key regulatory instruments based on the resource-directed approach provided by the French regulatory framework pertaining to LBMP regulation are a direct transposition of those provided by EU environmental law, mainly the WFD and the MSFD, including the requirements to set water quality objectives or standards and the determination of good environmental status.²⁰¹⁶ The SDAGE, which is one of the key French regulatory instruments,²⁰¹⁷ sets the environmental objectives and potentially the environmental standards for each river basin. In the context of the resource-directed approach, it is important to note that the *Code de l'environnement* recognises the economic and financial value of the water resource,²⁰¹⁸ recognising it as an economic asset. This is regarded as an important element for effective water protection and management. The resource-directed instruments provided by the French regulatory framework (as prescribed by European law) are regarded as comprehensive, as they include in their scope inland and coastal waters,²⁰¹⁹ and to some extent marine waters.²⁰²⁰ The legal analysis conducted for this research supports the position that such instruments are aligned with international best practice and therefore should assist LBMP regulation.

The South African situation is not as satisfactory. The resource-directed instruments prescribed by the NWA, namely the classification system, the setting of quality objectives and of the reserve,²⁰²¹ are considered as comprehensive and as being aligned with guidance from international best practice. Unfortunately,

2016 See 4.3.1.1.

2017 See 3.6.3.

2018 See 3.3.

2019 See 4.3.1 and 3.4.1.

2020 See 4.3.1 and 3.4.1.

2021 See 5.3.1.

their relevance in terms of LBMP regulation is very limited, as they are aimed only at protecting freshwaters, and to some extent estuaries and coastal wetlands.²⁰²² Therefore such instruments only have to take into consideration the ecological and users' requirements of the water resources (mainly freshwaters resources). The ecological and users' requirements related to coastal and marine waters are not considered when developing such resource-directed instruments, even if the coastal and marine waters are the ultimate recipients of all rivers, coastal run-off and most stormwaters and their associated pollution. Therefore, most of the coastal and marine waters are not protected by the resource-directed regulatory instruments prescribed by the NWA. Moreover, the NEM:ICMA does not prescribe resource-directed instruments for coastal and/or marine waters, despite the fact that it regulates the protection of the coastal zone and the discharge of effluents into the coastal environment.²⁰²³

The lack of resource-directed instruments for the coastal and marine waters resource is regarded as one of the main weaknesses (and as a regulatory gap) in the current South African regulatory framework for LBMP.

The resources-directed instruments prescribed by the NWA could, if their scope were extended to the marine and coastal waters, be very useful for LBMP regulation. However, the legal status of the classification system and water resource quality objectives is limited.²⁰²⁴ This is regarded as a weakness of the regulatory regime. Moreover, according to the latest draft regulations regarding the water resource objectives, it seems that they will mainly consider water users requirements and not the resource requirements.²⁰²⁵ This is also regarded as a considerable regulatory limitation of the effectiveness of such instruments, considerably diverging from an ecosystem-based regulatory approach.

2022 See 5.3.1.2.

2023 See 5.3.1.2(c) and 5.3.2.3.

2024 See 5.3.1.2(a).

2025 See 5.3.1.2(b).

In this context, guidance could be used from the resource-directed instruments of the French and European system to improve the South African regulatory framework.

b. Sources-directed instruments

France has developed various sources-directed instruments which are relevant for LBMP regulation. The first is a set of general sources-directed requirements prescribed by French water law.²⁰²⁶ Then specific sources-directed instruments are also prescribed by the basin district's programme of measures, contained in a SDAGE (also categorised as an integrated regulatory instrument).²⁰²⁷ Such a programme is similar to the programme of measures prescribed by the WFD.²⁰²⁸ A SAGE might also contain sources-directed measures.²⁰²⁹ A programme of measures prescribes various sources-directed instruments to achieve the objectives set out in a SDAGE. It enables a focused and customised regulatory approach and the development of specific sources-directed instruments aimed at addressing the priorities in the basin. A programme of measures contains two main types of measures (which in the context of this research may be qualified as regulatory instruments), namely fundamental/basic and supplementary/complementary measures.²⁰³⁰

The *Code de l'environnement* also prescribes specific sources-directed requirements to regulate the impacts on water resources of specific products, activities and sectors, including dangerous substances, effluents, sludge treatments and use, agriculture, oil, lubricants, detergents, fertilisers and nitrates, and listed activities.²⁰³¹ Such instruments and measures include the prohibition of use; use and/or sale restrictions; specific technical requirements (proactive and

2026 See 3.4.2.1.

2027 See 3.4.2.2.

2028 See 4.2.1.2(a).

2029 See 3.6.4.

2030 See 3.4.2.2 and 4.3.1.2.

2031 See 2.3.4.3.

reactive); and the regulation of activities (specific standards/criteria). This is a regulatory approach aligned with guidance from international best practice.²⁰³²

Another important sources-directed regulatory instrument in this context is the national programme of action against water pollution from certain dangerous substances (*Programme national d'action contre la pollution des milieux aquatiques par certaines substances dangereuses*)²⁰³³ which is aimed at preventing, minimising, and eliminating water pollution from identified dangerous substances. This approach is aligned with the European regulatory approach²⁰³⁴ and international best practice.²⁰³⁵

Specific sources-directed instruments are also prescribed regarding pollution, including LBMP, from agriculture related activities.²⁰³⁶ Such instruments are aligned with the provisions of the Nitrates Directive.²⁰³⁷ The development of a voluntary code of conduct for sustainable agricultural practices associated with financial incentives is regarded as an innovative regulatory approach which might be useful in the South African context.

In the context of European law, the combined approach²⁰³⁸ and the determination of priority substances and associated sources-directed measures²⁰³⁹ are regarded as two comprehensive sources-directed instruments aligned with guidance from international best practice. They may be useful in the South African context.

It is not the lack of South African sources-directed instruments which poses a problem, but rather the fact that they are not coordinated and integrated.²⁰⁴⁰ The existence of two legal regimes to regulate effluents and their respective

2032 See 3.4.2.1.
2033 See 3.4.2.3.
2034 See 4.3.1.1(c) and (d).
2035 See 2.3.4.1.
2036 See 3.8.2.
2037 See 4.6.3.
2038 See 4.3.1.2(c).
2039 See 4.3.1.2(d).
2040 See 5.3.2 and 5.8.4.

associated sources-directed instruments, one to be found in the NWA and the other in the NEM:ICMA, affects the integrated and ecosystem-based management of water resources including coastal/marine waters, and it is regarded as a limitation in terms of LBMP regulation.²⁰⁴¹ The discrepancies in terms of BAT, BEP, BPEO and other similar regulatory approaches in South Africa also create challenges for effective LBMP regulation and, more generally, integrated pollution management.²⁰⁴² The lack of integrated and binding water pollution standards and minimum requirements for pollution management is also considered as a weakness in the LBMP regulatory framework.²⁰⁴³ The fact there is only a (non-binding) policy for the disposal of land-derived water containing waste to the marine environment is also regarded as a limitation.²⁰⁴⁴ The sources-directed measures from sectoral statutes are also not always comprehensive and effective in terms of pollution management, including LBMP, as they adopt a very anthropocentric approach and are not primarily aimed at pollution prevention.²⁰⁴⁵ The different levels and types of "duty of care" and associated sources-directed regulatory requirements might also impair cohesive and uniform water pollution management.²⁰⁴⁶

Most of the specific sources-directed instruments are included in water licences, EIAs and other environmental authorisations. While such a regulatory approach creates flexibility and enables customised regulation, it is argued that it also creates an unpredictable and inconsistent approach towards sources-directed instruments. It is suggested that this approach should be additional and complementary to more general, predictable and uniform sources-directed regulatory instruments aimed at implementing integrated pollution prevention and control.

2041 See 5.3.3 especially 5.3.2.3.

2042 See 5.3.2.1.

2043 See 5.3.2.

2044 See 5.3.2.4.

2045 See Chapter 6.

2046 See 5.5.1.

Waste-related legislation can assist LBMP regulation,²⁰⁴⁷ but it is argued that the current legal assimilation in South Africa of waste and pollution is not effective.²⁰⁴⁸ It is submitted that a regulatory approach focusing on waste instead of pollution is too limiting, especially in the context of LBMP regulation, as not all sources of LBMP will be waste or due to waste-related activities. More generally, it is argued that the lack of a general pollution legal regime implementing the integrated pollution prevention and control regulatory approach impairs effective LBMP regulation.

c. Planning management instruments

Through this legal analysis, it appears that France²⁰⁴⁹ (and the EU)²⁰⁵⁰ has placed significant emphasis on the development of planning management instruments relevant to LBMP regulation. Of specific importance are the planning principles for coastal development,²⁰⁵¹ the marine eco-region and marine strategies,²⁰⁵² the *Schémas de mise en valeur de la Mer*,²⁰⁵³ which strives to manage marine and coastal waters use, the implementation of coastal zone management,²⁰⁵⁴ the basin districts approach,²⁰⁵⁵ the policy and strategy of the *conservatoire des espaces du littoral et des rivages lacustres*²⁰⁵⁶ which is aimed at protecting and facilitating the sustainable development of the French coastal zone, the littoral, and the use of traditional planning and zoning instruments.

The South African planning management instruments are regarded as comprehensive and the latest legal development in terms of the coastal zone as prescribed by the NEM:ICMA are regarded as being progressive, especially in

2047 See 5.3.2.5, 5.5.5, 5.5.6, 5.5.7 and 6.3.3.6.

2048 See 5.8.3.

2049 See 3.4.3.

2050 See 4.3.1.3.

2051 See 3.4.3.1 and 3.4.3.4.

2052 See 4.3.1 3(c).

2053 Valorisation scheme for the sea, see 3.4.3.3.

2054 See 3.4.3.1.

2055 See 3.4.3.2.

2056 See 3.4.3.5.

the context of LBMP and development on the coastal zone.²⁰⁵⁷ However, the planning management instruments are fragmented and sectoral and there might be too many of them which brings complexity.²⁰⁵⁸ For example, the existence of the different levels of assessment for EIA, in terms of the NEMA, the NEM:ICMA and the NEM:WA might adversely influence effective and integrated environmental management and complicate unnecessarily the legal framework.²⁰⁵⁹ The coastal zoning schemes²⁰⁶⁰ and set-back lines²⁰⁶¹ are a progressive legal development, as is the implementation of coastal integrated management²⁰⁶² and catchment areas management.²⁰⁶³ However, it is suggested that in South Africa a more integrated approach is necessary between sectoral planning instruments (water and coastal) and traditional planning instruments²⁰⁶⁴ (the IDPs and others). It is argued that most sectoral planning instruments should be integrated in the relevant main municipal and provincial planning documents. There is also a need to create a legal hierarchy between all of the planning instruments.²⁰⁶⁵

7.3.5.2 *Indirect regulatory instruments*

a. Assessment of ecological status, monitoring and information management

Under the influence of the requirements of the EU Law, France has conducted a comprehensive assessment of the ecological status of the marine and coastal environment.²⁰⁶⁶ Since 1999 South Africa has also been undertaking a comprehensive assessment of the ecological status for the environment as a whole, under the SOER.²⁰⁶⁷ However, it seems that such instruments could be

2057 See 5.3.3. especially 5.3.3.2(d).

2058 See 5.3.3 and 5.8.4.

2059 See 5.3.3.1(a),(b) and (c).

2060 See 5.3.3.1(j) and 5.3.3.2(b).

2061 See 5.3.3.1(j) and 5.3.3.2(b).

2062 See 5.3.3.2(d).

2063 See 5.3.3.2(c).

2064 See 5.3.3.2(e),(f) and (h).

2065 See 5.3.3 and 5.8.4.

2066 See 3.5.1.

2067 See 5.4.1.

improved in both countries. South Africa in particular needs to continue its efforts in developing and updating an ecological assessment in terms of coastal and marine environment. In terms of monitoring and information management, France has developed various (general and focused) marine and coastal-related monitoring programmes in terms of environment and substances.²⁰⁶⁸ However, it seems that there is a lack of a comprehensive national monitoring programme. South Africa has some *ad-hoc* monitoring programmes, but there does not seem to be a rationalised and uniform approach to coastal and marine monitoring in South Africa.²⁰⁶⁹ There is a lack of data and information on the marine and coastal areas, especially in terms of pollution. Financial and skills constraints might be the cause of the situation.²⁰⁷⁰

b. Effectiveness assessment

In the French and especially the European context, strong emphasis is placed on effectiveness assessment and associated corrective measures.²⁰⁷¹ In regard to the assessment of the effectiveness of regulatory instruments, programmes and measures, the South African regulatory framework prescribes sectoral and fragmented effectiveness assessment instruments and they are not regarded as very effective.²⁰⁷² The instruments are not very detailed on the indicators, process and components of the effectiveness assessments. The requirements do not always address the way forward to address the outcomes of the effectiveness assessment.

This thesis argues that the French and European tools could provide guidance for the establishment of such an assessment regime to be implemented in a cost-effective manner by the different governmental levels in South Africa.²⁰⁷³

2068 See 3.5.1.

2069 See 5.4.1.

2070 See 5.4.1.

2071 See 3.5.2 and 4.3.2.4.

2072 See 5.4.2.

2073 See 4.3.2.4.

c. Financial management

The French regulatory framework prescribes comprehensive financial instruments.²⁰⁷⁴ Comprehensive financial management measures are often integrated in other regulatory instruments, especially in combined and/or integrated instruments.²⁰⁷⁵ Financial planning instruments have a predominant place in the French regulatory framework.²⁰⁷⁶ Such a regulatory approach could assist in improving the South African framework. The South African financial management instruments having to do with pollution management, water management, and/or coastal management are limited and not very comprehensive.²⁰⁷⁷ This is regarded as a major weakness of the South African regulatory framework relating to LBMP pollution, especially in terms of budgeting, investment strategy and deployment of resources.

d. Enforcement and compliance

In terms of enforcement and compliance, the French approach seems to be more streamlined.²⁰⁷⁸ Various entities in different governmental spheres have enforcement powers.²⁰⁷⁹ The French approach also appears to be fairly sophisticated.²⁰⁸⁰ In the South African context, efforts have recently been undertaken to improve environmental compliance and enforcement.²⁰⁸¹ Unfortunately the current situation is regarded as a limitation to effective LBMP regulation.²⁰⁸² The current state of environmental compliance and enforcement is one of the main regulatory challenges which impairs LBMP regulation.²⁰⁸³

e. Public participation and capacity building

2074 See 3.5.2.
2075 See 3.5.2 and 3.6.
2076 See 3.5.2.
2077 See 5.4.3.
2078 See 3.5.4.
2079 See 3.5.4.
2080 See 3.5.4.
2081 See 5.4.5.
2082 See 5.4.5.
2083 See 5.4.5.

Both France²⁰⁸⁴ and South Africa²⁰⁸⁵ prescribe public participation requirements, mainly through the development process of regulatory instruments like the SGAGE,²⁰⁸⁶ SAGE,²⁰⁸⁷ declaration of priority waste the NWRS, the CMS, the coastal management programmes, the NWMS, during which stakeholders comments are invited and considered.²⁰⁸⁸ The EIA,²⁰⁸⁹ water nomenclature²⁰⁹⁰ and *installations classées*²⁰⁹¹ legal regimes also prescribe public participation in the authorisation process. However only South Africa addresses capacity building²⁰⁹² in its regulatory framework, but on an *ad-hoc* basis.

7.3.5.3 Integrated and combined regulatory instruments

In the South African context, the integrated regulatory instruments (i.e. the duty of care,²⁰⁹³ the NWRS,²⁰⁹⁴ catchment management strategies,²⁰⁹⁵ coastal management programmes,²⁰⁹⁶ the NWMS,²⁰⁹⁷ the IWMP,²⁰⁹⁸ and the industrial waste management plans)²⁰⁹⁹ are regarded as comprehensive and innovative.²¹⁰⁰ However, once again the approach is fragmented, a fact which challenges integrated pollution management, including LBMP regulation.²¹⁰¹ Moreover, the limited legal status of such instruments is regarded as a weakness which impairs their effectiveness and relevance.²¹⁰²

2084 See 3.5.5.
 2085 See 5.4.4.
 2086 See 3.6.3.
 2087 See 3.6.3.
 2088 See 5.4.4.
 2089 See 5.3.3.1.
 2090 See 3.6.1.
 2091 See 3.6.2.
 2092 See 5.4.4.
 2093 See 5.5.1.
 2094 See 5.5.2.
 2095 See 5.5.3.
 2096 See 5.5.4.
 2097 See 5.5.5.
 2098 See 5.5.6.
 2099 See 5.5.7.
 2100 See 5.5.
 2101 See 5.8.
 2102 See 5.8.

The particularity of the French and European approach resides in the combined instruments (the water nomenclature and the EU combined approach)²¹⁰³ and the integrated instruments (SDAGE, SAGE, *Contrats de baies* and other quasi-contracts)²¹⁰⁴ which are regarded as coherent and comprehensive regulatory instruments to facilitate LBMP regulation. The programme of measures in terms of the MSFD, which includes input controls, output controls, spatial and temporal distribution controls, management coordination measures, economic instruments; mitigation and remediation tools; provisions relating to communication, stakeholder involvement and raising public awareness, is regarded as a innovative integrated regulatory instrument.²¹⁰⁵ Such instruments should guide the amendment and improvement of the South African regulatory instruments.

7.3.6 Institutional structure

Both the French and the South African institutional structures are regarded as fragmented.²¹⁰⁶ However, France seems to have recently implemented various changes and instruments to facilitate co-operative governance and decentralisation.²¹⁰⁷ In terms of the South African institutional structure,²¹⁰⁸ the main challenges seem to be co-operative governance,²¹⁰⁹ insufficient human capacity,²¹¹⁰ and the lack of decentralisation and effective delegation.²¹¹¹

7.3.7 Regulatory priorities

Both France and South Africa have identified their respective regulatory priorities.²¹¹² However, France seems to have various dedicated sectoral

2103 See 3.6 and 4.3.1.2.

2104 See 3.6.

2105 See 4.3.1.2(b).

2106 See 3.7 and 5.6.

2107 See 3.7.

2108 See 5.6.1.

2109 See 5.6.2.

2110 See 5.6.3.

2111 See 5.6.3.

2112 See 3.8 and Chapter 6.

regulatory instruments to address its regulatory priorities.²¹¹³ The South African sectoral regulatory approach does not seem to be as comprehensive. Most of the sectoral statutes are not really aimed at regulating pollution from such sectoral activities. They only do so in an indirect, incidental and/or *ad-hoc* manner. They also have a very anthropocentric regulatory approach. Therefore not all of them provide assistance in the regulation of LBMP from such sources.²¹¹⁴

7.4 Recommendations for South Africa

In the light of the foregoing, this study proposes the following short, medium and long-term strategies to improve the existing South African environmental regulatory framework with respect to LBMP.

7.4.1 Short and medium-term strategies

7.4.1.1 *Incorporation of the law principles advocated by international best practice*

- All of the law principles identified by international best practice in terms of LBMP regulation²¹¹⁵ should be incorporated in the South African regulatory framework, mainly in the NEMA, NWA and NEM:ICMA.
- The ecosystem-based approach should be better incorporated in the overall environmental legal framework and should guide the

2113 See 3.8.

2114 See Chapter 6.

2115 See 2.3.1.

implementation of environmental law in South Africa to balance the current anthropocentric regulatory approach.

- The practical and effective implementation of the polluter-pays principle, which is already incorporated into the NEMA, should be effectively implemented and operationalised, especially in terms of pollution and the use of natural resources.
- Community-based natural resources management should also be efficiently operationalised, as this could assist in the management of LBMP arising from specific community-based coastal activities and/or in sensitive coastal environments.
- The law principles related to financial management are essential components of the regulatory regime and should be incorporated into the environmental legal framework. Of specific importance is the principle of cost-integrated water resources management. The lack of provisions relating to the financial aspects of LBMP regulation is one of the great weaknesses of the South African regulatory framework.
- The law principles related to sustainable resources management, namely the rational-equitable-efficient-sustainable use of natural resources, integrated river basin/watershed management, and the integrated territorial approach, also need to be integrated and operationalised.
- The principle of land-ocean-atmosphere connections needs to be integrated into the regulatory framework.²¹¹⁶
- All of the recommended principles should be effectively operationalised, ensuring that they are integrated and implemented into the environmental decision-making process and regulatory instruments.

7.4.1.2 Adjustment of the regulatory scope

²¹¹⁶ For a definition of each of them refer to 2.3.1.

As a transitional measure, the DWEA should clarify the regulatory scope of the NWA and the NEM:ICMA, especially in terms of estuaries, coastal wetlands and the management of the discharge of effluents. Such a clarification should ensure that their respective regulatory scopes are clear and if there are overlaps the DWEA should clarify how the two acts should interact with each other in such areas. A statutory guideline/explanatory document might need to be developed by the DWEA to this effect.

The provisions of the NWA are comprehensive enough to enable the effective protection and sustainable use and protection of the water resource (including coastal and marine waters) in South Africa. In this context, it is suggested that ultimately the regulatory scope of the NWA should be extended to include coastal and marine waters. Such an integration would facilitate a more holistic and integrated regulatory approach to water management, respecting the unity and interdependence of the different types of water resources (especially between fresh waters and marine waters). As result the NWA and the NEM:ICMA will have two clear regulatory scopes: one for water (including fresh, coastal and marine waters) management and one for coastal zone management (with some level of interdependence).

The integration of coastal and marine waters in the scope of the NWA would require specific amendments to the Act. It is already possible to set out preliminary legal considerations for the integration of coastal and marine waters in the regulatory scope of the NWA. The initial step to undertake such a legal incorporation will have to be the amendment of the current definition of a "water resource" provided by the NWA, which is: "water resource includes a watercourse, surface water, estuary, or aquifer". Such integration will have to be undertaken in alignment with the provisions of the NEM:ICMA. Therefore a suggested new definition for a "water resource" in the NWA could be: "water resource includes a watercourse, surface water, estuary, coastal and marine waters or aquifer". In this context, the current definition of a "watercourse" in terms of the NWA might also have to be amended to incorporate references to

marine and coastal waters, which should include at a minimum the sea-shore, estuaries, wetlands, internal waters and territorial waters. In terms of international best practice, the EEZ should also be included when possible. With the amendment of the NWA, catchment management areas should include coastal and marine waters. Ultimately, once the NWA has been amended to incorporate coastal and marine waters, the NWA should be the main act to manage water use, including the discharge of effluent into coastal waters. The NEM:ICMA should be amended accordingly.

The DWEA should also clarify the regulatory scope of the NEMA and other specific environmental acts regarding the coastal and marine environment. It is recommended that the coastal and marine environment be included in the regulatory scopes of all environmental acts.

Specific definitions should be amended to ensure alignment and consistency between the NEMA, the NWA, the NEM:WA and the NEM:ICMA. The definition of "estuary" in the NWA will have to be changed to the definition provided by the NEM:ICMA. The definitions of "pollution" in the NWA and the NEMA will have to be aligned. For consistency's sake it would be appropriate to amend the definition provided in the NWA to align it with that provided in the NEMA. However, such a change might have a detrimental impact on the protection of water resources against pollution, and especially the regulation of LBMP.²¹¹⁷ An alternative would be to qualify the term "pollution" in the NWA. Instead of referring generally to "pollution", the NWA could refer to "water pollution" and the current definition could remain the same. However, the legal implications of such a qualification and amendment would have to be carefully assessed. For example, it might lead to a situation where a spill starting on land might be regarded as a source of pollution from the NWA perspective but not from the NEMA's perspective. It might create complexity in terms of legal interpretation. It might therefore be preferable to only have one definition of pollution but the

2117 See 5.3.1.

NEMA's definition should maybe be amended to make it more ecocentric. The NWA (once amended to incorporate coastal and marine waters) could include a definition of LBMP.

The definition of "waste" given in the NWA and the NEM:ICMA might also have to be amended to be aligned and consistent with that given in the NEM:WA. The definition of "wetland" in the NWA should be amended to include "coastal wetland" as defined in the NEM:ICMA. The definition of water bodies²¹¹⁸ should be clarified to include coastal and marine waters when relevant. The definition of waste water, used water, water containing waste and effluents should be aligned and streamlined.

The current legal assimilation between waste and pollution should also be rectified, as waste is regarded as a category of pollution but the concept of waste is limited and does not encompass the wide scope of pollution.

7.4.1.3 Improvement of the regulatory objectives

It is suggested that a more ecocentric regulatory approach should be adopted and that the environmental regulatory objectives should assist the implementation of an ecosystem-based regulatory approach, as currently done to some extent by the NWA. The regulatory objective related to the management of the use of natural resources (land- and water-based) should be further specified to inform the development of suitable regulatory instruments.

7.4.1.4 Consolidation of the existing direct regulatory instruments

a. Resource-directed regulatory instruments

Firstly, resource-directed instruments for marine and coastal water resources have to be developed, including a classification system, quality objectives and indicators, and possibly a reserve as per the NWA approach. The reserve for

2118 See 5.3.2.4.

coastal and marine resources should be aimed at ensuring that sufficient quantity of freshwater reaches the coastal and marine environment. There are currently two possible approaches, either such resource-directed instruments can be prescribed by the NEM:ICMA or the regulatory scope of the NWA is amended, to include the coastal and marine environment, and the resource-directed instruments prescribed by the NWA will then have to be developed for coastal and marine waters. This thesis argues that the second approach would be more suitable as it will create one single act dealing with all water resources of the country. Moreover, such an approach would extend the public trust doctrine in terms of the NWA to the coastal and marine water.²¹¹⁹

However the resource-directed instruments prescribed by the NWA also need to be improved.²¹²⁰ Currently the binding character of such instruments is limited in its scope to only powers and duties performed by specific persons and only in terms of the NWA.²¹²¹ From an implementation perspective, this situation affects their effectiveness.²¹²² It would be more effective if the legal opposability and legal status of the resource-directed instruments were broader. In this context, section 15 of the NWA could be amended as follows: "all national and provincial departments, municipalities, organs of state and relevant management authorities and agencies when exercising any power or performing any duty as per their respective functions and mandate must, when applicable, give effect and comply with any determination of a class of a water resource, the associated reserve and the resource quality objectives as determined in terms of this Part and any requirements for complying with the resource quality objectives".

Then, the draft regulation regarding the quality objectives in terms of the NWA²¹²³ should also be amended to be more ecocentric and aligned with the provisions of

2119 See 5.3.1.1.

2120 See 5.3.1.2.

2121 See 5.3.1.2.

2122 See 5.2.

2123 See 5.3.1.2(b).

the NWA, taking into consideration the ecological requirements of the resource to be protected.

Finally, as recommended by the South African NPA, a research programme should be developed to assess the current state of atmospheric deposition in respect of LBMP. According to the outcomes of this assessment, the ambient air quality standards in terms of the NEM:AQA should be amended to take into consideration the deposition of air quality pollutants into the coastal and marine environment.

b. Sources-directed regulatory instruments

Currently, the concepts of BPEO, BAT, BATNEEC, best available affordable cleaner technology, cleaner production measures and environmentally sound management are concurrently prescribed by the South African environmental regulatory framework. This thesis argues that there is a need for a more consistent, streamlined and systematic approach to such concepts and standards. BPEO could be the generally accepted approach in South Africa. South Africa being a developing country it could be argued that in terms of technology, the BATNEEC is the most suitable approach. However, considering the current economic situation of South Africa and the need to effectively address LBMP, the adoption of the BAT, at least for certain regulatory areas (i.e. sewage systems, waste water treatments plants, and used water purification systems) is recommended.

The DWEA should develop specific guidelines and standards regarding the applicable BEPO, BATNEEC and/or BAT generally for water pollution prevention and control, and specifically with regard to LBMP. Such guidelines and standards should be developed collaboratively between the DWEA, other governments entities (i.e. the DTI, the DPE, the DST, the DPW, national treasury, provinces and municipalities) and the private sector. The standards should indicate which are the applicable BEPO, BATNEEC and/or BAT for certain processes/activities or at least provide an option or process to identify them. The guidelines could be

developed for each relevant industrial sector and for specific environmental aspects (i.e. water treatment, run-off control, stormwater management) and according to specific criteria (i.e. size of company, quantity of water to be purified, run-off from agricultural activities, run-off from mines).

The Operational Policy for the Disposal of Land-Derived Water Containing Waste to the Marine Environment in South Africa, 2004, which is currently considered as the most comprehensive policy in terms of LBMP regulation²¹²⁴ should be formally adopted as a BEPO and some of its recommendations should assist in the identification of the BAT or BATNEEC for the disposal of land-derived water containing waste to the marine environment.

Some of the current guidelines, minimum requirements, best practice, guidelines, norms, standards and operational policies mostly developed by the former DWAF²¹²⁵ which are relevant for LBMP need to be updated. In this context, sources-directed standards and guidance documents regarding effluents management and water pollution should be harmonised and streamlined, new ones might need to be developed in terms of pollution and disposal of effluent in the marine and coastal environment. This thesis also argues that they should be adopted as legally binding standards.

The conditions of the water use licences and authorisations, EIAs and of other environmental authorisations encompass sources-directed regulatory instruments. As previously indicated,²¹²⁶ this approach enables focused and customised sources-directed measures and instruments. However, DWEA should develop a set of general sources-directed measures regarding water pollution management, including LBMP, in the form of a set of regulations or a set of legally binding standards or norms. In addition, each specific environmental authorisations should then set out specific and additional conditions. However,

2124 See 5.3.2.4.

2125 See 5.3.2.4.

2126 See 7.3.5.1(b).

the sources-directed instruments prescribed in terms of different acts (the NWA, the NEM:ICMA, the WSA) regarding effluents management should be aligned.

The DWEA in collaboration with relevant stakeholders should conduct an assessment to determine which categories of waste impact the most on the coastal and marine environment and according to the outcomes of the assessment, the DWEA might decide to declare some of the identified categories of waste as priority waste in terms of the NEM:WA.

c. Instruments based on planning management

The various regulatory provisions regarding effluents regulation and management should be streamlined and aligned to ensure a consistent regulatory approach to effluent regulation. In this context, the definitions of waste water, water with waste, used water and effluents found in different acts, guidelines, standards and norms (i.e. WSA, NWA, NEM:WA, NEM:ICMA, the policy on the disposal of land-derived water containing waste mentioned above) need to be aligned and streamlined into one concept if possible, preferably the concept of effluent or used water, which are regarded as broader than waste water or water containing waste. The DWEA needs to clarify the interrelationship between the NWA and the NEM:ICMA in terms of the regulation of effluents disposal into the marine environment, possibly through the development of a guideline document or an amendment to the acts, clarifying when the NWA applies and when the NEM:ICMA applies. The NWA and the NEM:ICMA should also be amended to ensure that a compulsory preliminary assessment is conducted to inform the decision on the authorisation and attached conditions related to the disposal of effluent/waste water/used water disposal, as advocated by the operational policy referred to above. Ultimately, the regulatory scope of the NWA should, be amended to include coastal and marine waters and consequently the NWA should become the main act to regulate the disposal of effluents in fresh, coastal or marine waters.

In terms of EIAs, this research argues that EIAs should take potential LBMP from

proposed activities into consideration, even if the proposed activities are located far inland. The potential impacts of a proposed activity on the coastal and marine environment should always be considered and assessed if appropriate and relevant. In order to assist such a process, the DWEA should develop a guideline for the performance of such consideration and assessment process. There is also a need to rationalise the EIA regime in terms of the NEMA, the NEM:WA and the NEM:ICMA. The main EIA legal regime should be prescribed under the NEMA and associated regulations, then any specific sectoral requirements, like the ones currently prescribed by the NEM:ICMA in terms of coastal activities, should be prescribed in a set of regulations in terms of the NEMA not another act. As recommended above, it is also suggested that every EIA should contain general and specific conditions (sources-directed measures) relating to pollution management - especially water pollution (including LBMP). Such general conditions could be an approved legally binding set of standards. This thesis argues that the French regulatory approach to water nomenclature and *les installations classées* could be used to review and improve the EIA regime in South Africa. The current EIA listing notices are regarded as too complex and rigid to enable flexibility in their application and adaptability over time. The regime of *les installations classées* could assist the DWEA in adopting a more flexible, simple and manageable approach to the listing of activities. Moreover the regime of *les installations classées* seems to adopt a more streamlined and integrated approach which could be useful in the South African context, which could make the administration of such legal regime easier. Moreover, for each type of installations, *arrêtés* or *circulaires* determine the specific conditions of operation, applicable BAT and BEP and other requirements, including specific requirements and conditions in terms of waste water and stormwater management. Such an approach which could assist LBMP regulation in South Africa. The regime of *les installations classées* also provides an interesting approach regarding the combination of direct and indirect instruments in a more systematic way than the South African EIA's regime. The listed activities in the water nomenclature could be used to determine if new listed activities (in terms of water pollution) should be

added to the current EIA listed activities, for example the use of large quantities of fertilizer in or near the coastal zone. The focused process and requirements are directly aimed at water pollution management, they could therefore inform the development of a specific guideline or set of standards regarding pollution management which will be applicable for each proposed activity requiring an EIA and/or being issued an environmental authorisation.

The types of water use classified in the NWA should be reviewed in regard to LBMP regulation. As indicated previously,²¹²⁷ some of the permissible uses and general authorisations are not conducive to effective LBMP regulation and they should be regulated or at least monitored more stringently. New water uses requiring a licence might need to be added especially if the regulatory scope of the NWA is extended to coastal and marine waters. For example, the reference to waste or water containing waste might need to be modified to make reference to effluent or used water. It could also refer to any activities which could cause erosion of the coastal zone or contaminate run-off. Another use could refer to irrigation for agricultural activities in or near the coastal zone.

Regarding coastal management, there is a need to determine and prioritise (as part of a cooperative approach) the legitimate uses of the coastal and marine environment. The DWEA should develop a guideline document to assist such process at the municipal and provincial level, including a matrix template to identify and prioritise needs and uses of the coastal and marine environment (land and marine based). The legitimate uses should then be incorporated into the relevant planning and land-use statutory documents. In this context, the *schema de mise en valeur de la mer*,²¹²⁸ which aims at allocating different (sea and land based) zones of the littoral to specific users, in a specified geographical area could be useful in the South African approach and it could inform the

2127 See 5.3.3.2(a).

2128 See 3.4.3.3.

development of a similar instrument in South Africa, to regulate coastal zone uses within a specific zone.

This thesis also recommends that LBMP considerations and implications should be integrated into the IDPs. IDPs being the main/central planning instrument at the municipal level, they should integrate all other environmental related planning instruments (i.e. coastal management programmes, catchment management strategies) and/or their requirements, at this governmental level. There is also a need to rationalise the various planning and land-use documents at the various government spheres. A clear legal hierarchy between the various planning plans and documents also need to be established, to facilitate their alignment and the coherence of the overall legal system. Such a hierarchy will also assist in the management of conflict between two sectoral plans. This hierarchy will create logical and clear legal links between all the existing plans in a coherent and integrated manner. The French regulatory framework has established a strong legal hierarchy between the various planning instruments and most of its integrated regulatory instruments,²¹²⁹ such an approach could inform the hierarchisation process to be undertaken in South Africa. The French system could serve as an example of the legal means and processes to establish such a legal hierarchy.²¹³⁰

Finally, specific sensitive/vulnerable zones to LBMP should be identified and a specific protection and management regime should be established for each of them.

d. Integrated regulatory instruments

There is a need to rationalise the different duties of care in South Africa.²¹³¹ Currently, there are different levels of duty of care,²¹³² which is not advisable.

2129 See 3.4 especially 3.4.3.

2130 See 3.4 especially 3.4.3.

2131 See 5.5.1.

2132 See 5.5.1.

Therefore, there should only be one duty of care for the water resource under the NEMA, which homogeneously applies to the entire environment (land and marine based).

The NWRS²¹³³ and catchment management strategies²¹³⁴ should integrate LBMP considerations. The catchment management strategies and areas²¹³⁵ should integrate the relevant coastal and marine waters. The legal status of the NWRS²¹³⁶ and catchment management strategies²¹³⁷ should be extended and reinforced. They should be binding for all public or private entities, like the NWMS.²¹³⁸ All administrative decisions should be aligned with their provisions. Considering that the catchment management strategies have not yet been developed, South Africa could adopt the French²¹³⁹ and European²¹⁴⁰ approach to catchment management strategies, ensuring that the strategies encompass a "programme of measure", which combines direct instruments in a focused and customised way.²¹⁴¹ In addition, the French regulatory approach to the SDAGE²¹⁴² and SAGE²¹⁴³ could be used to inform the development of the catchment management strategies. The SDAGE and SAGE cohesively integrate direct and indirect regulatory instruments in one single key integrated regulatory instrument for the catchment or a specific area. The development process of the SDAGE and SAGE is also very participative and they encompass very comprehensive financial instruments, which will be very useful for South Africa. The SDAGE is regarded as a comprehensive regulatory instrument for water management.

2133 See 5.5.2.

2134 See 5.5.3.

2135 See 5.3.3.2(c).

2136 See 5.5.2.

2137 See 5.5.3.

2138 See 5.5.5.

2139 See 3.4.2.2.

2140 See 4.3.1.2.

2141 See 5.5.1.

2142 See 3.6.3.

2143 See 3.6.4.

The French contractual approach to coastal zone management and water pollution of the coast in the form of a *contrat de baie*²¹⁴⁴ could be a useful instrument in the South African context. It would enable collaborative regulation and management of a specific geographical area, like a bay. The strong financial instruments²¹⁴⁵ encompassed in a *contrat de baie* would address a current limitation of the South African regulatory framework. Such an instrument will also enable a localised collective and customised regulatory approach to address a local situation. It is recommended for South Africa to consider the development of a similar instrument under the NWA.

7.4.1.5 Consolidation of the existing indirect regulatory instruments

a. Assessment of the ecological status, monitoring and information management

The SOER regarding rivers and the coast²¹⁴⁶ should be updated taking LBMP into consideration, including the findings of the NPA process.²¹⁴⁷ There is a need to develop a comprehensive national monitoring programme for LBMP and more generally for the coastal and marine environment and associated pollution. The existing monitoring programmes²¹⁴⁸ relevant to the coastal and marine environment should be consolidated and mainstreamed. A specific institution should be designated to lead the assessment and monitoring processes in terms of the coastal and marine environment. It would be preferable for the institution to have a certain level of independence, as not be impaired by government processes and related constraints and ensure objectivity and independency in its work.

b. Effectiveness assessment

2144 See 3.6.5.1.

2145 See 3.6.5.1.

2146 See 5.4.1.

2147 See 5.4.1.

2148 See 5.4.1.

Effectiveness assessments need to be improved and consolidated. Each planning and/or integrated instrument should prescribe a comprehensive effectiveness assessment based on international best practice.²¹⁴⁹ Then the outcomes of the individual assessments should be consolidated into a national report, which should be developed at least every two years providing an overview of the progress achieved and indicating the areas for improvement and the proposed measures to improve the situation. The Minister in charge of performance, monitoring and evaluation and administration in the Presidency could assist in this process.

c. Financial management

There is a need to develop and implement effective financial instruments on a more consistent basis. Each planning and integrated regulatory instrument should integrate comprehensive financial instruments, dealing with financial planning and mobilisation as advocated by international best practice.²¹⁵⁰ The inclusion of financial instruments should be an obligation for all planning or integrated regulatory instruments, rather than a mere possibility. Such instruments should always be accompanied by a financial mobilisation and/or investment plan to ensure their effective implementation, as suggested by best international practice.²¹⁵¹ The French integrated regulatory instruments²¹⁵² could also be of assistance as they prescribe comprehensive financial instruments. The DWEA in collaboration with the national treasury needs to assess the proposed actions and interventions of the *NPA*²¹⁵³ from a financial perspective, and the necessary financial planning and mobilisation instruments need to be developed in this regard. The French taxes relating to water pollution²¹⁵⁴ could be of assistance to the National Treasury to develop similar taxes in South Africa. The

2149 See 2.3.4.2(b).

2150 See 2.3.4.2(c).

2151 See 2.3.4.2(c) of this research for an outline of the international best practices in terms of financial management.

2152 See 3.6.

2153 See 3.5.2.

2154 See 5.4.1 and Appendix 6.

DWEA, the national treasury, and the Minister in the Presidency in charge of the national planning commission should collaborate to move forward in terms of financial instruments regarding LBMP pollution.

d. Enforcement and compliance

There is a need for better enforcement and compliance in terms of LBMP. There should be higher fines for water pollution, including LBMP, and prosecution should be facilitated, especially regarding diffuse sources. Financial provisions might need to be increased to provide sufficient human and financial resources to improve environmental compliance and enforcement. The polluter pays principle needs to inform the enforcement and compliance approach and instruments. Taking for example the French approach in this domain,²¹⁵⁵ a way forward for South Africa is to expand the enforcement powers to others entities than the environmental management inspectorates,²¹⁵⁶ or to designate additional environmental management inspectorates in various departments and organs of state at different governmental levels (provincial and local).

e. Public participation

The French combined²¹⁵⁷ and integrated²¹⁵⁸ regulatory instruments demonstrate that public participation is not only required at the beginning of a process. Such engagement should be sustained throughout the implementation process. It is therefore recommended for South Africa to ensure that public participation is not only facilitated at the adoption process of an instrument, measure, programme or

2155 See 3.5.4.

2156 See 5.4.5.

2157 See 3.4.4.

2158 See 3.6.

strategy, but that it is carried on during the implementation phase at regular intervals and in a constructive way.

f. Capacity building

There is a need for better capacity building at governmental level to understand and implement their mandates and functions in terms of LBMP regulation. Specific training courses should be designed for municipalities and provinces in terms of LBMP, this would also assist in reaching a certain level of decentralisation, as advocated by international best practice.²¹⁵⁹ The Department of Public Service and Administration and the DWEA could facilitate such a capacity building programme.

7.4.1.6 *Integrated institutional structure*

The new DWEA should ensure a smooth, clear and effective transition from the former DEAT to the DWEA at all governmental levels. The functioning of the DWEA should be clearly outlined and explained. Cabinet or government should develop a guideline document to outline the institutional and regulatory framework of the current Cabinet in terms of environmental regulation. The guideline document should indicate for each ministry and department which environmental legislation it administers which are its counterparts at the provincial and municipal level. The guideline document should also clarify which intergovernmental structures exist in this area and outline their structure and functions. As previously mentioned, there is a need to facilitate capacitated decentralisation,²¹⁶⁰ consequently the DWEA should ensure that all municipalities and Provinces are capacitated to understand their mandates, functions and powers in terms of LBMP regulation. There is a need for better cooperative governance especially in terms of the numerous entities established in terms of

2159 See 2.3.5.

2160 See 2.3.5.

the NWA, the NEM:ICMA and the NEMA.²¹⁶¹ Their interrelationship need to be clarified. In this context, the Department of Cooperative Governance and Traditional Affairs in collaboration with the Department of Public Service and Administration and the DWEA could develop a guidance manual to facilitate environmental co-operative governance and decentralisation.

7.4.1.7 Regulatory priorities

Regarding LBMP from agriculture activities, the Department of Agriculture, Forestry and Fisheries should render services (in terms of the CARA)²¹⁶² for water pollution management including LBMP and it should also develop specific control measures,²¹⁶³ again in terms of CARA, aimed at addressing effluents, run-off, stormwaters and water pollution generally. A financial scheme (in terms of the CARA)²¹⁶⁴ aimed at integrated pollution prevention and control, including water pollution and LBMP, should be developed by the abovementioned department. A code of conduct based on the French²¹⁶⁵ and European²¹⁶⁶ approach for agriculture-related environmental practices could also be adopted, as it will facilitate co-operative and voluntary regulation. The regulatory scope and objectives of the FFASA should be amended to adopt a more ecosystem-based approach, where the regulation of fertilisers, farm feeds, agricultural remedies and stock remedies should be undertaken to ensure human health protection, environmental protection and sustainable development.

In terms of LBMP from substances, a programme similar to the French national programme of action against water pollution from certain dangerous substances (*Programme national d'action contre la pollution des milieux aquatiques par certaines substances dangereuses*)²¹⁶⁷ could be developed by the DWEA in

2161 See 5.6.

2162 See 6.1.4.

2163 See 6.1.4.

2164 See 6.1.4.

2165 See 3.8.2 and 4.6.2.

2166 See 6.3.

2167 See 3.4.2.3.

South Africa to prevent, minimise and eliminate water pollution from identified dangerous substances. Such a programme should be developed in collaboration with the relevant industrial sectors.

In terms of LBMP from water services, the effectiveness of water services and sanitation services²¹⁶⁸ need better annual assessment and monitoring, especially in terms of pollution and environmental impacts. The water services authorities should integrate LBMP considerations in the WSPDs.²¹⁶⁹ The recommendations regarding the sources-directed instruments mentioned above are very relevant in this context. Finally as indicated above, the various regulatory instruments regulating effluents, including those prescribed by the WSA,²¹⁷⁰ have to be aligned and streamlined.

7.4.1.8 *Next steps*

It is recommended that the next steps should build on the *NPA* and accordingly the DWEA should develop an action plan for LBMP regulation. Such an action plan will have to address at least the following matters:

- Law principles to be incorporated into environmental legislation.
- Legal interventions required to change the regulatory scope of the NWA, and clarify the scope of the other environmental acts accordingly.
- Legal interventions required to improve management of use of natural resources, especially of the coastal and marine environment.
- Legal interventions required to improve existing direct regulatory instruments and development of new ones.

2168 See 6.2.4.1.

2169 See 6.2.3.3(b).

2170 See 6.2.3.3(a).

- Legal interventions required to improve indirect regulatory instruments and development of new ones.
- Specific focus on financial management instruments required for effective LBMP regulation.
- Legal interventions required to improve the national institutional framework to facilitate LBMP regulation.
- Legal interventions required to address LBMP regulatory priorities.

The action plan should determine the responsible and accountable department(s), the timelines and the budget for each of the abovementioned matters.

7.4.2 Long-term

Considering the outcomes of this research, it is not recommended to have a single act dealing only with LBMP. However, in order to facilitate and improve LBMP regulation, water pollution management and more generally implement integrated pollution prevention and control in South Africa, it is recommended that a new act be developed. Such an act should be a framework act for integrated pollution prevention and control in South Africa, this will not prevent other specific environmental acts to prescribe additional and stricter sectoral pollution prevention and control requirements. This act will have to be a specific environmental act and it will have to be especially aligned with the NEMA, the NWA, the NEM:ICMA and all the other environmental acts. This act will be aimed at rationalising the legal framework pertaining to pollution regulation, which NEMA is currently not achieving. It will set out the minimum and general requirements in terms of integrated pollution prevention and control.

It is recommended that the act should at least address the following matters:

- Applicable law principles

It will have to incorporate all the law principles identified in this research.²¹⁷¹ In this context, the EU IPPC Directive could provide guidance.

- Regulatory scope

The regulatory scope should be integrated and holistic. In terms of the environment to be protected it should be the entire environment, its associated natural resources and human beings. The environment should include the land-based environment, the coastal and marine environment (including the sea), the atmosphere and all the associated natural resources (on, in and under the mentioned environment). The regulatory scope should then include all activities taking place in the territory of the state, land-based, coastal, marine and others activities, as well as contributing factors. The regulatory scope should be as comprehensive, adaptative and flexible as possible.

- Regulatory objectives

The act should adopt the regulatory objectives recommended in this research.

- Regulatory instruments

The Act should adopt the recommended approach in this research by prescribing a flexible mix of direct and indirect instruments. A strong emphasis should be allocated to sources-directed instruments, planning instruments, integrated instruments and indirect instruments, especially instruments for effectiveness assessment, ecological status assessment and financial management. In terms of resource-directed instruments, the specific environmental acts could provide such resource-directed instruments for each environmental media or aspect.

- Determination of regulatory priorities in terms of pollution.

2171 As well as other relevant law principles in terms of IPPC, but this was not part of this research and further analysis is required in this context.

Such an act should provide specific instruments (direct and indirect) to identify general regulatory priorities in terms of pollution. Then specific environmental acts could further assist with the regulation of specific regulatory priorities.

- National institutional structure

The act should, in alignment with the NEMA, facilitate co-operative governance and decentralisation in terms of integrated pollution prevention and control. It should also facilitate enforcement and compliance from an institutional perspective.

Finally, in terms of agriculture, there is also a need for a new act aimed at implementing sustainable agriculture, which will address the regulation of pollution, including LBMP, from agriculture-related activities, especially in terms of water pollution from effluents, run-off and storm waters.

7.5 General concluding remarks

LBMP is a significant risk to sustainable development in South Africa. If South Africa reacts promptly and in accordance with international best practice, it could in a pro-active and cost-effective manner prevent significant LBMP, which would ultimately prevent irreversible damage to the coastal and marine environment. This thesis strives to provide guidance on where and how the regulatory framework related to LBMP regulation could be improved. It is argued that it is possible to address LBMP regulation in an effective and pro-active manner with specific legal interventions and amendments. It is now up to the government to choose to take the initial step of the NPA forward, possibly using some guidance from this research. Unfortunately, if the government does not intervene adequately, South Africa could find itself in a situation similar to that arising from the acid mine drainage (AMD)²¹⁷² into the country's freshwater resources

2172 AMD is highly acidic water, usually containing high concentrations of metals, sulphides, and salts as a consequence of mining activity. According to the CSIR, "The threat of AMD to the environment will not be solved in the short to medium term, and is likely to persist

(which could ultimately impact on the coastal and marine environment), but this time South Africa would experience the impact of LBMP on its coastal and marine environment.

for centuries to come. It is also not solved by a single intervention, but will require the integrated implementation of a range of measures", see CSIR.2009 http://www.csir.co.za/nre/docs/BriefingNote2009_2_AMD_draft.pdf. AMD has been referred as the "single most significant threat to South Africa's environment". see Creamer Media's 2009 <http://www.miningweekly.com/article/in-the-midst-of-a-disaster-2009-05-08>.